EXPLORING 10,000 YEARS OF HUMAN HISTORY ON EBEY'S PRAIRIE, WHIDBEY ISLAND, WASHINGTON

by

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ABSTRACT

Northwest Coast prairies contain a suite of resources not available in other ecosystems, making them a unique and sought after environment for animals and people. Archaeological research in Northwest Coast prairies is in its infancy but it is clear that an integrated approach, drawing on a number of disciplines, is needed to decipher human use of prairies in the past. I investigate the archaeological, archaeobotanical, and ethnographic record of Ebey's Prairie, located on central Whidbey Island in Washington State. My findings indicate that people used Ebey's Prairie throughout prehistory for a variety of activities over a broad time scale (~10,000 to 150 BP). Direct evidence of *Camassia*—one of the most important native plant foods in the Northwest, is one indication that indigenous people tended and maintained edible and useful plant resources on Ebey's Prairie for hundreds and perhaps thousands of years.

Keywords: Whidbey Island; anthropogenic prairie; camas, archaeobotany; Ferry House; Northwest Coast

DEDICATION

To my husband, Andris, for his patience and loving support. To my parents, C.J. and Adrienne Weiser, my sister, Rachel R. Robertson, and brother, Russell R. Weiser, for helping me believe I can do anything I put my mind to.

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CHAPTER 1: INTRODUCTION

Anthropogenic Prairies of the Northwest Coast

It is well recognized among anthropologists that the ecological abundance of the Northwest Coast played a central role in the development of complex social and economic systems of Northwest Coast people (e.g., Ames and Maschner 1999; Matson and Coupland 1995; Suttles 1987a, 1990). For archaeologists, models of social development have largely focused on specific resources, especially salmon, but more recently on other fisheries (Coupland 1988; Matson 1983, 1992; Matson and Coupland 1995; Moss 1993). Terrestrial resources, and indeed terrestrial ecosystems, have received considerably less attention. In this thesis I focus on one human-influenced terrestrial ecosystem — the anthropogenic prairie of the Pacific Northwest Coast. As defined in this thesis, anthropogenic prairies are grassy lowland openings in the forest-dominated landscape, which were maintained and enhanced by people.

What is a Prairie?

Ecologists have been grappling with how to classify prairie ecosystems on the Northwest Coast for a long time. For instance, James G. Cooper, a naturalist hired by the United States government, spent the better part of two years between 1854 and 1857 classifying prairies in western Washington based on the soils, vegetation, elevation, and the causes which produced them (Cooper 1860a; WNPS 1994:11). What Cooper began to recognize is that small prairies at that time were not only widespread across the landscape from seashore to mountain top on various soil substrates, but that maintenance of these ecosystems by indigenous people, through intentional burning, was also widespread. Cooper's observations, though valuable, were not quantifiable.

Today, ecological studies indicate that openings naturally occur in early successional forests throughout the Pacific Northwest Coast (Franklin and Dyrness 1988; Krukeberg 1991) but close naturally as trees encroach upon them (Boyd 1999a; Lertzman et al. 1996; Lertzman et al. 2002). Natural fire frequency is low on the Northwest Coast however, and cannot account for the existence of extensive prairie openings which were documented in the early historic period (e.g., Boyd 1999b). It follows then, that the prolonged existence of prairies prior to European contact was largely the result of extensive management by indigenous peoples.

What is an "Anthropogenic Prairie"?

> Their (prairies) most striking feature is the abruptness of the forests which surround them, giving them the appearance of lands which have been cleared and cultivated for hundreds of years. From various facts observed, I conclude that they are the remains of much more extensive prairies, which within a comparatively recent period, occupied all the lower and drier parts of the valleys, and which the forests have been gradually spreading over in their downward progress from the mountains. The Indians, in order to preserve their open grounds for game, and for the production of their important root, the camas, soon found the advantage of burning… (Cooper 1860a:23; WNPS 1994:16).

I use the term anthropogenic prairie (after Norton 1979b) to identify the human-maintained herbaceous lowland openings west of the Cascade Mountains. I use this term because it incorporates the word "prairie," commonly used in much of the literature by American ethnologists and ecologists to describe the open lowland ecosystems of the

Northwest Coast (Franklin and Dyrness 1988; Kruckeberg 1991; White 1980). Further, it highlights the essential component of these ecosystems — the role of humans. Canadian ecologists use the term “meadow” for such ecosystems (e.g., Lepofsky et al. 2005a), and they generally reserve the term “prairies” to refer to the vast openings of the Central Plains which occur east of the Cascade Range.

The Distribution and Significance of Anthropogenic Prairies on the Northwest Coast

Anthropogenic prairies were once common on the Northwest Coast (Figure 1) and were deeply linked to subsistence strategies for indigenous peoples (Norton 1979b). Determining the distribution of prairies across the Northwest Coast in any given time period is difficult, given the dynamic combination of natural and cultural disturbances which produce and maintain them (Table 1). Documenting the distribution of prairies in the last 250 years in particular is problematic because of the unprecedented rate of change in the distribution of prairie ecosystems during this time. These changes are due to the combined effect of the cessation of intentional burning by many indigenous peoples and the conversion of pre-contact prairie ecosystems into farmland by European settlers. Despite these confounding factors, historic documents combined with paleoecological data indicate that prairies were once a relatively common part of the ecological mosaic of the Pacific Northwest (Cooper 1860a; Crawford and Hall 1997; Franklin and Dyrness 1988; Kruckeberg 1991; Leopold and Boyd; Boyd 1999a, 1999b; Lea et al. 2003; North et al. 1979; Pojar and MacKinnon 1994), especially on southern Vancouver Island in

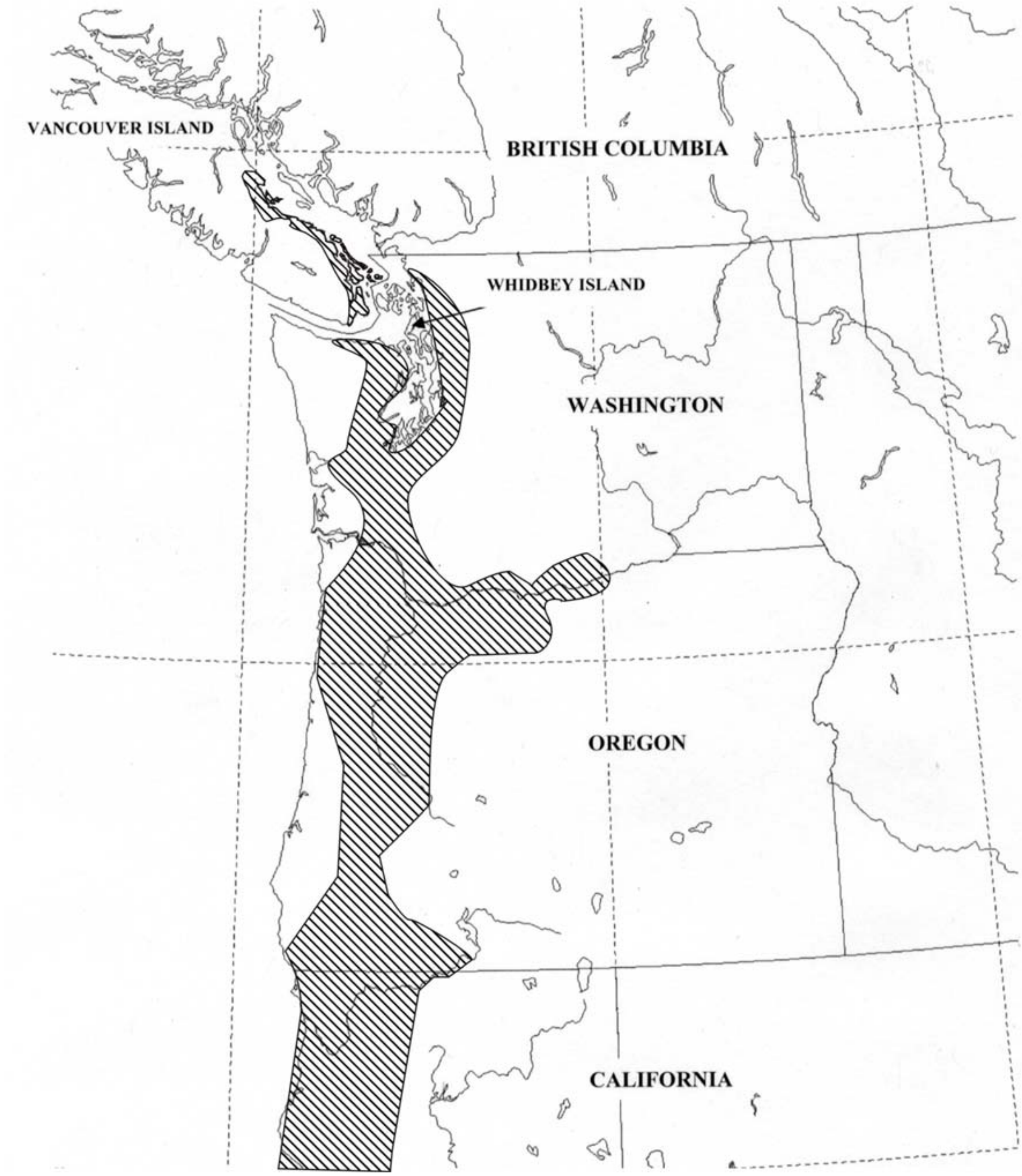


Figure 1. General distribution of Northwest Coast Prairies. Discontinuous prairies occurred within the broad areas denoted by hatching. Distribution is based on ranges of Camassia and Q.garyanna recorded in the California flora database http://www.calflora.org accessed April 24, 2006, Gould (1942), Oregon Flora Project (2005), Lea et al. (2003) and the US Forest Service http://www.na.fs.fed.us/pubs/silvics_manual/volume_2/quercus/garryana.jpg accessed on April 24, 2006.

Table 1. General climatic fluctuations influencing Northwest Coast prairies during the Holocene (after Whitlock and Knox 2002).

Time Period	***Climate***	***Vegetation***
Early Holocene 11,000-7,800 BP	Drought: summer temperatures 1-3°C higher than today, annual precipitation 40-50% lower than today.	Prairies open naturally: bracken fern, red alder and Douglas-fir in pollen record.
Mid-Holocene 7,800-4,400 BP	Drought subsides: summers cooler and wetter than Early Holocene but drier and warmer than today.	Prairies shrink, forests begin to close. Oak and Douglas-fir less abundant, western redcedar, western hemlock, Oregon ash, big leaf maple increase in pollen record.
Late Holocene 4,400-present	Cooling trend, reaching modern temperatures and precipitation.	Prairies continue to shrink and forests close naturally, treeline shifts downslope. Probably warm and dry within the Fraser Valley Fire Period (2,400-1,200 BP) (Hallett et al. 2003; Lepofsky et al. 2005b). Historically, indigenous people counteract this by burning prairies (Boyd 1999a; Minnis and Elisens 2000; Vale 2002).

British Columbia, in the Puget Basin of Washington, and the Willamette Valley of Oregon (Figure 2). The rainshadow effect, which creates warm dry pockets within the cool wet maritime climate, is one factor which has influenced the long-term maintenance of these ecosystems (Franklin and Dyrness 1988; Kruckeberg 1991).

To document the approximate extent of anthropogenic prairies on the Northwest Coast, I plotted the distribution of the historic and modern extent of camas (*Camassia* spp.) and Garry oak (*Quercus garryana*) — two common taxa of anthropogenic prairies (Figure 1). While such a map does not represent the full extent or diversity of anthropogenic prairies, it clearly demonstrates that such ecosystems were once widespread in the complex ecological mosaic of the region.

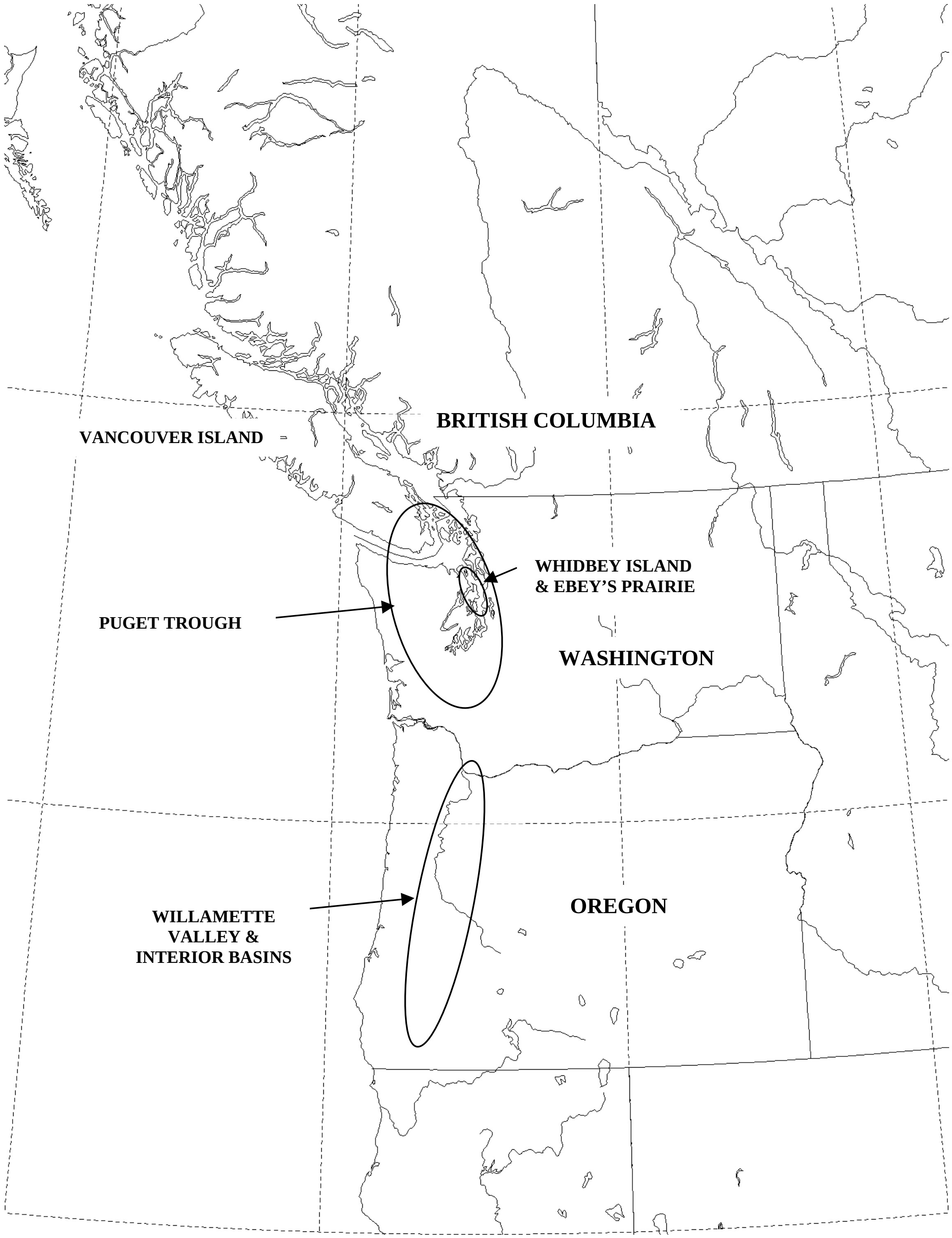


Figure 2. Map of the Pacific Northwest showing showing the location of Whidbey Island, the Puget Trough, and Willamette Valley and Interior basins where numerous prairies are located.

In the historic period, indigenous peoples were clearly motivated to enhance prairie resources for both economic and social reasons. Setting prairie fires was a common practice on the Northwest Coast (Agee 1993; Beckwith 2004; Boyd 1999a, 1999b; Collins 1974; Cooper 1860a; Deur 1999; Franklin and Dyrness 1988; Lepofsky et al. 2005a; Norton 1979b; Pyne 1993; Suttles 1974, 1990; Turner 1995; Turner and Peacock 2005; Whitlock and Knox 2002; White 1976, 1980) to concentrate finite resources which may have otherwise been too widely dispersed for efficient foraging (e.g., Deur 1999). Furthermore, women's status was partly dependent on their ability to procure plant foods in quantity, so they used a number of methods to enhance production of favoured plant resources (e.g., Deur 1999; Turner and Peacock 2005). Though many researchers suspect this to be true for thousands of years prior on the Northwest Coast (e.g., Boyd 1999b; Brown and Hebda 2002; Pellatt et al. 2001), there have been few attempts to support such claims through archaeological evidence.

In areas where archaeological research has focused on prairies, there is considerable evidence for extensive use of these ecosystems for many thousand years (e.g., Andrefsky et al. 2000; Cheatham 1988; Hedlund 1973; Morgan 1999; O'Neill et al. 2004; Prouty et al. 1999; Thoms 1989). Numerous human activities occurred in prairies, but only some of them can be discovered archaeologically (Table 2). Archaeological evidence of prairie use can include an array of roasting features, trash middens, tools for processing plant roots and bulbs, hunting implements, and tool assemblages related to temporary camping and construction of food drying racks (Lepofsky 2004).

Table 2. Indicators of prairie use and their discoverability as archaeological deposits in prairies.

Activity	*Archaeological Indicator*	*Discoverability*	*Reasoning*
Intentional Burning	Soil charcoal	Low to med	Charcoal may burn to ash and integrate with soil matrix through cultural activity and bioturbation
Collecting	Digging sticks	Low	"Personal" tools are more likely found in villages
Plant processing	Baskets, roasting pits, and hearths (boiling stones, charred wood, plant seeds and bulbs, roots and rhizomes), drying rack post holes, lean-to post holes, mortars/grinders	Low to high	Some artifacts and features will not preserve well, such as baskets, mats, and drying racks. Charred plant remains in hearths or roasting pits may have strong archaeological signatures, particularly if plants were processed *en masse*.
Plant storage	Pits in house floor	Low	Storage expected in villages rather than on prairie
Hunting	Projectile points and knives	Medium to high	Animals often targeted on prairies, projectiles easily lost
Animal processing	Knives, roasting pits and hearths (boiling stones, charred wood and bone), holes from cooking sticks, drying racks, lean-to posts	Low to medium	Animals may be processed close to where they were procured.
Intermittent camping	Hearths, boiling stones, trash pits, thin midden, artifacts in low density	Medium	Temporary camps expected in prairies but leave weak archaeological signatures unless reused multiple times or for long periods
Habitation (village)	Post holes, house floors, multiple hearths, compacted ground, trash pits and thick middens, mixed unique artifacts, high density of similar artifact or ecofacts in work areas, burials, high density of weedy plants (via charred seeds, and pollen)	High	Villages are expected near prairie edges. For Island locations, a protected canoe pullout, fresh water, and access to salmon-bearing streams would be important considerations for locating a suitable village site.

Sources: Andrefsky et al. 2000; Cheatham 1988; Deur 2005; Lepofsky 2004; Lepofsky et al. 2003; Morgan 1999; O'Neill et al. 2004; Schalk 2005; Tasa et al. 2000; Thoms 1989

In this thesis I explore the ancient history of one anthropogenic prairie, on Whidbey Island, historically named Ebey's Prairie (Figure 2). The larger goal of this thesis is to highlight the potential for archaeological research in prairies of the Northwest Coast and contribute to our understanding of how people used them in the past. A number of ethnographic studies illustrate that prairies were important to Northwest Coast indigenous people at least since the proto-historic period (Beckwith 2004; Collins 1974; Gunther 1973; Norton 1979a, 1979b; Suttles 1987a, 1990; Thomas 2006; Turner 1995, Turner and Efrat 1982; Turner and Kuhnlein 1983; Turner and Peacock 2005; White 1980; 1999). Archaeological evidence can extend our understanding of prairie use further into the past.

My reconstruction of the history of use of Ebey's Prairie by ancient peoples involves multiple lines of evidence. First, I compiled Northwest Coast ethnographic and ethnohistoric literature to understand how indigenous people used and sustained anthropogenic prairies. Second, I reviewed the results from archaeological research in coastal and non-coastal prairies of the Northwest. These became the foundation for my understanding of the kinds of artifacts and features most likely to be recognized in anthropogenic prairies. This background research helped me to formulate an archaeological sampling strategy for Ebey's Prairie specifically. Third, I excavated a small portion of Ebey's Prairie to look for artifacts, features, and stratigraphic deposits which could help me develop a chronology of cultural events. I sampled several features and examined their contents in the laboratory to determine what kinds of activities were represented over time by the archaeological deposits. Further, I examined diagnostic stone tools found scattered across Ebey’s Prairie to contribute to my understanding of the chronology of activities over time.

My results show that people have been using Ebey’s Prairie for a variety of activities over a broad time scale (~10,000 to 150 BP). Many of these activities are represented in the ethnographic and ethnohistoric records. Over 800 projectile points found scattered across the prairie suggest that game were plentiful and consistently hunted since about 10,000 years ago. From ethnographic records it is clear that game were attracted to prairies due to their rich forage. An increase in the number of features since ~2,300 cal. BP illustrates that people may have used part of Ebey’s Prairie more intensively in the Late Holocene, shifting from primarily hunting to multiple uses, including plant processing. Further, the increased presence of plants which thrive in open, non-forested ecosystems in the last 2,300 years suggests that people were burning the Ebey's landscape to discourage forests and encourage economically important plants, such as camas prior to European contact. Increased plant food production, especially since ~2,300 cal. BP on Ebey’s Prairie, is consistent with the timeline of other significant social developments on the Northwest Coast during this period (Ames 2005; Ames and Mashner 1999; Matson and Coupland 1995).

Outline of this Thesis

In the following chapters, I will discuss ethnographic and paleoenvironmental literature as well as direct evidence I gathered from Ferry House Site (45IS221) on Ebey’s Prairie. In Chapter 2, I present specific ethnographic evidence about the indigenous use of Ebey's and other prairies on Whidbey Island. I also briefly discuss the archaeological context of Ebey's Prairie and introduce the Ferry House Site, where I collected field data. Through my evaluation of the ecological and cultural context of Ebey's Prairie in Puget Sound, I establish that this ecosystem is well suited for further exploration. Subsurface deposits on Ebey's Prairie are relatively well preserved and it has an already richly documented ethnographic record.

Through an examination of the Ferry House Site (45IS221) and a review of other archaeological sites on Ebey's Prairie, I investigate the human use of this anthropogenic prairie throughout the prehistoric period. In Chapter 3, I discuss my field and laboratory methods, my analysis of artifact collections documented by Trebon (1998), and review broader paleoecological data from the region. In Chapter 4, I present results and offer interpretations, leading to a chronology of human activities on Ebey's Prairie in prehistory. These results inform my discussion of the broader context of Northwest Coast anthropogenic prairies in Chapter 5, and I suggest future directions for archaeological research in them.

CHAPTER 2: CULTURAL CONTEXT OF ANTHROPOGENIC PRAIRIES

> Rather than being major Indian food sources because they dominated the prairies, bracken and camas more likely dominated the prairies because they were major Indian food sources (White 1976:333).

Plant Resources in Anthropogenic Prairies

Prairies support a range of plants not available in forested ecosystems. Cooper (1860a), and Lotspeich et al. (1961), identified 162 prairie and prairie-ecotone plants as native species in western Washington prairies (Appendix A). Though this list of plants cannot be considered complete for Northwest Coast prairies, it serves as a starting point and a means of demonstrating the diversity of these ecosystems. Nearly all these plant species listed require unforested or sparcely forested ecosystems to survive. Based on these data, Northwest Coast prairies hosted plants from 38 plant families and included primarily forbs with lesser amounts of grasses and grasslike plants (i.e., sedges and rushes), shrubs, and a few trees such as pines (*Pinus*) and Garry oak (*Q. garryanna*) (Figure 3).

A wide variety of plants found in prairies were used by indigenous peoples of the Northwest Coast. Nutritionally speaking, plants were a critical source of carbohydrates, as well as vitamins, minerals, and fiber not available in a meat and fish diet (Norton 1979a; Turner and Kuhnlein 1983). Nearly 60% of the plant species identified in

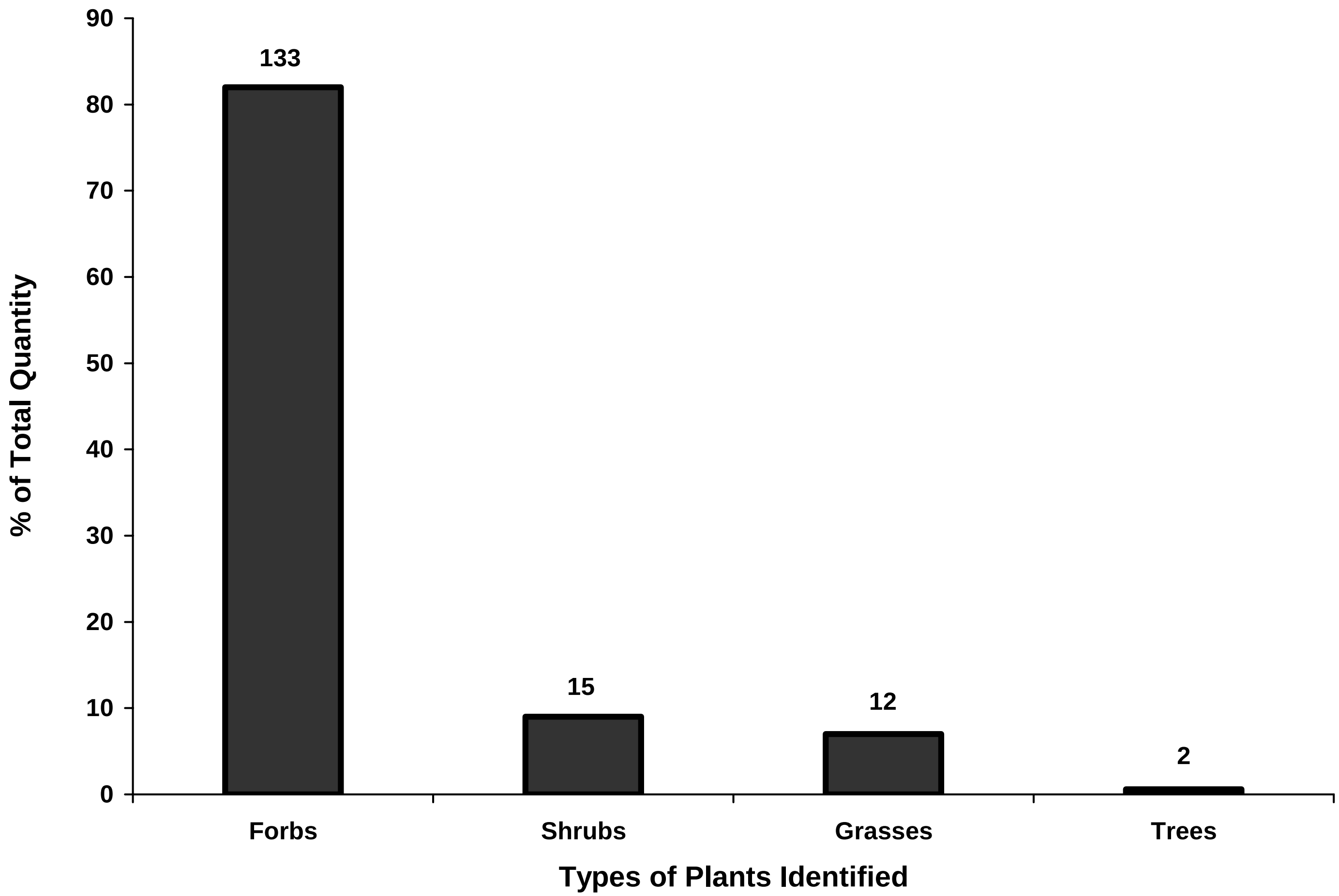


Figure 3. Types of plants identified in western Washington prairies (based on species identified in prairies by Cooper (1860a) and Lotspeich et al. (1961). Number above each column indicate number of plant species per category.

Appendix A have also been used as food, medicine, materials, toiletry, charms, in ceremony, or as forage for game on the Northwest Coast (Collins 1974; Ebey 1855; Farrar 1916, 1917; Gibbs 1877; Gunther 1973; Norton 1979a, 1979b; Suttles 1974, 1990; Turner 1995, 1998) (Figure 4). The ethnographic data does not represent a complete list of all uses for all plants but can help approximate the richness of prairie ecosystems as sources for a variety of raw materials. Many of the grasses were likely to be attractive forage for game animals as well, but have not been specified in ethnographic literature as such. Grasses, though often documented in ethnographic literature for use in baskets, mats, and bedding (e.g., Turner 1998; Wray 2002), are rarely identified by genus or species.

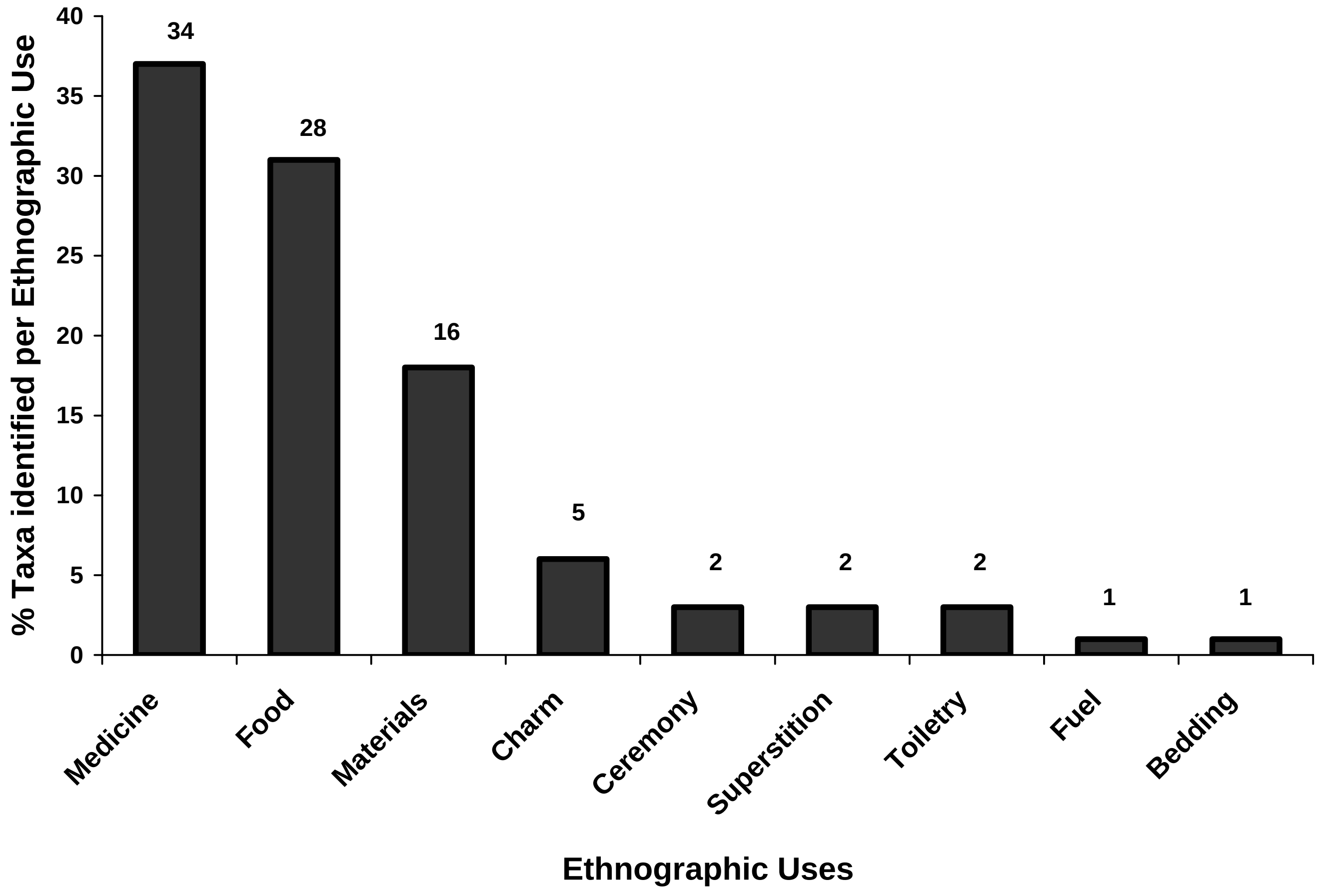


Figure 4. Ethnographic uses documented for many of the plant taxa in Northwest Coast prairies. Uses based on ethnographic references (e.g., Collins 1974; Ebey 1855; Farrar 1916, 1917, Gibbs 1877; Gunther 1973; Norton 1979b; Suttles 1974, 1990; Turner 1975, 1998) for Northwest Coast Peoples. Number above each column indicates number of plant taxa per category. Some taxa will fit into multiple categories, such as Rosa which was used for food, medicine, materials, and toiletry. The strong representation of medicines, shown here, may be significant for prairies. Further study would be needed to demonstrate whether this pattern is truly representative.

Animal Resources in Anthropogenic Prairies

Three categories of birds and mammals can be found in prairies: inhabitants, foragers, and predators (Appendix B). Inhabitants are small mammals who forage and make their homes in grassy openings. Foragers, such as deer and elk, spend much of their time under the forest canopy, but browse regularly on plants in and along the edges of prairies. Birds like ducks and geese feed primarily in prairies and wetlands. Finally, predatory mammals and birds often target other animals in prairies, and feed on prairie or edge vegetation to supplement their diet (Banfield 1974; Cowan et al. 1978).

Ethnographic and ethnohistoric sources indicate that many of the animals that frequent prairies were hunted by people and used as food as well as for utilitarian and ceremonial items (Barnett 1955; Cooper 1860b; Drucker 1955; Gunther 1972; Jenness 1977; Matthews 1955; Maud 1978; Suttles 1974) (Appendix B). A variety of hunting techniques were employed to target animals in prairies.

Maintaining the Harvest

Historically, indigenous people exercised a range of techniques to sustain prairie productivity (Table 3) because prairies contained a wealth of useful and edible plants and animals, and were not ubiquitous across the Northwest Coast region. Indigenous people set intentional, low-intensity fires to discourage the encroachment of trees and brushy vegetation, enhance forage for game animals (e.g., White 1980), increase edible berry yields, and promote other edible, medicinal, and useful plants (Peacock and Turner 2000;

Table 3. Prairie enhancement strategies used by Northwest Coast Peoples to promote resource abundance. Summarized from Turner and Peacock (2005).

Desired Outcome	***Enhancement Strategy***	***Season***	***Effect***
Hunt deer, elk, bear	Intentional burning	Fall	Enhance browse, lure animals to prairie, replenish soil
Collect root vegetables	Intentional burning	Fall	Reduce species competition, replenish soil, grow large healthy roots
	Selective harvest by season	Spring or fall	
	Replant propagules	During harvest	
Collect young greens	Intentional burning	Fall	Reduce species competition, replenish soil, grow edible greens
	Selectively harvest by season	Spring	
Collect herbaceous leaves for matting and packing material	Intentional burning	Fall	Reduce species competition, replenish soil, grow large healthy leaves

Turner and Peacock 2005). In short, the simple act of setting fire to the prairie helped to enhance a culturally-preferred environment.

Socially-prescribed rules were observed historically which prevented overharvesting of valued prairie resources and helped manage them sustainably (Beckwith 2004; Collins 1974; Deur and Turner 2005; Gunther 1973; Peacock and Turner 2000; Suttles 1990). Such social practices, though widespread historically, can be difficult to demonstrate archaeologically.

Ebey's and other Prairies of Whidbey Island

Ebey's Prairie is one of three anthropogenic prairies on central Whidbey Island in Puget Sound (White 1980) (Figure 5). Although much of Whidbey Island is heavily forested, the prairies on the central part of the island are uniquely situated in a dry warm belt in the rainshadow of the Olympic Mountains which receives less than half the annual rainfall when compared to the rest of Whidbey Island. Despite low rainfall, Ebey's Prairie has historically been very lush, and at times waterlogged (Kellogg 2001), due to a freshwater stream that courses through it.

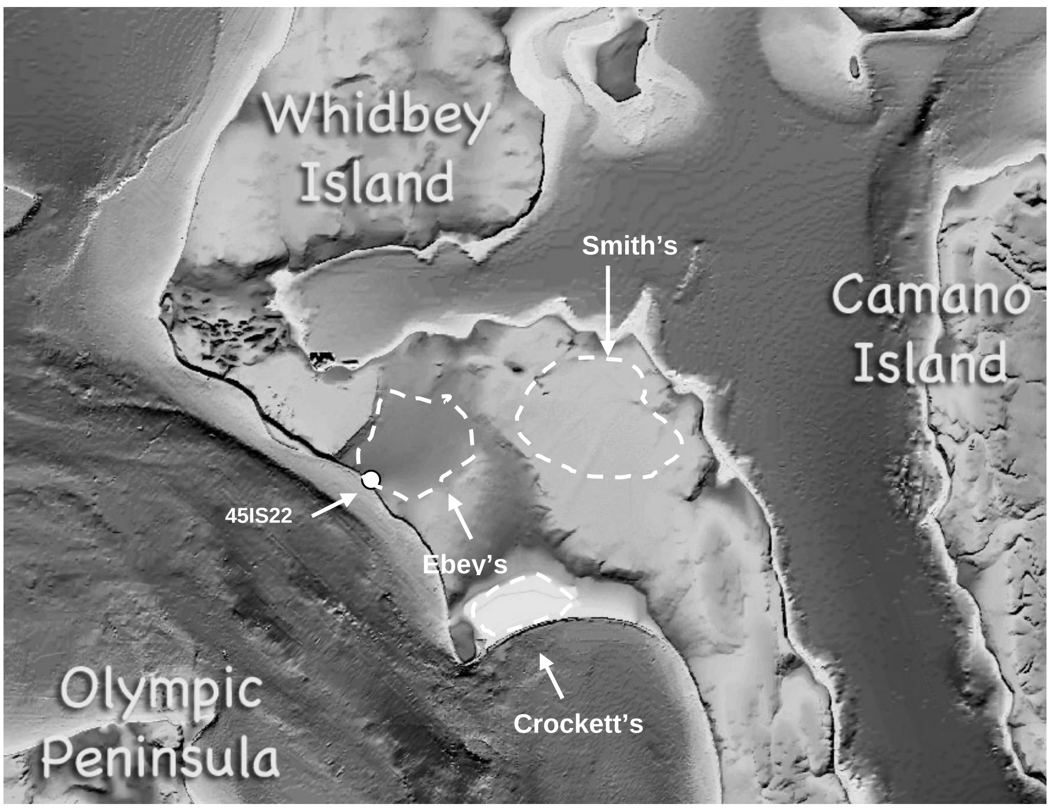


Figure 5. Ebey's, Crockett's and Smith's Prairies located on central Whidbey Island in Puget Sound, Washington. Base map created by Doug Littauer.

Early explorers did not mention Ebey's Prairie by name (named in 1850 for settler Isaac Ebey) but it likely figured prominently in their descriptions of Whidbey Island prairies because it was exceptionally lush and productive, and it was easily visible from Admiralty Inlet — the main water route from open ocean into Puget Sound. The earliest accounts of Whidbey Island prairies come from the Vancouver Expedition. In 1792, Second Lieutenant Peter Puget described the "beautiful lawns" with grass "Man Height," and "healthfull and delightfull plains which distinguish this favored Land from the Rest of the Coast of America…An Island distinguished in the General Chart by the name Whidbey's Island is absolutely as fine a tract of Land as I have ever saw, at least apparently so" (Morgan 1979:17). Ebey's Prairie was first mapped in 1841 on a nautical chart of Admiralty Inlet (NOAA 2005) which illustrates a grassy/marshy opening between two ridges with one large conifer tree near the center of the prairie. Isaac Stevens, early Washington governor, noted the unique quality of Whidbey Island's prairies in the 1850s, writing, "there are on the sound (Puget's) many islands worthy of mention, the most important of which is Whidby's (sic) island, which may be called the garden of the Territory….On this island is a considerable quantity of prairie land, which at an early day was taken up by the settlers" (Stevens 1860:260). Naturalist J. G. Cooper, one of Steven's agents, described rich prairies, such as Ebey's, with black soil 30-91 cm deep, very high in organic content and hosting vegetation which grew about 180-200 cm tall and included "everything adapted to the climate in luxuriant profusion" (Cooper 1860a:14).

The size or extent of Ebey's Prairie likely fluctuated throughout prehistory and today, evidence of these changes is obscured on the surface by modern vegetation and land use patterns. Ebey's Prairie falls within a National Historic Reserve which includes 5949 ha. of private and public lands — a checkerboard of productive non-irrigated farmlands (National Park Service 2005). It is situated in a basin (~18-37 meters or 60-120 feet in elevation) between wooded ridges and is about 2.5 km^2 in size, encompassing the current settlement of Prairie Center. Vegetation is no longer a reliable measure of the historic or prehistoric prairie extent because Ebey's "Prairie" is primarily cultivated farmland (Figure 6). Only a few small refugia of native vegetation remain in areas that have never been plowed — in wetlands and on ridge slopes surrounding the prairie. One such pocket of native vegetation is situated on a ridge slope which borders Ebey's Prairie to the west and includes edible camas (*Camassia quamash* and *Camassia leichtlinii*), chocolate lily (*Fritillaria lanceolata*), and *Lomatium* (Figure 7). This small remnant is evidence that the vegetation of Ebey's Prairie once included edible native plants.

Maps produced by the Department of Agriculture in 1949 and 2005 (USDA 1949; NRCS 2005) delineate the boundaries of Ebey's Prairie based on soil types and slope — two defining factors that have changed very little in the Late Holocene. The A-horizon or organic-rich soil layer just below the surface is quite thick on Ebey's Prairie (ca. 20-30 cm) indicating a long-stable open grassy environment of indeterminate age. Based on studies elsewhere, prairie soils of this nature represent at least 200 years of development (Lepofsky et al. 2003:3).

Figure 6. Ebey's Prairie today, view to the west. Unpublished photograph by R. Harbour, used with permission.

Figure 7. Native prairie plants, *Camassia quamash*, *Fritilaria lanceolata*, and *Lomatium* sp. on Ebey's Ridge above Ebey’s Prairie. Unpublished photograph by R. Harbour, used with permission.

Historic Evidence of Indigenous Use of Ebey's Prairie

Historically, several Coast Salish groups used Ebey's Prairie for a number of activities (Table 4). Ethnohistoric documents place the Skagit, Snohomish, S'Cllalum, (White 1980:15-17), Skekowmish or Sowkamish (sic), Snoqualmie, Tulalip (Kellogg 2001:15-17), as well as unidentified tribes from the Seattle and Port Madison area (Ebey 1855) and upper Puget Sound (Kellogg 2001:17) on Ebey's Prairie. Many of these groups had familial ties with one another and also followed protocols regarding resources within their territories, for hunting, fishing, and plant collection (Haeberlin and Gunther 1930:136-137). Such protocols would govern how and when prairie resources were used and by whom.

Ebey's Prairie had several resources worth fighting for — some of the richest soil and abundant animal resources in the vicinity (Ebey 1855; Farrar 1916, 1917; Kellogg 2001; White 1980). Ethnohistoric documents provide evidence of conflict between the S'Clallum, who paddled across Admiralty Inlet from the Olympic Peninsula, and the Skagit and Skekowmish or Sowkamish (sic) (Kellogg 2001:8), who had villages bordering Ebey's Prairie (Farrar 1916, 1917; Kellogg 2001:1, 2, 8; Vancouver 1792:568; White 1980:16-17). In fact, Father Blanchet documented that two S'Clallum men died in a scuffle with Chief Tslalakum's men in 1841 (Kellogg 2001:8). By most accounts, the S'Cllalum were latecomers who began laying claim to the fertile soil of Ebey's Prairie

Table 4. Indigenous uses of Ebey's Prairie in the historic period. Summarized from Ebey (1855), Farrar (1916, 1917) and Kellogg (2001).

Group	***Use***	***Date***	***Source***	***Possible Archaeological Signature***
Skekwamish or Sowkamish[1]	Chief Tslalakum's village on bluff 50' above beach	May 28 – June 1, 1840	Blanchet (cited in Kellogg 2001:7-9)	Shell midden, post holes, house floors, hearths, implements
Skekwamish or Sowkamish[1] & Skagit	Indigenous Catholic worship; i.e., room built of mats, plank altar, post with flag and Catholic "ladder"	May 29, 1840	Blanchet (cited in Kellogg 2001:7-9)	Possibly post holes
S'Clallum & Skekwamish[1]	Indigenous battle; two Clallam killed	May 28, 1840	Blanchet (cited in Kellogg 2001:7-9)	None; individuals were likely taken to S'Clallum village
Unspecified indigenous group	Indigenous cultivation of potatoes; potato plants and use of digging sticks	May 30, 1840	Blanchet (cited in Kellogg 2001:7-9)	None
S'Clallum	Defense of potato grounds; wooden fort	1840	OPD 1853[2] (cited in White 1980:15)	Possibly post holes
Chief Patkanim of Snog-qualamies (Snoqualmie?) and sub-chiefs of Whidbey Island and upper Puget Sound	Feasting on 60 deer and holding council	1848	Thomas Glasgow (cited in Kellogg 2001:17)	Cooking features
Indigenous people from Seattle area	Collect and cook camas	1855	Ebey 1855	Cooking features
Indigenous people from Port Townsend area (Cllalam?)	Camping on beach below Ebey's house	1855	Ebey 1855; Farrar 1916, 1917	Ephemeral cooking features, trash pile

1 These group names identified by Blanchet in 1840 do not match any currently recognized tribal names, yet they are phonetically similar to several Coast Salish groups (e.g., Skokomish, Skykomish, Squamish)
2 *Olympia Pioneer and Democrat* (April 9, 1853) (cited in White 1980:15)

after the introduction of potatoes and the Skagit had long-term villages near the prairie edge (White 1980:15-16).

Three plants documented as being culturally important and which grew on Ebey's Prairie in the early historic period are bracken fern (*Pteridium aquilinium*) (Table 5), camas (*Camassia*) (Table 6), and nettle (*Urtica dioica*) (Table 7) (Blanchet 1878; Ebey 1855; Farrar 1916, 1917; White 1980). Several varieties of berries and wild onion were also widespread on the prairie (Bell 1914, 1915:222). These plants were used similarly by most Northwest Coast People.

Camas (*Camassia*) was abundant on Ebey's Prairie historically (Blanchet 1878; Ebey 1855; Farrar 1916, 1917) and was highly valued food resource of the Northwest Coast people (Gibbs 1877; Gunther 1973; Collins 1974; Turner 1995). Camas was closely linked to anthropogenic prairies (Norton 1979; White 1980), and has been identified in archaeological deposits elsewhere on the Northwest Coast (e.g., Lepofsky 2004; O'Neill 2004; Tasa et al. 2000). The bulb of this plant was valued because it was one of few starchy foods in the diet (Turner and Kuhnlein 1983) and has a sweet flavour (Turner and Peacock 2005). In order to make the bulb palatable and digestible, a long slow cooking period was necessary (24-48 hours); it was typically cooked in quantity in earth ovens (Gunther 1973; Turner 1995) which leave a recognizable archaeological signature (Thoms 1989). This cooking process also increases the chances that some of the bulbs become charred and preserved in archaeological deposits.

Ethnographic and ethnohistoric accounts record that Coast Salish people settled along the borders of Ebey's Prairie and camped on the prairie while they collected camas.

Table 5. Indigenous uses of bracken fern (*Pteridium aquilinium*) on the Northwest Coast. Summarized from Gunther (1973), Norton (1979), Suttles (1974) and Turner (1995, 1998).

Plant Part	***Use***	***Preparation***	***Season Collected***	***Locations & Details***	***Informant***
Rhizome	Food	Roasted in ashes peeled, starchy center eaten. Sometimes stored in baskets (Sw) or steamed in pits, chewed and fibers spit out. Eaten with fish eggs or oil.	Fall; L, Sk	Numerous burnt prairies: e.g., SG collected juicy ones at Birdsview in Skagit River basin	Ch, Co, Ck, G, Ha, K, Kw, L, M, Nu, Ql, Qt, Se, Sg, Sh, Sk, Sn, Sq, Sw
	Food (bread)	Pound with dogwood sticks (Sn) and dry pulp of rhizome, grind to flour, make paste, cook as bread			H, No, Ql, Sh, Sn, Ss
Rhizome fiber	Cordage	Fibers twisted into cordage	Likely fall		Ql
	Tinder or “slow matches”[1]	Fibers for tinder or bound in cedar bark or clam shells for slow burning, also bundled for torches (SS, Ha)	Early spring (for torches)	When bundled, they could hold a fire for hours or days	Ha, Kw, Nu, Ow, SS
Fiddleheads/ shoots	Food	Eaten raw or boiled (fiddlehead)	Spring		Co, Nu, Se
	Hunting lure	Burn prairies to lure deer and elk with new growth	Likely fall	On the Olympic Peninsula; Forks and Quillayute Prairies	Ql
Leaves	Food preparation	Lining for steaming pits			unspecified (widespread)
	Design pattern	Used as a template in basket weaving designs			Hi
	Wiping fish	Leaves used to lay fish on during cleaning and to wipe them off			M, Ql, Sq, Sw
	Camp bedding	Cut and pile for bedding			Sq, SS

1=reported in Turner 1998:65, Ch=Chehalis, Co=Cowlitz, Ck=Chinook, G=Green River, Ha=Halkomelem, Hi=Haida, H=Hoh, K=Klallam, Kw=Kwakwaka’wakw, L=Lummi, M=Makah, N=Nisqually, No=Nooksack, Nu=Nuu-chah=nulth, Nx=Nuxalk, Ow=Oweekeno, P=Puyallup, Ql=Quileute, Qt=Quinault, Sa=Saanich, Sh=Samish, Se=Sechelt, Sg=Skagit, Sk=Skokomish, Sn=Snohomish, Sq=Squaxin, SS=Straits Salish, Sw=Swinomish. Other tribes likely participated similarly but have not been specifically identified in the literature cited.

Table 6. Indigenous uses of camas (*Camassia)* on the Northwest Coast. Summarized from Gunther (1973) and Turner (1995).

Plant Part	***Use***	***Preparation***	***Season Collected***	***Locations & Details***	***Informant***	***Note***
Bulb	Food	Roasted and steamed in pits (earth ovens) using hot rocks and lined with plants, e.g., seaweed, blackberry and salal branches, fern fronds, and grand fir boughs. Mounded with soil and old mats (Turner 1995:43	Late spring (May for L)	Grows best in prairies and island bluffs; e.g., Ql collect from Quillayute and Forks Prairies after blossoms fade; Qt collect from Baker's, Cook, and O'Toole Prairies; L collect from Matia, Barnes, Spieden, and Clark Islands; Sa and So in Victoria area and Saanich Islands, Sk acquire through trade from Chehalis area	Ch, Co, Cx, Ha, K, Kw, L, M, N, Nu, P, Ql, Qt, Sa, Se, Sn, So, Sk, Sq, Sqm,	Highly valued, widely traded; Reagan 1934:60 describes camas oven mounds scattered throughout the region & north to Fraser River.
	Stored food	Dried in the sun after pit-roasting, cached in baskets lined with maple leaves, set up in trees for use when travelling	Late spring	Nisqually Plains	N	
	Food (cakes)	Bulbs smashed and pressed together to preserve them, later boiled in stew with salmon			Ch	

Ch=Chehalis, Co=Cowlitz, Cx=Comox, Ha=Halq'emeylem, K=Klallam, Kw=Kwakwaka'wakw, L=Lummi, M=Makah, N=Nisqually, Nu=Nuu-chah-nulth, P=Puyallup, Ql=Quileute, Qt=Quinault, Sa=Saanich, Se=Sechelt, Sg=Skagit, Sk=Skokomish, Sn=Snohomish, So=Songhees, Sq=Squaxin, Sqm=Squamish, Sw=Swinomish. Other tribes likely participated similarly but have not been specifically identified in the literature cited.

Table 7. Indigenous uses of nettle (*Urtica dioica*) on the Northwest Coast. Summarized from Gunther (1973) and Turner (1995, 1998).

Plant Part	***Use***	***Preparation***	***Informant***
Bark	Medicine	Boiled, infusion for headache or nosebleed	Qt
Entire plant	Medicine	Pounded with white fir (*Abies grandis*) and boiled. Medicinal bath as a general tonic or for colds.	Sh, Sg, Sw
Leaves	Medicine	Crushed and put in water for a woman having difficult childbirth, or for colds	Sq, L, Co, Sn
Leaves and stems	Purification	Rub the body with the plant after handling a corpse	M
Leaves and stems	Stimulant	Rub the body with the plant before a seal hunt to stay awake through the night	Ql
Root	Dye	Combined with a shrub from Northern tribes to make a yellow dye (Swan 1857:175)	unspecified; likely M
Root	Medicine	Pounded and boiled. Infusion is drunk for rheumatism	Ql
Roots	Hair wash	Boiled	Ch, Sk
Sprout	Medicine	Crushed as a poultice for rheumatism or paralysis. Collected in spring.	Co
Stalk	Medicine	Used to whip a patient with rheumatism or paralysis	Ch, Ql
Stalk/leaves	Medicine	Rub against skin for colds	Sn
Stalk	Medicine	Soaked in water and rubbed on the body for soreness or stiffness	K
Stem fiber	Cordage: fish and duck nets, snares, bowstrings, fishing lines. Spun with goose down for blankets	Stripped off leaves, stems dried in the sun or over a fire. Fibers pounded or worked, then twisted together or used a disc spindle. Collected in fall.	Ca, Ch, Co, Gx, Ha, Hi, Kw, K, L, LS, LN, M, Ng, Nu, Nx, Ql, Qt, Sa, Sh, Sg, Sk, Sn, Sqm, Sq, Sw, Tl, T

Ca=Carrier, Ch=Chehalis, Co=Cowlitz, Ck=Chinook, G=Green River, Gx=Gitxsan, Ha=Halkq'emeylem, Hi=Haida, H=Hoh, K=Klallam, Kw=Kwakwaka'wakw, LS=Lower Stl'atl'imx, LN=Lower Nlaka'pamux, L=Lummi, M=Makah, N=Nisqually, Ng=Nisga'a, Nu=Nuu-chah-nulth, Nx=Nuxalk, P=Puyallup, Ql=Quileute, Qt=Quinault, Ss=Saanich, SH=Samish, Sg=Skagit, Sk=Skokomish, Sn=Snohomish, Sqm=Squamish, Sq=Squaxin, Sw=Swinomish, Tl=Tlingit, T=Tsimshian. Other tribes likely participated similarly but have not been specifically identified in the literature cited.

Early ethnographer George Gibbs noted that camp sites related to camas harvest and roasting could generally be found, “near the skirts of timber which border the open lands for the convenience of gathering and preserving” (Gibbs 1877:193). Early explorers, missionaries and people who settled on Ebey’s Prairie documented that villages and temporary camps were located on the east and west edges of the prairie (Farrar 1916, 1917; Kellogg 2001:1, 2, 8; Vancouver 1792:568; White 1980:16-17). One village, led by Chief Tslalakum and recorded by Father Blanchet as Skekowmish or Sowkamish (sic), was described by Blanchet in 1840 to be situated on the west side of the prairie and on a bluff 50 feet above Ebey’s Landing (Kellogg 2001:8). This is in close proximity to the Ferry House archaeological site described in detail later in this thesis and may, in fact, account for some of the archaeological deposits found during my excavation there. Temporary camps described by the Ebey family in diaries and letters (Farrar 1916, 1917) are also in close proximity to or perhaps on the Ferry House archaeological site.

According to ethnohistoric sources, indigenous people actively tended the Ebey’s Prairie ecosystem to maintain and encourage certain resources. In addition to setting fires regularly to keep the prairie open (Cooper 1860b:22-23; Fararr 1916, 1917; White 1980:20-22, 1999:40, 42) indigenous people tilled the land with digging sticks (Kellogg 2001:9) to harvest and encourage camas (Ebey 1855; Gibbs 1978:39).

Early exploring parties, like the Vancouver and Wilkes Expeditions, among others, noted the abundance of deer, elk, and ducks (Kellogg 2001:3; Vancouver 1792:68; White 1999:19, 46) on all prairies of Whidbey Island. Several historical references mention the abundance of deer, in particular, on Ebey’s Prairie (Farrar 1916, 1917; Kellogg 2001; White 1980). Even after European settlement on the prairie, deer and other game were plentiful. When interviewed by June Collins (1974), John Fornsby, an Upper Skagit man, reported that there had always been plenty of deer and ducks on Whidbey Island and that the Lower Skagit people ate meat most every day (Collins 1974:302). One method of duck hunting used tall poles to secure nettle-fiber nets (Figure 8). People scared the ducks into the nets at night using flaming torches. The abundant nettle supply on Ebey's Prairie, deriving from plants 180-215 cm (6-7 feet) tall, could have provided prime material for net construction.

Ebey's Prairie was also used as a place for large groups to gather for worship, council, and feasts (Kellogg 2001). In 1840, Father Blanchet performed religious services on Ebey's Prairie and noted that "chiefs and subchiefs" joined them from other parts of Whidbey Island (Kellogg 2001:8,19). Blanchet also noted that the people who came together to worship had a great deal of practice with the Catholic songs before he had arrived, indicating that such gatherings had been regular events. In 1848, a large multi-tribal council was held on Ebey's Prairie to discuss encroachment into their territories by European settlers. Sixty deer were killed for the feast (Kellogg 2001:17) and one would-be settler was chased off of Ebey's Prairie by several of the men.

By the late 1850s indigenous use of Ebey's Prairie had changed in several ways. In particular, setting the prairie on fire was discouraged, many traditional camas grounds were claimed by homesteaders, and guns were increasingly used for hunting. The increased hunting pressure by Europeans led to a sharp decline in the abundance of deer (White 1980). The village site at Ebey's Landing, adjacent to the Ebey family

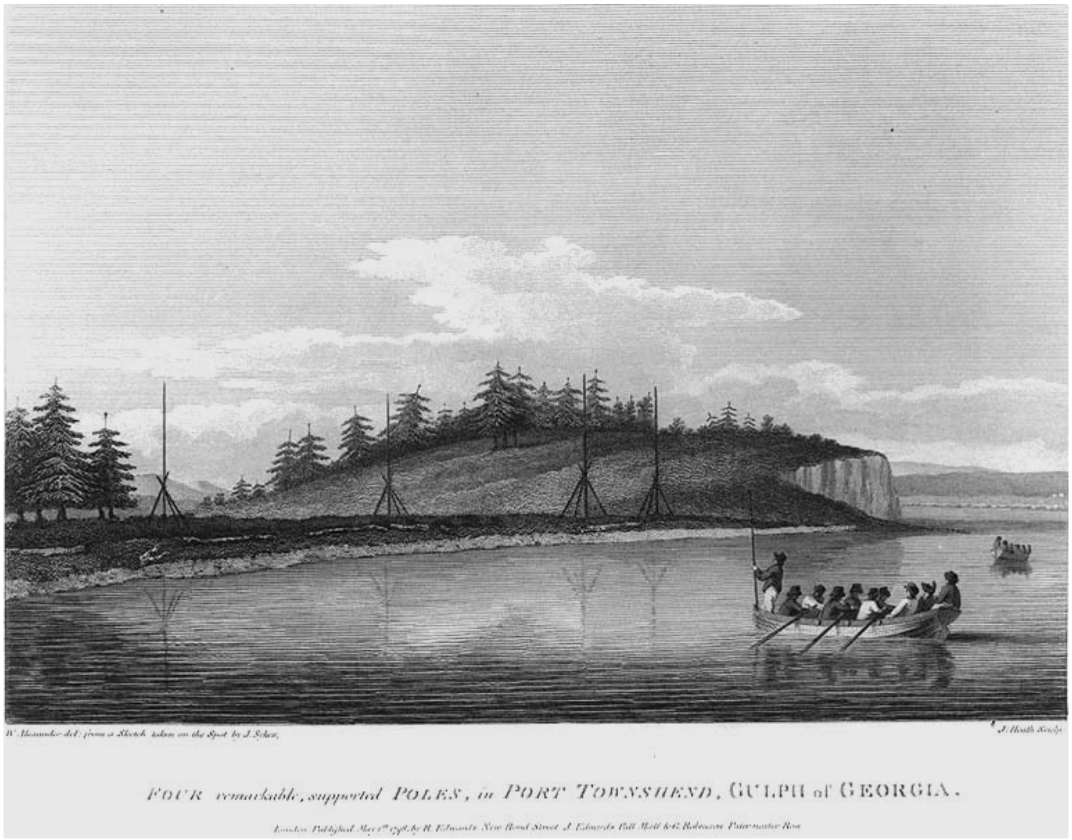


Figure 8. 1792 Engraving by John Sykes. Duck-netting poles, across Admiralty Inlet from Ebey's Prairie (Vancouver 1798:234). University of Washington Libraries, Special Collections Division *http://content.lib.washington.edu/* accessed 2/24/2006.

homestead, was not mentioned by the Ebey family in diaries and letters, suggesting that it had been abandoned by the 1850s.

Archaeological Context of Ebey's Prairie

More than 50 archaeological sites have been recorded on central Whidbey Island and the Quimper Peninsula (part of the Olympic Peninsula), both within easy travelling distance of Ebey's Prairie by foot or boat (Figure 9). Most of these are shoreline sites that contain shell middens; many are long-term habitation sites, but few have been radiocarbon dated or examined in detail (Smith 1907; Smith and Fowke 1901; Bryan 1954, 1955, 1963; Holmes and Kidd 1961; Kidd 1961; Jermann 1977a, 1977b; Robinson 1980, 1981; Wesson 1988; Luttrell et al. 2003). Though artifacts have been noted scattered across Ebey's Prairie (Trebon 1998), it has never been systematically examined by archaeologists.

A long history of artifact collecting on Ebey's Prairie is both a detriment to the archaeological record and a testament to its richness. Unfortunately, local citizens have collected over 800 artifacts from Ebey's Prairie over the past several decades (e.g., Trebon 1998) and specific context of these artifacts has been lost due to a lack of documentation when they were collected.

Ebey's Prairie is in close proximity to several winter village sites identified ethnographically (Suttles and Lane 1990:486; White 1980:16) and many more identified archaeologically (Wesson 1988). The Ferry House Site (45IS221), reported on in this thesis, is the only archaeological site within Ebey's Prairie to receive in-depth study. Based on the cursory evidence of surface finds (Trebon 1998), many more archaeological sites are expected within the prairie.

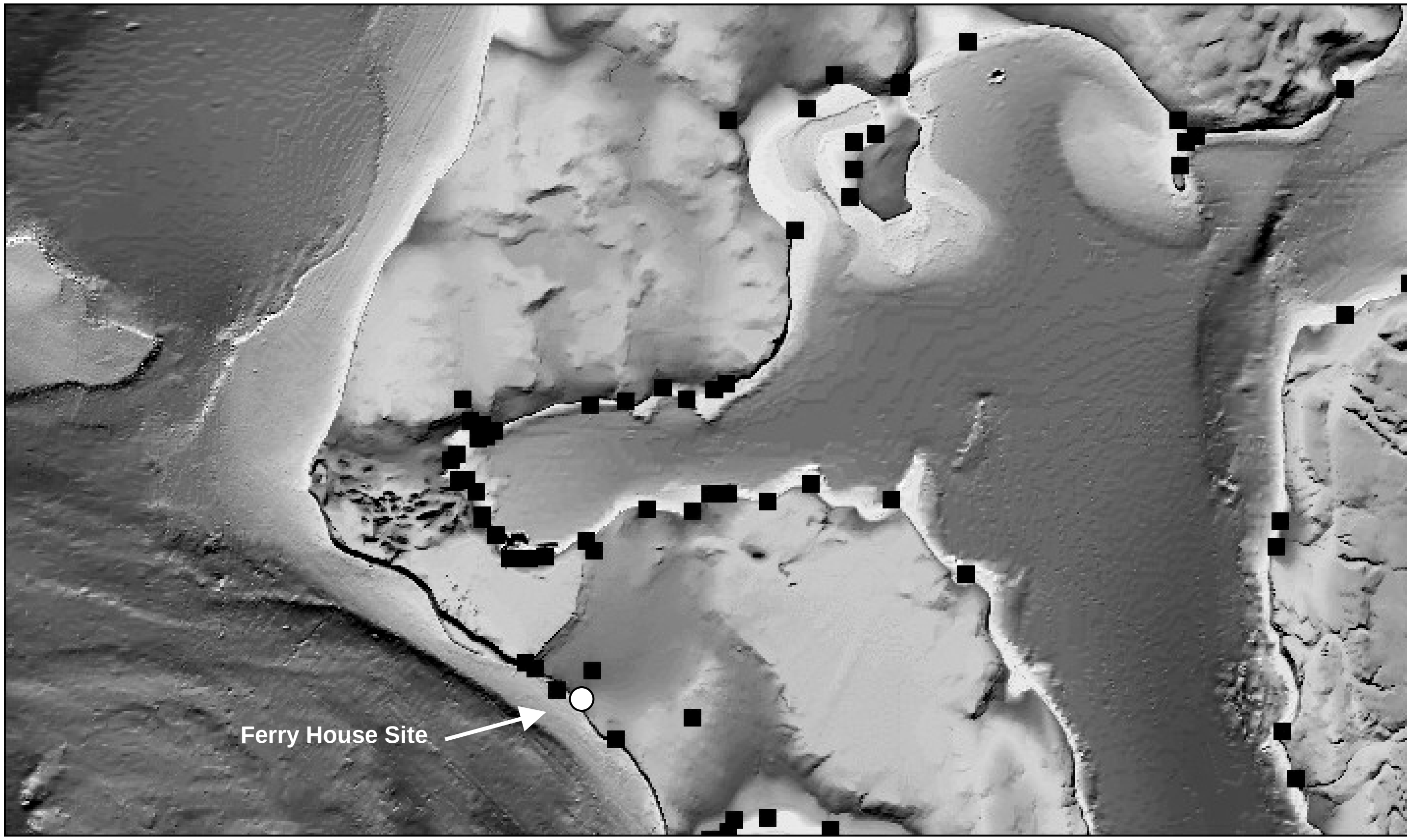


Figure 9. Archaeological sites of central Whidbey Island. Data points are generated from Washington State Department of Archaeology and Historic Preservation Records, Olympia. Base map prepared for Ebey's Landing National Historical Reserve by Doug Littauer.

The Ferry House Site (45IS221) on Ebey's Prairie

The Ferry House Site (45IS221) is the focus of field and laboratory study for this thesis. Located near the western edge of Ebey's Prairie (Figure 10), the Ferry House Site (45IS221) contains historic structures and artifacts as well as prehistoric artifacts and features.

The Ferry House Site (45IS221) demonstrated high potential for archaeological remains because it is situated next to a freshwater stream, adjacent to an accessible landing along Admiralty Inlet (historically named Ebey's Landing), and is near the edge of a fertile prairie which was cultivated historically by both Coast Salish and Euroamerican peoples. In addition, the site was a desirable research location because archaeological excavations could be coordinated with subsurface disturbance carried out by the National Park Service in order to stabilize and preserve the Ferry House. The Ferry House is one of the oldest and most significant historic structures in the State of Washington (Central Whidbey Island Historic District 1998).

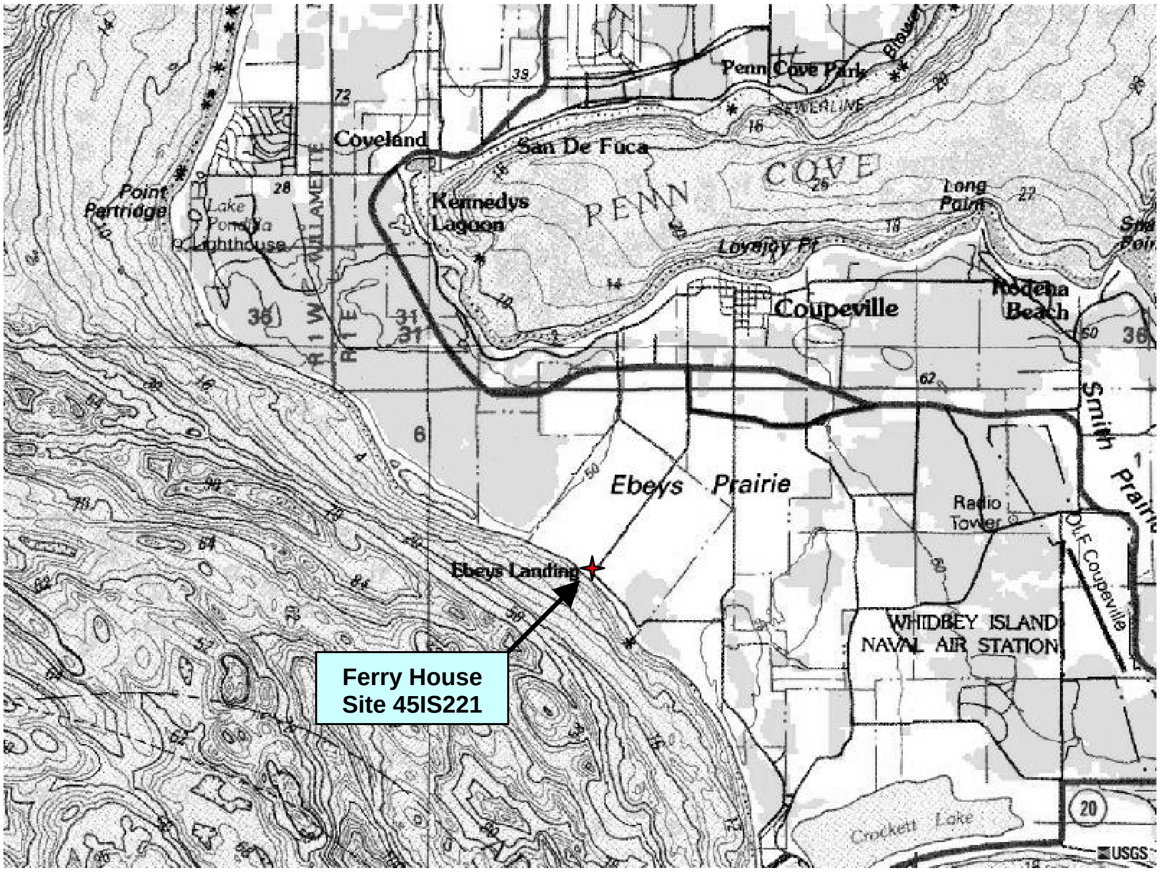


Figure 10. Location of the Ferry House Site (45IS221). Base map acquired from **http://terraserver-usa.com**, accessed October 23, 2005.

CHAPTER 3: METHODS

I used a variety of field and laboratory methods to explore the anthropogenic history of Ebey's Prairie. In this chapter, I outline the field methods used to find and document prehistoric artifacts and features at the Ferry House Site (45IS221) as well as the laboratory methods used to examine the artifacts and archaeobotanical remains recovered from the excavations. I also discuss how I analyzed a large group of diagnostic artifacts which were collected throughout Ebey's Prairie by private landowners and documented in unpublished records and a summary report by Trebon (1998).

My excavation data from the Ferry House site derives from an archaeological investigation which was guided by the requirements of Section 106 of the National Historic Preservation Act and conducted by the National Park Service. Technical results focusing solely on the Ferry House Site archaeological investigation are published elsewhere (see Mierendorf and Weiser 2002, 2006).

National Park Service objectives were dictated by a need to retrieve archaeological data from underneath and around the Ferry House within areas where ground disturbance was necessary during stabilization of the building. I operated within the confines of the National Park Service project objectives and property boundaries. My own objectives were to locate and sample prehistoric artifacts and features within this project area, and to further analyze them in the laboratory. It was also important for me to establish stratigraphic context and age of features whenever possible to construct a chronology of human activities on Ebey's Prairie. I incorporate data generated from the

Ferry House Site investigation as well as data from other sources to inform my broader, prairie-wide discussion in this thesis.

Field Methods

I used a judgemental sampling strategy and standard archaeological excavation methods to find, examine, and document prehistoric archaeological features and artifacts at the Ferry House Site. I first conducted a systematic surface survey of the Ferry House Site, but vegetation limited visibility and the only artifacts identified were metal scraps and brick associated with the historic Ferry House. I then randomly placed and excavated exploratory test holes (50 x 50 cm) around the perimeter of the Ferry House within the area of planned disturbance. A team of National Park Service archaeologists, including me, subsequently discovered artifacts, features, and archaeobotanical remains through the excavation of a number of additional subsurface tests (Figure 11). The tests included seventeen 50 x 50 cm exploratory holes, one 1 x 2 m excavation unit, one 2 x 2 m excavation unit, and eight shovel test pits (approximately 40 cm wide), two of which were expanded to approximately 0.50 x 1.5 m units, and 44 trenches of varying depth and size. Excavated soil was sifted through 6.4 mm (1/4-inch) mesh except for features which were sampled in bulk for later analysis, or sifted through 3.2 mm (1/8-inch) mesh in the field. From these exploratory pits, excavation units, trenches and an exposed road cutbank, we collected information from features, artifacts, and archaeobotanical remains. Details of our field research are available in technical reports produced by the National Park Service (Mierendorf and Weiser 2002, 2006).

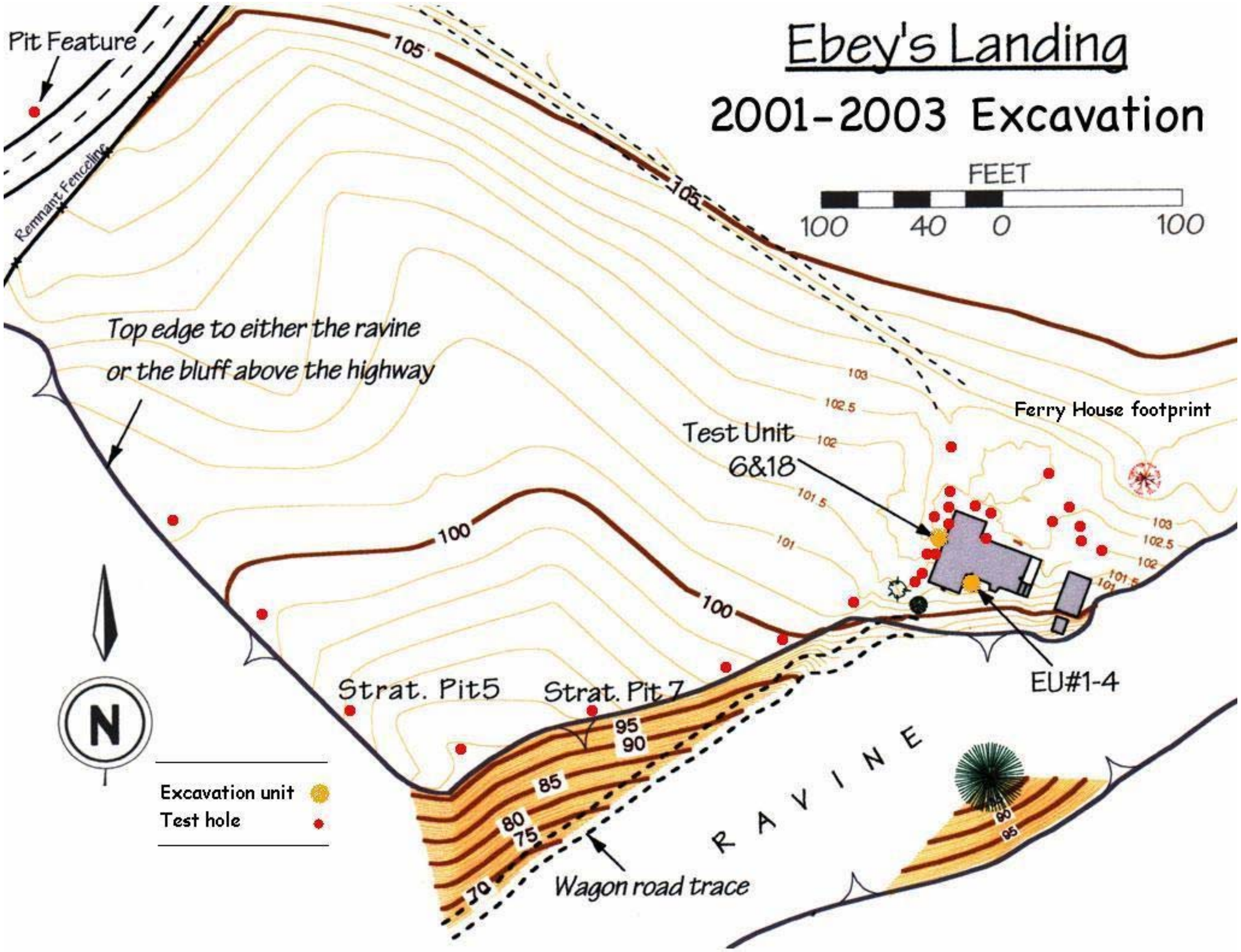


Figure 11. Excavation units at the Ferry House Site (45IS221). Base map by Keith Garnett.

Exploratory Excavation Units

In each of ten exploratory 50 x 50 cm test pits, special attention was given to any soil anomalies (such as dark staining) or clusters of artifacts which might indicate prehistoric features. Each test pit was excavated until no cultural remains were recovered for at least 10 cm and then a stratigraphic profile was drawn of the test unit before it was backfilled. Using these methods, we were able to locate intact prehistoric features below the litter of fragmented historic artifacts.

A feature composed of a cluster of fire-modified rock was exposed in the initial exploratory tests (see Test Units 6 & 18 on Figure 11). The area surrounding this feature was expanded into to a 1 x 2 m excavation unit and was further examined over the next two brief field seasons. This excavation eventually revealed four features (Features 1, 2a, 2b, and 3), and became the inspiration for further exploration in other areas with the intent of finding and analyzing additional features. Further descriptions of features and specific feature locations are provided in the context of results in Chapter 3.

Remote Sensing

The National Park Service chose to use *ground-penetrating radar* (GPR) in an effort to find more prehistoric features. Specialist Larry Conyers was hired for this purpose. Conyers (2002) laid out test grids on the west (15 x 40 m), north (12 x 30 m), and south (12 x 20 m) sides of the Ferry House and passed GPR equipment over the ground surface along grid lines spaced 0.5 m apart, looking for anomalies. See Conyers technical report (2002) for further details of the methods and equipment used.

In order to recognize what type of reflection profile a prehistoric feature would produce, Conyers first passed his GPR equipment over a known prehistoric pit feature that was visible in the road cut. He found that the feature produced an anomaly which was subtle but visible as a spike in wave data. He then continued with his test grids and indicated areas where anomalies or subtle spikes in his GPR wave data occurred. He indicated several anomalies on the west and south sides of the Ferry House, which were potential prehistoric archaeological features (Figure 12). The archaeological crew placed exploratory shovel pits in each of the locations where significant anomalies had been indicated. In addition, we placed shovel pits where anomalies did not occur to ground-truth the effectiveness of GPR as a prediction tool. We selected these locales based on our own predictions of where cultural deposits were likely to be found (e.g., along the terrace and creek edges). Nine shovel tests, each averaging 40 cm wide, were excavated to varying depths until no cultural remains were found. Shovel tests yielding prehistoric artifacts or features were expanded into larger excavation units in a separate but related sedimentological project by Stein et al. (2006). I also sampled these areas for artifact and feature content.

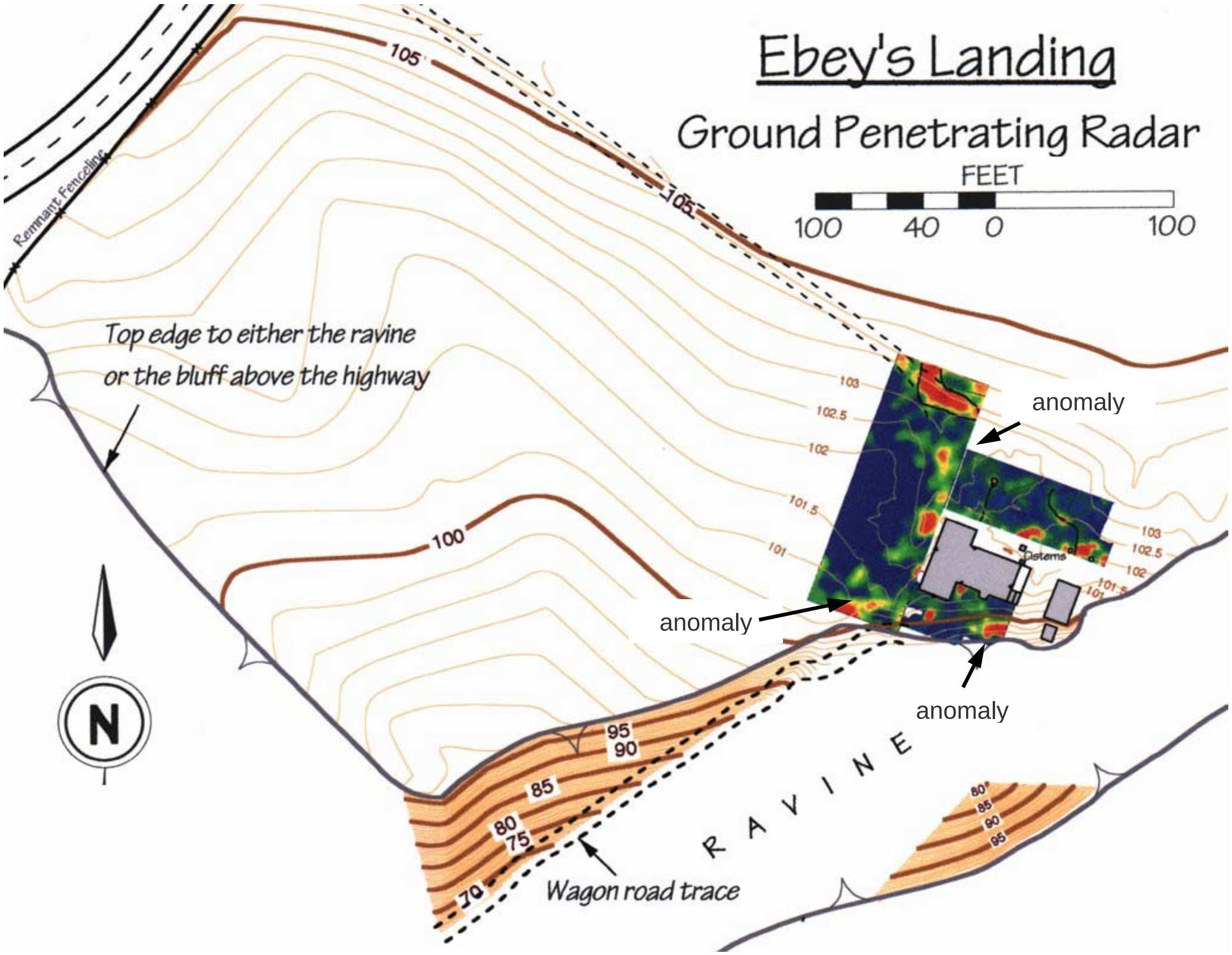


Figure 12. Map of ground-penetrating radar survey grid at the Ferry House Site 45IS221. Anomalies are denoted by white outlines. Base map by Keith Garnett, overlay by Larry Conyers.

Feature Sampling

The two shovel pits the archaeological team had placed along the terrace and creek edge to test the effectiveness of GPR predictions yielded prehistoric artifacts and features. These were expanded into larger excavation units so that the features (5, 6, 7, and 8a) could be described and sampled quickly from the soil profile.

Our team excavated three trenches with a backhoe near the creek edge. We did this to examine the depositional history at the site and to look for intact archaeological remains which may have been covered by fluvial deposits. Soil removal from these excavations was monitored, and the trenches were periodically examined for features and backdirt was screened (through 6.4 mm hardware cloth) for artifacts. One of these trenches was positioned to reopen a previously backfilled excavation pit that contained prehistoric features. We discovered, described, and bulk sampled two new features (8b and 9) in this backhoe trench. In addition, I bulk sampled a feature (8a) which had been previously recorded in the old excavation unit. We also discovered two features (10 and 11) in the soil profile of a nearby roadcut. I described and collected bulk samples from these for flotation and analysis.

Excavations under the Ferry House

Our team also excavated several trenches adjacent to and under the historic Ferry House (Figure 13) during monitoring of construction activities. Because most of these trenches were excavated under a house which is on the National Register of Historic

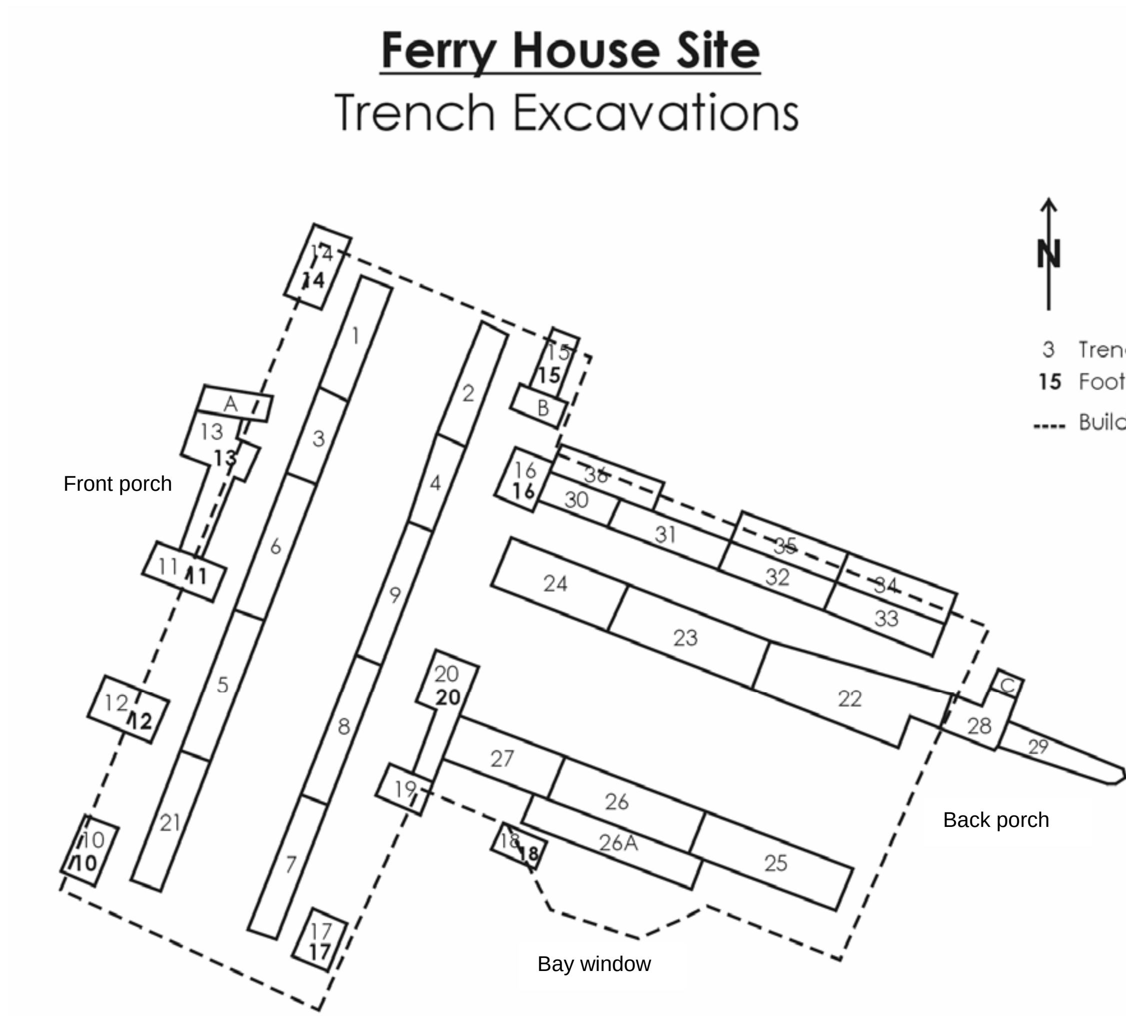


Figure 13. Trenches excavated under and adjacent to the Ferry House. Refer to Figure 11 for location of Ferry House. Base map by Monika Nill.

Places, we were unable to cut out the floor or destabilize the structure by digging archaeological excavation units beneath it. Instead, soil was removed by tunnelling beneath the house with hand shovels and headlamps and transporting soil by sled to locations where it could be screened and examined by archaeologists. Using this method, soil within the first 30 cm of depth below surface was mixed as it was removed, and we were therefore unable to ascribe more precise vertical provenience to our archaeological finds. However the horizontal provenience of finds could be roughly determined. Soil removed from each trench was transferred to buckets labelled with the trench number. Each trench was mapped so that the distribution of artifacts could be estimated (Figure 13). All artifacts and archaeobotanical remains larger than 6.4 mm (¼-inch), were collected, except for fire-modified rock which was noted and discarded. Through excavations under the Ferry House, we were able to discover additional prehistoric artifacts, including a modified bone tool, and a nondescript lens of blackened soil that contained charred plant bulbs (Feature 4). Since most of this feature was under the Ferry House where archaeological excavation was not possible, it was not described in detail or bulk sampled. The charred bulbs collected from this feature are described in Chapter 3.

Laboratory Methods

Flotation

I processed the bulk soil samples from the Ferry House Site (45IS221) using two-stage bucket flotation which combines techniques described by Watson (1976) and more recently by Pearsall (2000). Each soil sample was immersed in a bucket of water and gently stirred by hand and left to rest for approximately five minutes, while the light and heavy fraction separated due to gravity. The light fraction was then decanted to a geological sieve lined with fine-weave sheer cloth with an approximate aperture of 0.25 mm. Some of the light fraction was also removed from the water surface with a cloth-lined scoop of the same aperture (Figure 14). This process was repeated until light fraction particles were no longer visible on the surface. The heavy fraction was then transferred to a bucket with a mesh bottom (stainless steel hardware screen) with an aperture of 0.5 mm or, for some samples, a geological sieve with an aperture of 1 mm and submerged in a larger bucket of water with continuous freshwater flow and gently agitated by hand (Figure 15). Remaining light fraction particles which floated to the surface were collected using a cloth-lined scoop. Heavy fraction materials were gently agitated until the water looked clear. The heavy fraction was removed by hand to a geological sieve lined with sheer cloth. Both heavy and light fraction catch cloths were placed directly on a drying rack for later examination.

Many of the bulk soil samples from the Ferry House Site (45IS221), particularly from features, contained solid blocky clods due to very fine silt and clay particles (and possibly fire ash) which made it difficult to obtain clean light fraction specimens. These clods were persistent, even when wet. Consequently several samples had to be floated twice in order to separate light and heavy fractions. Even then, light fraction materials were often trapped in the bottom of the bucket. I tried additional techniques to expedite separation of light and heavy fractions including use of a deflocculant (baking soda) in

Figure 14. Stage 1 bucket flotation; capturing light fraction in a sheer mesh cloth. Unpublished photograph by Rob Klengler, used with permission.

Figure 15. Stage 2 bucket flotation; agitating heavy fraction in water in a mesh-bottomed bucket. Unpublished photo by Rob Klengler, used with permission.

the flotation water to change the water density, and gently sieving samples through a 0.212 mm mesh geological sieve before flotation while the material was still dry. By gently dry sieving, I was able to eliminate some of the fine silt particles and prevent heavy caking in the bottom of the flotation bucket. However, even using these additional techniques, the light fraction samples were covered with adherent fine silt particles which made specimens difficult to identify microscopically.

Sorting and Quantifying Feature Contents

Once dry, I weighed and separated each sub-sample (light and heavy fractions for each bulk sample) using a series of geological sieves (4.0 mm, 2.0 mm, 1.0 mm, 0.425 mm, 0.25 mm aperture and catch basin (<0.25 mm). I sorted sub-samples by hand and identified archaeobotanical remains using the aid of a light binocular microscope (10-40x).

I examined light fractions down to the smallest particle size in the catch basin (<0.25 mm) for microscopically identifiable archaeobotanical material. I also examined all heavy fractions for paleoethnobotanical remains. Charred plant elements such as fruits, seeds and achenes, buds, and needles were separated from each light and heavy fraction and weighed or counted. In the light fractions, charred wood fragments >2.0 mm in size were separated from the non-charred materials and weighed. In the heavy fractions, charred wood fragments >1.0 mm in size were separated from other materials and weighed. In addition, I sorted heavy fractions into remaining constituent parts (e.g., gravel or sand, artifacts, bone, and shell) down to the 1.0 mm particle size and weighed or counted them to quantify contents and aid in my interpretation of feature deposits and potential feature functions.

Archaeobotanical Identification

I identified all charred archaeobotanical material (e.g., fruits, seeds and achenes, buds, and needles), excluding wood, from bulk samples after flotation. I paid special attention to diagnostic characteristics such as surface patterns, ridges, and attachments to recognize genera. Those specimens which could be identified with confidence are indicated by genera or family name. Specimens identified with less confidence are preceded with "*cf.*" for a probable identification (e.g., *cf. Camassia*). Those specimens identified as possible but uncertain are preceded by "?" (e.g., ?*Camassia*). Specimens which exibit diagnostic characteristics but which I was unable to key to a particular family or genus are classified as "unknown." Specimens lacking diagnostic characteristics are classified as "unidentifiable."

I did not systematically identify charred wood, but I examined wood fragments >2 mm to see if both hardwoods and softwoods were represented in the assemblage to aid in my interpretations about fuel-wood selection for hearths and cooking features. Non-carbonized plant materials were not identified because they are likely to be modern remains.

I made archaeobotanical identifications with the aid of several reference manuals on seed and fruit identification (Anderberg 1994; Beijerinck 1947; Berggren 1969, 1981; Hitchcock et al. 1961a, 1961b, 1964, 1969; Martin and Barkley 1961), charcoal identification (Hoadley 1990), and thorough examination of macrobotanical reference specimens housed in Dana Lepofsky's paleoethnobotanical laboratory at Simon Fraser University.

Plant Bulbs Recovered *In Situ* or from Screens

A number of charred plant bulbs were recovered in screens or *in situ* during excavation of Feature 4. To devise methods for identifying charred geophytes, I used reference manuals (Hather 1993, 2000) and consulted with archaeobotanist Phil Dering (Shumla School, Texas) and plant physiologist Dr. Marah Fernando (Simon Fraser University Biological Sciences). For identifications, I used my own collection of fresh and charred plant bulbs and rhizomes as well as those in Dana Lepofsky's paleoethnobotanical collection. To examine and identify geophytes, I used varying degrees of magnification (10-200x) and a variety of light microscopes in the Biological Sciences department of Simon Fraser University and a Scanning Electron Microscope (SEM) in the BioImaging Facility in the Botany department at University of British Columbia with the help of Derrick Horne.

To identify these specimens, I divided them into categories by shape, then by cross-section, and further by cellular patterning. Initially, I sorted remains using specimen shape, attachments and basic structure (e.g., overlapping modified leaf scales of a bulb vs. porous parenchymous tissue of a rhizome) as guides to identify the type of remain (e.g., bulb, root, rhizome). I used a dissecting microscope (10-40x) to examine details. Based upon ethnographic literature (e.g., Turner 1995) and plant identification manuals (Hitchcock et al. 1961a, 1961b, and 1969), I determined that 24 plants native to the Pacific Northwest produce edible bulbs, roots, and rhizomes that were commonly used by indigenous people (Appendix C). I considered these the most likely geophytes to be recovered in prehistoric archaeological deposits because edible geophytes from other parts of the world were not introduced until the historic period (Suttles 1990). I compared my archaeological specimens to reference specimens for each of these edible geophytes (Appendix D) except one, an onion (*Allium amplectins*), which was not available for examination in the reference collection. For this species, I relied upon botanical illustrations and descriptions provided by Hitchcock et al. (1969).

After finding that the majority of remains from the Ferry House Site were in the Liliaceae family, based on overall shape and morphology at low magnifications (<40x), I attempted to determine genus by looking at the epidermal cell patterning at higher (40-200 x) magnification. To do this, it was necessary to first create a comparative collection of epidermal cell tissues from edible bulbs in the Liliaceae family (Appendix E). I used both charred and non-charred reference specimens from my own collections and from Dana Lepofsky's paleoethnobotanical collection at Simon Fraser University. I examined each reference bulb with a dissecting microscope (10-40x) and peeled a thin layer of epidermal tissue from the midsection of fresh (uncharred) bulbs using tweezers or a fingernail. For charred samples, I flaked off a thin layer of epidermal tissue using tweezers, taking care that the specimen be as thin as possible to let enough light pass through to photograph the cell walls. I created temporary mounts of epidermal tissue to slides, using distilled water and cover slips. For some of the fresh (uncharred) samples, I also experimented with tinting agents diluted with distilled water (i.e., 10% chloral hydrate and 0.05% toluidine blue) and polarizing optics to increase visual clarity of epidermal cell walls. I examined each specimen using a light microscope (40-200x) and took digital photomicrographs of epidermal tissue at various magnifications to use as a comparative collection for identifying the archaeological specimens (Appendix E). I used a Scanning Electron Microscope (SEM) to examine a few of the specimens. To do this, I mounted the whole specimen to a platform with adhesive. I used the same techniques, described above, to acquire, examine, and photograph archaeological tissue specimens. Whether flaking off tissue to mount on slides or mounting the specimen whole to examine with SEM, archaeological samples became damaged during the examination process. I was not able to determine a strategy which was non-destructive to the archaeological samples because they are easily crushed and extremely brittle.

As I was developing my methods to evaluate these specimens, I noted that epidermal tissue on a single specimen may have cells which are various shapes and sizes, depending on what part of the organ it was taken from. For example, cell openings on the midsection of the bulb coat may be compacted, while cell openings near the apex of the bulb, particularly during new growth, may be elongated. For this reason, I consistently examined the midsections of bulbs in the comparative collection and archaeological specimens. To ensure that I was examining mid-sections on archaeological specimens, I chose whole or nearly whole bulbs. Bulb fragments were not examined in detail.

The process of finding and examining epidermal tissue on archaeological samples requires switching back and forth to various magnifications (e.g., 10-200x). Ideally, a dissecting microscope with 10-40x magnification and a microscope designed for taking photomicrographs with higher magnification (40-200x), are in close proximity to one another to make identifications possible. I was able to make identifications on most of my archaeological samples, even those less photogenic, by comparing with the set of reference photomicrographs I had created.

Analysis of Artifacts from Excavation

I evaluated each lithic artifact collected during the Ferry House Site (45IS221) excavations of 2001-2004 (including those from under the house) and categorized them using common characteristics and usewear patterns (as identified by Andrefsky 1988; Crabtree 1971; Mierendorf et al. 1998; Plew et al. 1985) and using specific artifact categories as defined by Mierendorf et al. (1998:444-457). I based my identifications on flake morphology (e.g., bulb of percussion, concoidal and radial scarring), usewear (e.g., evidence of grinding, pecking, and crushing), and evidence of heat (e.g., fire-spalling, blocky fracturing, and discoloration from oxidized minerals) to determine types and functions of artifacts. To identify material types, I used a lithic comparative collection housed in the National Park Service Marblemount Curation Facility at North Cascades National Park Service Complex. All artifacts evaluated from the Ferry House Site (45IS221) have been accessioned and are housed at the National Park Service Curation Facility in Marblemount, Washington.

Analysis of Artifacts from Private Collections

I also analyzed projectile points which had been collected across Ebey's Prairie by citizens over several decades (Trebon 1998). The National Park Service sponsored a project to have researcher Teresa Trebon interview several citizens about the artifacts they had collected while farming private lands on Ebey's Prairie. This was a way for the National Park Service to retrieve archaeological data from a larger expanse of the prairie which may not be available otherwise. During interviews, Teresa had photographed the collections and plotted roughly where the artifacts had been found. I chose to evaluate artifacts from five out of the 15 collections she documented (Interviews 20 and 24-27) because the great majority of artifacts in these collections were clearly from the bottomlands of Ebey's Prairie (i.e., <150 ft in elevation) and were temporally diagnostic. I chose not to analyze artifacts from the 10 additional interviews because I was unable to discriminate between artifacts found on the prairie and those which were not.

From the five interviews, I evaluated the diagnostic attributes of 400 photographed projectile points. I enlarged artifact photographs to aid in identification and classified projectiles into temporal categories based on hafting morphology using the guideline presented by Mierendorf et al. (1998: 495-514). In Mierendorf's key, projectiles are illustrated with planview outlines and grouped in style categories based on hafting elements. These style categories are assigned age ranges based upon projectiles from radiocarbon-dated contexts in archaeological sites throughout the Northwest. In my analysis, I used size as an identifying factor only when necessary to distinguish between projectile point styles with similar hafting morphology. Attributes like artifact thickness and basal grinding could not be discerned from planview photographs, but many specimens could easily be categorized into the chronological time periods suggested by Mierendorf et al. (1998) based on more obvious features of the hafting element. I did not evaluate specimens which appeared to be unfinished bifaces, were broken, or otherwise lacked clearly identifiable characteristics.

Deciphering Human Activities across Time and Space

I compiled several sets of information to decipher how people used Ebey's Prairie during prehistory through time and across space. To determine spatial distribution of cultural remains, I mapped the locations of artifacts and features found on the Ferry House Site (45IS221) during excavation and the locations of surface artifacts collected by citizens from across the prairie. To determine age of cultural deposits, I used radiocarbon age estimates acquired from excavated cultural contexts (primarily features) and seriation of the projectile point styles I analyzed from private collections.

The apparent functions of features and artifacts helped me to determine the types of human activities represented on the prairie (Chapter 3). I interpreted feature functions based on their appearance, associations within natural and cultural soil stratigraphy, and content. I determined artifact functions by examining their forms and usewear patterns. By comparing features and artifacts in relation to one another spatially, temporally, and functionally, I was able to reconstruct the human activities represented on Ebey's Prairie throughout the Holocene, which are presented in the following chapters.

Exploring Prairie Longevity

How Long was Ebey's Prairie Anthropogenic?

The archaeological and archaeobotanical study also has relevance to the question of how long Ebey's Prairie has been a prairie. Further, these data have the potential to answer the question of how long Ebey's Prairie has been anthropogenic, or manipulated and influenced by people. In order to answer these questions I first evaluated the regional changes in climate that would naturally result in the closing or opening (via tree encroachment or lack thereof) of the Ebey's ecosystem. To do this, I compared evidence of glacial history regionally and more specifically on Ebey's Prairie. I also compared ecological data from other, similar low elevation, flat landforms with xeric microclimates influenced by the rainshadow effect (i.e., today's "prairies" of southeast Vancouver Island and the Olympic Peninsula). By learning the climatic and ecological fluctuations of the region, I was able to assess whether the archaeological and archaeobotanical data from the Ferry House Site could offer more specific detail about how long Ebey's Prairie has been anthropogenic.

CHAPTER 4: RESULTS AND INTERPRETATIONS

In this chapter I outline results from various lines of evidence to document the prehistory of human activity on Ebey's Prairie. The ethnographic evidence reviewed in Chapter 1 documents that Coast Salish people were hunting, cultivating and processing camas, worshipping, feasting, and holding council on Ebey's Prairie after Euroamericans arrived in the region (Ebey 1855; Farrar 1916, 1917; Kellogg 2001; White 1980). These records also indicate that Coast Salish people periodically burned Ebey's Prairie and had temporary campsites and longer-term settlements near the prairie edges which they occupied year after year. In this chapter, I extend the reconstruction of human use of Ebey's Prairie into the more distant past. I do this by examining features, artifacts, and archaeobotanical remains from a small portion of Ebey's Prairie in the vicinity of the Ferry House Site (45IS221), as well as through examination of artifacts collected across Ebey's Prairie by landowners and farm workers. These data are the foundation of my interpretations of the human activities across Ebey's Prairie throughout the Holocene.

Results of Remote Sensing

We were able to determine that GPR was not an effective tool for quickly finding prehistoric features on this site. In fact, none of the GPR anomalies we ground-truthed through excavation corresponded to prehistoric features. What they did correspond to were concentrations of historic artifacts, particularly metal scraps or brick — items which reflect radar and produce recognizable spikes in wave data. Large concentrations of rocks — such as those associated with camas roasting features (*cf.* Thoms 1989), should also produce similar spikes in wave data. Thus, it seems unlikely that features with highly reflective contents are located within the GPR survey area. Conyers did note that an abundance of subtle reflections in the three GPR test grids may indicate prehistoric features (Conyers 2002:10) with few reflective materials (e.g., roasting or storage pits with only a few rocks), but these small spikes in wave data could also represent a number of naturally occurring soil anomalies and would take a great deal of time to analyze. Magnetometry has been effectively used to find roasting features in the Willamette Valley (O'Neill et al. 2004) and may be a more effective tool for finding prehistoric features in Ebey's Prairie in the future.

Feature Sampling

In total, our archaeological team discovered 13 prehistoric features near the western edge of Ebey's Prairie on the Ferry House Site and the adjacent vicinity (Figure 16). I documented and sampled eleven of these features. I collected bulk samples from 10 of the 11 features which are described in detail later in this chapter. These samples were then floated and analyzed (Table 8, Table 9, and Appendix F). In addition, I analyzed archaeobotanical remains from Feature 4 which had been recovered in screens during excavation (Table 10 and Appendix E). Feature types include one rock cluster, several hearths, midden deposits, and carbon-rich soil layers associated with

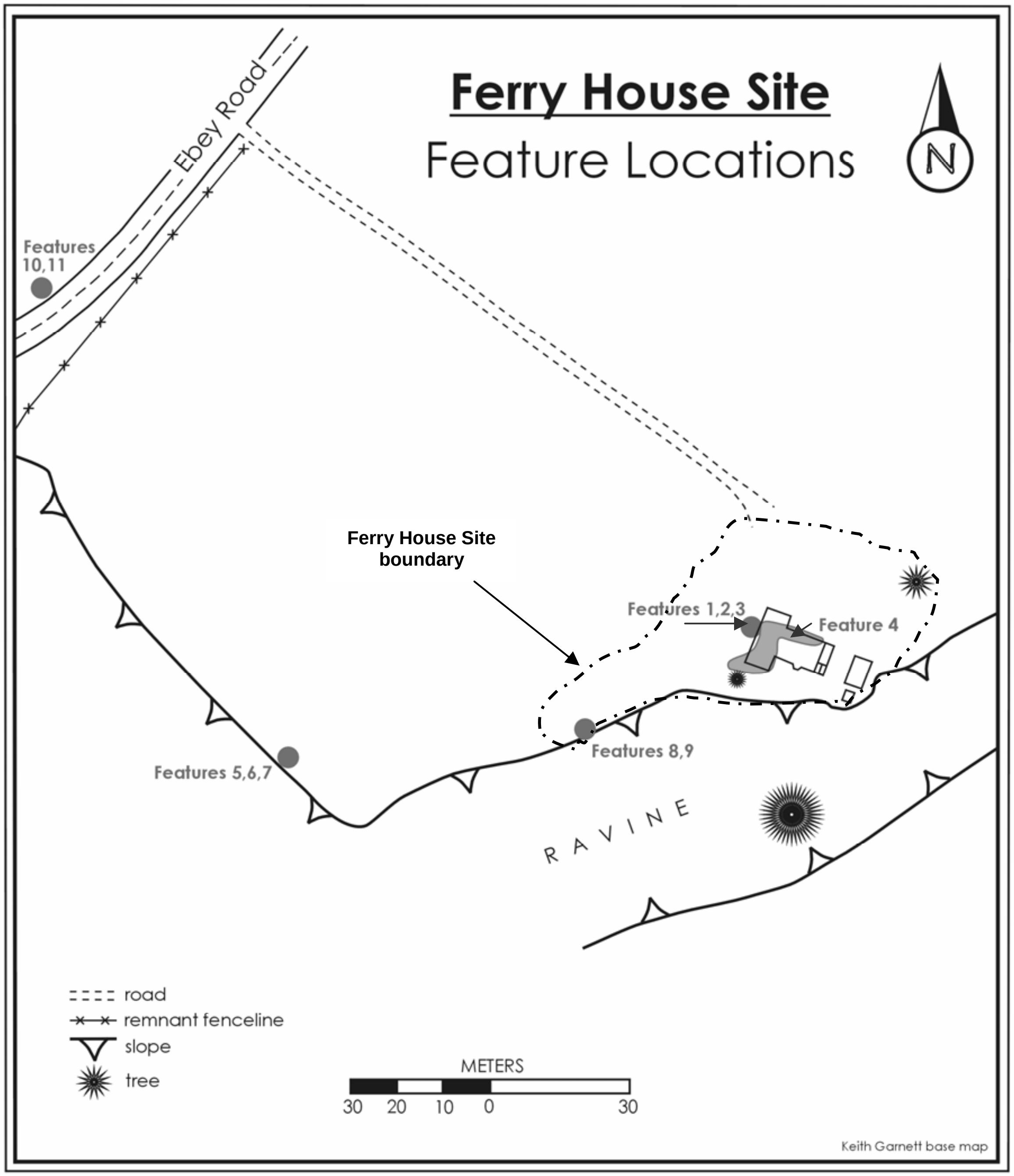


Figure 16. Locations of the 11 features analyzed in this thesis. Note that features 5-7, 10 and 11 are outside of the Ferry House Site boundary as it is currently defined. Base map created by Keith Garnett.

Table 8. Summary of cultural content recovered in bulk soil samples and general interpretations of features.

F[1]	***Soil Vol.*** (l)	***Seeds*** (N)	***Needles*** (N)	***Cone scales*** (N)	***Charcoal*** (g)	***Other botanical*** (N)	***Other Cultural Material***		***Interpretation***
							(N)	(g)	
1	9.60	132	30	4	9.57	2 confer buds 3 ?cotyledon 1 ?nutshell 1 ?pericarp 1 berry	1 lithic flake	3.10 metal 0.12 glass 0.92 bone	Steam cooking with intrusion of historic debris near plow zone
2a	0.88	9	57	324	1.74	1 glume	-	-	Hearth
2b	3.50	4	20	75	6.66	1 ?cotyledon	-	-	Hearth
3	0.33	3	11	0	0.68		-	-	Refuse
5	2.00	47	0	1	0.50		2 FMR 1 lithic flake 5 lithic shatter 20 urchin spines	193.70 shell 2.00 bone	Shellfish processing
6	0.35	8	1	0	2.70			0.11shell 1.80 bone	Shellfish processing
8a	1.20	6	1	0	1.00		3 FCR 4 lithic shatter	0.10 bone	Hearth
8b	1.00	3	0	0	0.10		-	-	Hearth
10	0.95	0	0	0	0.10				Refuse pit
11	0.50	0	0	0	0.02		1 lithic flake		Refuse pit
*****	2.30	2	0	0	0.02		1 fish vertebra		Living surface
T	22.61	214	120	404	25.07	10	38	201.85	--

F[1] Feature. T = Totals. *Non-feature deposit; this bulk sample was associated with an anthropogenic soil horizon containing flaked stone tools. For density of archaeobotanical remains per feature see Table 16.

Table 9. Overall summary of non-botanical feature contents recovered from bulk soil samples.

Sample Numbers		***Type of Remains***										
		Artifacts					**Geologic**			**Zoologic**		
		FMR[3] (N)	Glass	Lithic Flake (N)	Lithic Shatter (N)	Rusted Metal	Calcium carbonate	Gravel/ Sand	Lapilli	Bone	Marine shell	Urchin spine (N)
F[1]	**B[2]**											
1	20-1		0.12			3.07		37.8	0.09	0.02		
	20-2							22.2	0.02	0.01		
	21-1			1				34.5		*		
	21-2							15.2				
	69-1							56.3		0.88		
2a	36-1							4.6				
	61-1							12.2				
	513-1							14.5				
2b	44-1							5.1				
	48-1							12.1				

		Type of Remains										
		Artifacts					**Geologic**			**Zoologic**		
Sample Numbers		FMR[3] (N)	Glass	Lithic Flake (N)	Lithic Shatter (N)	Rusted Metal	Calcium carbonate	Gravel/ Sand	Lapilli	Bone	Marine shell	Urchin spine (N)
	514-1							27.9				
3	62-2							7.4				
5	556-1	2		1	5			126.2		2.0	193.7	
6	558-1							25.1		1.8	0.11	20
8a	579-1	3			4		0.03	25.6		0.1		
8b	577-1							12.3				
11	580-1			1				5.6				
Totals		5	0.12	3	9	3.07	0.03	444.60	0.11	4.81	193.81	20

* indicates presence of an item with a weight >0.01 g. Measurements are weights in grams with decimals rounded to the nearest hundredth except where indicated by (N) for number of items. [1]Indicates feature number. [2] Indicates bulk sample number. [3] Indicates fire-modified rock.

Table 10. Charred underground storage organs recovered from 6.4 mm (1/4-inch) and 3.2 mm (1/8-inch) screen during excavation under and around the Ferry House Site.

Sample No.	***Provenience***	***Taxonomic i.d.***	***Identifying Characteristics***
Bag 82*	TU 7 Level 3	*Camassia*	S, L, A, CW, H, SX, B
Bag 97	TU 7 Level 3	Rhizome or swollen underground stem	S, A, J/N
Bag 9, Sample 1	Trench 9	*Camassia*	S, L, A, CW
Bag 9, Sample 2	Trench 9	*Camassia (cf. C.leichtlinii)*	S, L, CW, H, SX
Bag 27B, Sample 1	Trench 26	*Allium*	S, L, CW, H
Bag 27B, Sample 2	Trench 26	*Allium (cf. A. cernuum)*	S, L, CW, H
Bag 27B, Sample 3	Trench 26	*Camassia*	S, L, SX, CW, B, A
Bag 27B, Sample 4	Trench 26	*Camassia*	S, L, B, SX,
Bag 27B, Sample 5	Trench 26	*Camassia* (*cf. C.quamash*)	S, L, H, SX, A, CW, G
Period 3 West #2 Sample 1	Trench 26a	*Camassia* (*cf. C.leichtlinii)*	S, L, H, CW
Period 3 West #2 Sample 2	Trench 26a	*Camassia*	S, L, A, CW, SX
Period 3 West #2 Sample 3	Trench 26a	Liliaceae	S, L, H, B
Period 3 West #2 Sample 4	Trench 26a	Liliaceae	S, L, H, B
Period 3 West #2 Sample 5	Trench 26a	*Camassia*	S, L, DB, CW
Period 3 West #2 Sample 6	Trench 26a	*Camassia*	S, L, CW
Period 3 West #2 Sample 7	Trench 26a	*Camassia*	S, L, CW
Period 3 West #2 Sample 8	Trench 26a	*Camassia*	S, L, CW
EBLA1727 (Bag 517)*	TU 18 L 3 W. half	*Camassia*	S, L, A, CW, B
EBLA1717 (Bag 501)	TU 18 L1	*Camassia*	S, L, CW
Bag 13	TU 6, Feature 1	*Allium*	S, L, CW, H, A, G

*14C age estimate (see Table 8)
A=Attachments; B=bubbled surface; CW=Cell wall patterning; DB=daughter bulb; G=glassy; H=hollow cavity; J/N=Joint rings or nodes present; L=layering; S=shape; SX=spiral cross-section *cf.*=probable identification based on cell-wall patterning as illustrated in Appendix E.

fire-modified rocks, archaeobotanical remains, and in some cases marine shell or calcined bone.

By identifying the contents of bulk samples from features, I developed many of my preliminary field interpretations which had been largely based upon examination of soil stratigraphy. In the field, each of the features I described appeared to be prehistoric based on stratigraphic context. Nine features were subsequently radiocarbon dated, and confirmed this observation. Further, the radiocarbon data demonstrate that the western portion of Ebey's Prairie was used repeatedly over several thousand years from about 7475 to 1670 cal. BC (Table 11).

In the following section I summarize feature descriptions, present ages, and offer interpretations. I then make broader inferences concerning human use of Ebey's Prairie represented by features.

Feature 1

Feature 1 was characterized by a tight cluster of 16 fire-modified rocks including one battered cobble, one flaked cobble, one pecked cobble, and one core (Figures 17 and 18, Appendix G). The top of the rock cluster also contained an intrusion of historic period window glass and rusted metal nails (Figure 17, Table 9). Soil below the rock cluster contained prehistoric artifacts and archaeobotanical remains. I collected charcoal *in situ* from below the rock cluster and radiocarbon analysis returned an age range of 540-330 cal. BP (2-*sigma*, 95% probability) (Table 11).

Figure 17. Feature 1 during excavation of Test Unit 6. This uncatalogued photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Small bars on north arrow indicate cm.

Table 11. Radiocarbon ages of cultural deposits at the Ferry House Site and vicinity on Ebey's Prairie.

Feature No.	***Conventional Radiocarbon Age (BP)***	***C13/C12 ratio o/oo***	***Calibrated Age 2-sigma (BP) 95% probability***	***Intercepts with calibration curve (Cal BC or AD)***	***Sample Context***	***Radiocarbon Lab Sample No.***
Feature 5	160±40	-24.1	290-0	1670-1690, 1730-1810, 1920-1950 AD	shell lens	Beta-203848
Feature 4 (TU7)	300±40	-23.9	470-290	1635 AD	camas bulb	Beta-170656
Feature 4 (TU18)	390±40	-27.4	520-320	1470 AD	camas bulb	Beta-204825
Feature 1	440±50	-23.8	540-330	1445 AD	charcoal among cooking stones	Beta-170657
Feature 6	1110±40	-25.5	1080-940	890-990 AD	shell lens	Beta-203849
Feature 2a	1410±40	-26.1	1360-1270	650 AD	hearth	Beta-159712
Feature 2b	2210±40	-24.3	2330-2120	220, 300, 350 AD	hearth	Beta-159711
Feature 8a Trench 3	3170±40	-24.9	3460-3340	1430 BC	hearth	Beta-211162
Feature 8b Trench 3	4470±40	-26.4	5300-4960	3100 BC	hearth	Beta-204827
Feature 10	5990±40	-26.8	6900-6730	4840 BC	refuse pit	Beta-204826
Anthropogenic paleosol	8360±50	-23.4	9490-9265	7475 BC	anthropogenic paleosol w/ core	Beta-170658

Sample ages determined by Beta Analytic, Inc., Miami, FL. Atmospheric data based on INTCAL98 Calibration database, Stuiver et al. 1998; Mathematics approach based on Talma and Vogel 1993.

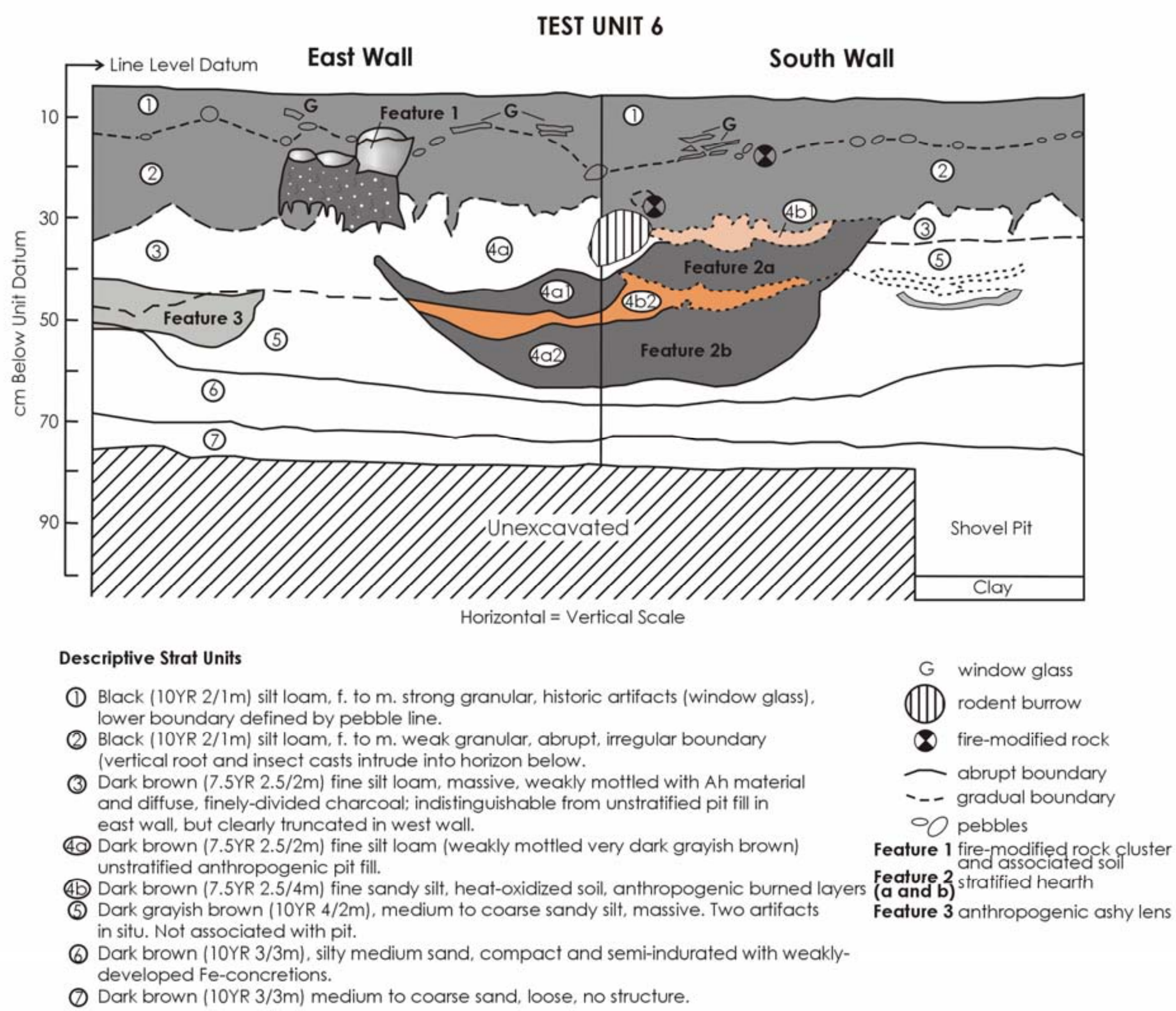


Figure 18. Stratigraphic profile showing Features 1, 2a, 2b, and 3 of the Ferry House Site. Original drawing by Robert Mierendorf and Andrea Weiser, digital graphic by Monika Nill.

I collected and analyzed five bulk soil samples from this feature. Many of the seeds in the assemblage from Feature 1 were eroded but some still retained diagnostic characteristics and I was able to make probable or secure identifications after close examination of seed coats, ridges, and other characteristics (Appendix F). There were also many seeds in Feature 1 that were highly fragmented, unidentifiable, and are not reported in the content summary in Appendix F. Faunal remains in this feature were highly fragmented and could not be identified to genera.

Interpretation of Feature 1

Feature 1 appears to represent a prehistoric steam-cooking feature, used in summer through early fall, for processing plants and animals, with intrusion of historic debris near the plow zone. The cluster of fire-modified rock which included discarded cobble tools, a diverse charred archaeobotanical assemblage, and a small sample of highly fragmented calcined faunal remains provide the basis for this interpretation.

Many of the plants identified from the archaeobotanical assemblage of Feature 1 are edible and include bulbs (Liliaceae), berries (*cf. Amelanchier*, Ericaceae, *cf. Fragaria*, *Rubus*, *Sambucus*, and possibly nuts (?nutshell, ?pericarp[1], ?cotyledon). The occurrence of this array of edible plants together suggests that they were introduced to Feature 1 as a result of human agency. Lily bulbs, berries, and nuts were often cooked by Northwest Coast people (Suttles 1974, 1987a, 1987b; Turner 1995, 1998) in hearths or earth ovens. Alternatively, plant remains may have been introduced unintentionally by people, animals, or other natural processes. This explanation seems unlikely given the presence

[1] A pericarp refers to the fruit wall. In true nuts a nutshell and pericarp are the same.

of artifacts in the same matrix and the nature of charred remains which are mostly food plants.

The small size of the archaeobotanical assemblage could reflect a number of possibilities which would produce very few charred remains, including particular cooking techniques such as steaming, or very few cooking episodes. Wrapping them in vegetal material before cooking them or using baskets or cedar boxes to contain edible plants during cooking were common practices used by Northwest Coast people (Turner 1995, 1998). Low recovery rates of charred archaeobotanical remains are consistent with other archaeobotanical assemblages on the Northwest Coast (Lepofsky 2000a, 2004; Lepofsky et al. 2004; Lepofsky and Lyons 2003; Lyons 2000) and can also reflect a number of taphonomic processes which have diminished the discoverability of remains (Lepofsky 2000a, 2002; Pearsall 2000).

Low temperatures and sustained cooking are indicated by the presence of fire-modified rocks (which produce sustained, reflective heat), and numerous plant fragments which are volatile and likely to be destroyed at higher temperatures. The plant fragments include needles, cone scales, conifer buds, needle tip fragments, and numerous minute twigs from both hardwoods and softwoods. Northwest Coast people commonly practiced steam cooking and would smother a fire with soil and vegetal debris and add hot rocks to provide indirect heat for the foods they were cooking (People of 'Ksan 1980; Turner 1995, 1998).

The preservation of charred needles in Feature 1 likely reflects a smothered fire. Needles from four different conifers (*Abies, Picea, Pinus* and *Tsuga*) were identified in the archaeobotanical assemblage. These may indicate use of green conifer branches in steam cooking, or may be the remains of fuel wood with needles still attached used to keep the fire going over long periods. Both these uses have been documented ethnographically (Turner 1995). Fresh conifer needles would have been desirable for fire starting as well, due to the high resin content, though when used for this purpose needles commonly burn to ash. Conifer boughs would have been available in the surrounding tree islands. Though high winds are common on Ebey's Prairie, and could potentially blow light materials like loose needles into a cooking fire, the association with edible plant seeds and small-diameter branchlets suggests that the conifer needles were intentional constituents of the feature.

Many of the seeds recovered from this feature originate from plants which are edible and may also have been used as packing materials in steam cooking (Asteraceae, *Brassica*, *Chenopodium*, *Claytonia*, *cf.* Cyperaceae, Ericaceae, *Euphorbia*, *Galium*, *cf.* Lamiaceae, *Plantago*, *cf. Portulaca*, *cf. Potamogeton*, *Ranunculus*, *cf. Ruppia*, *Scirpus*, *Silene*, and *cf. Sparganium*). The plant species identified from seeds indicate that this feature was likely used in summer to early fall, when seeds of these plants reach maturity.

The cobble tools included in the cluster of fire-modified rock show signs of flaking, pecking and battering. These are tools which would be well suited for a number of functions, including chopping and splitting small branches for firewood collecting, scooping the earth for pit construction, and scraping and hammering poles for temporary structures or drying racks. While cobble tools in the cluster appear to have served a secondary function as part of the heating element for a cooking feature, none of them have been severely broken or otherwise rendered unusable. They would still be functional tools today and may have been left in this cluster intentionally for future use.

Feature 1 did not appear contiguous with any of the other features at the Ferry House Site based on stratigraphy examined during excavation. However, several attributes of Feature 1 appear similar to Feature 4, such as the presence of Liliaceae bulb fragments and fire-modified rock, the potential association with steam cooking, the age range of each feature, and the similar stratigraphic unit in which they were discovered.

Features 2a and 2b

Feature 2 was basin-shaped and characterized by two layers of black (10 YR 2/1) (Munsell 1973), carbon-rich sediment (i.e., very fine particulate charcoal in the soil matrix) with a layer of reddish, heat-oxidized soil between them. This feature had an amorphous shape in planview and did not appear to be directly associated with the fire-modified rock cluster in Feature 1 overlying it (Figure 18). I concluded that there were two separate, overlapping events represented by the black lenses, and the oxidized layer of soil between them was associated with the lower of the two lenses (see Figures 19 and 20). I collected bulk samples from each lens for microscopic analysis. The age of Features 2a and 2b was obtained from charcoal collected *in situ* during excavation. Radiometric analysis revealed an age range of 1360-1270 cal. BP (2-*sigma*, 95% probability) for Feature 2a (the upper lens) and 2330-2120 cal. BP (2-*sigma*, 95% probability) for Feature 2b (the lower lens). Two lithic flakes found during excavation

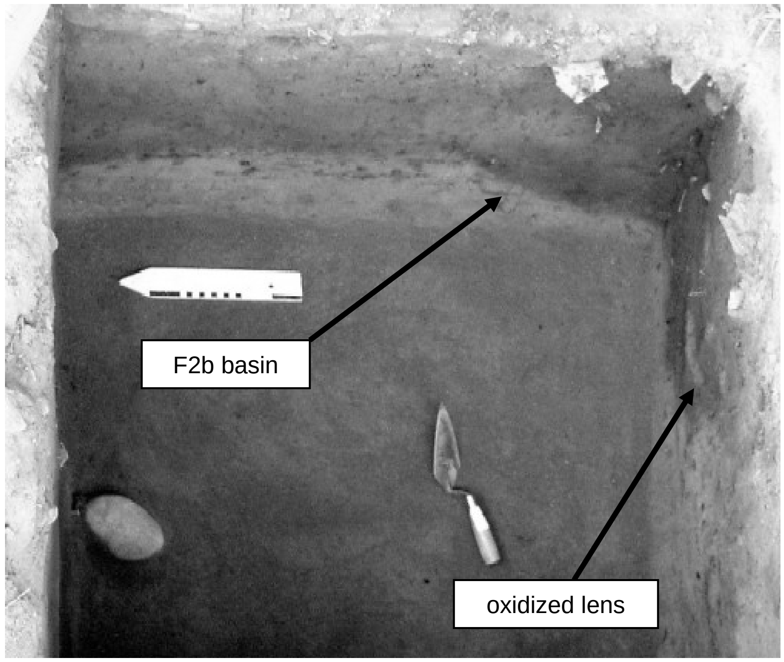


Figure 19. Feature 2 at the Ferry House Site in Test Unit 6. This photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Small bars on north arrow indicate cm.

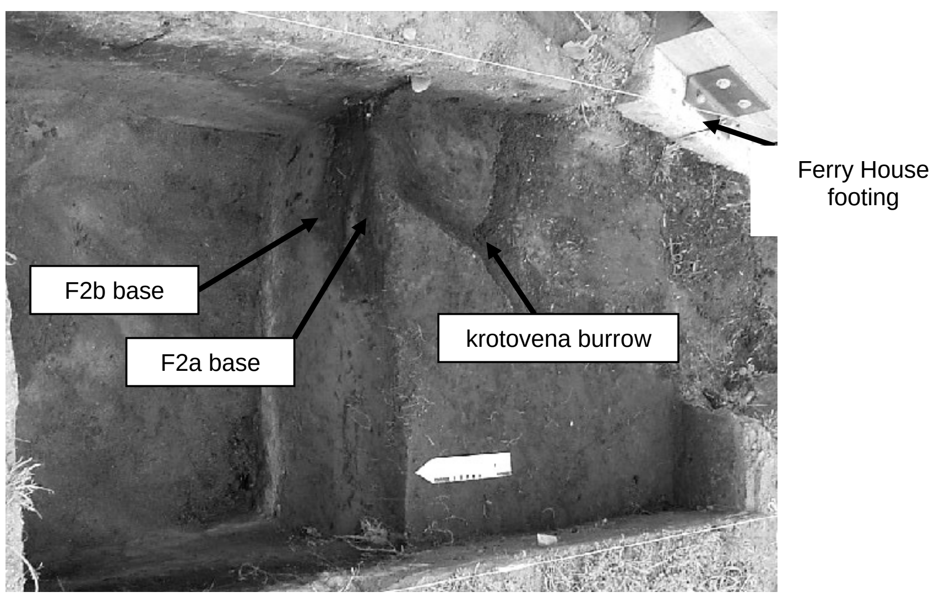


Figure 20. Features 2a and 2b at the Ferry House Site in Test Unit 18. This photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Small bars on north arrow indicate cm.

were associated with Feature 2a (Table 9). No artifacts were found to be associated with Feature 2b during excavation.

Many of the seeds in Feature 2a were highly fragmented, unidentifiable, and are not reported in the content summary in Appendix F because they cannot provide reliable information about seed quantity or taxonomic diversity of the assemblage. However, a small, lightly charred glume was recovered from Feature 2a, indicating the presence of grassy material. Seeds from Feature 2b were eroded, lacked diagnostic characteristics, and therefore unidentifiable.

Interpretation of Features 2a and 2b

Feature 2a and 2b appear to be prehistoric hearths, constructed in the same location but separated in time by approximately 800 to 1000 years (Table 11). It is unclear whether these hearths were used as cooking fires, heating fires or both. Both features contained open fires during part of their histories, as indicated by mottled oxidized soil above the black lens of Feature 2a and the continuous oxidized layer overlying the black lens of Feature 2b. Several items in the features also indicate low temperatures; such as the glume, conifer cone scales and needles, and the possible cotyledon (?Fabaceae), which would have been destroyed if exposed to high temperatures.

I identified four conifers (*Picea, Pinus, Pseudotsuga menziesii*, and *Tsuga*) from needle fragments in Feature 2a (Appendix F), which also contained a high density of cone scales. Feature 2b contained *Picea* and *Pinus* needles and a moderate density of cone scales.

Seasonality of the features is unclear. One seed, which is likely *Rosa,* and a glume, found in Feature 2a could indicate that the feature was deposited in the late summer or early fall when seeds of these plants reach maturity. However, rose seeds and grass glumes may also have remained on dried plants through the winter before being deposited in the hearth.

It is clear that Features 2a and 2b are not directly associated with one another because of their temporal separation. The fact that they overlap spatially may signify an indirect association, however. This locale appears to have been favored for particular activities which centered around a hearth, even over thousands of years. The two features appear to have served similar functions for heating and perhaps cooking, based on their appearance and contents. Feature 2a may be more directly associated with Feature 3, based on depth, proximity, and content, though their temporal relationship is yet unknown. This possible relationship is discussed further in the context of observations related to Feature 3.

Feature 3

Feature 3 was characterized by a small area of darkly stained soil which was roughly rectangular in shape, flat on the top and concave at the bottom (Figures 18 and 21). During excavation I noted that this unusual soil lens contained charcoal flecks and fire ash.

Figure 21. Ferry House Site Features 1-3 in Test Unit 6. This uncatalogued photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Small bars on north arrow indicate cm.

I sampled this feature in its entirety and analyzed the contents. The sample contained very few charred remains but included small diameter (~1 mm) pieces of branch wood and otherwise contained very few charred remains (Appendix F). There has been no attempt to determine the age of this feature. Charcoal was collected *in situ* during excavation but it has not been submitted for radiocarbon analysis.

Interpretation of Feature 3

Feature 3 provides no evidence that it is a hearth. Rather, the presence of few charred needles, seeds, or wood charcoal, combined with the mixed and mottled sediments with ash, point toward a refuse dump or potentially a windblown deposit from a hearth located nearby (such as Feature 2a). The shallow, linear nature of Feature 3 may indicate that feature fill was deposited where a log or other item used to be.

Feature 3 may be related to Feature 2a (a hearth) which is in close proximity (ca. 20 cm distant), situated at a comparable depth, and is to the windward side of Feature 2a for at least part of the day. The presence of *Picea* and *Pseudotsuga menziesii* needles in Feature 3 is consistent with the contents of Feature 2a. The mottled appearance of the oxidized soil overlying the top of Feature 2a is also consistent with a wind-deflated surface where oxidized soil has been displaced. Radiocarbon analysis of the charcoal collected *in situ* from Feature 3 would help determine whether Feature 2a and Feature 3 are contemporaneous.

Feature 4

Feature 4 is largely defined by its content, rather than its appearance. The most distinguishing characteristic of Feature 4 is that it contains charred Liliaceae bulbs, many of them *Camassia* (Figures 22 and 23, Table 10). It also contains carbon-rich sediment, fire-modified rock, and large fragments of charcoal >6.4 mm (1/4-inch) in size (Table 12). Most of this feature was not visible in profile because it was excavated from under the Ferry House (Figure 24). However, a small window into the stratigraphic context of this feature can be demonstrated in Test Unit 7 (Figure 25). The content recovered from this feature (Tables 10 and 12) only represents remains >6.4 mm (1/4-inch) in size due to the dry screening method used.

Figure 22. *Camassia* from Feature 4, Ferry House Site. Bulb on left is ~470-290 cal. BP (Field Bag 82). These items are in the collection of North Cascades National Park Service Complex. Photograph by Andrea Weiser, used by courtesy of the National Park Service.

Figure 23. *Camassia* bulb from Feature 4, Ferry House Site. This item is in the collection of North Cascades National Park Service Complex. Photograph by Andrea Weiser, used by courtesy of the National Park Service.

Table 12. Summary of Feature 4 cultural material collected from 6.4 mm (1/4-inch) screen during excavation.

Cultural Material	Quantity (N)
Archaeobotanical Remains	
Lilliaceae bulbs	20⁺
Charcoal >6.4 mm	51-200
Root or rhizome	1
Artifacts	
Fire-modified rocks	~50

A number of the plant bulbs recovered from Feature 4 were too fragmented to classify but I was able to identify 20 nearly-whole specimens (Table 10). I examined these 20 specimens in detail and compared them to reference samples, finding that the majority of them were camas (*Camassia)* and onion (*Allium)*. Both camas and onion bulbs have paper-thin overlapping modified leaf scales which appear as concentric rings or a spiral in cross-section. I was able to differentiate between these two genera in some samples by examining the epidermal tissue where the delicate net or brick-like cell-wall patterning was visible. Although epidermal cells can appear similar in shape and arrangement in onion and camas, a difference in the size of cellular openings is a distinguishing characteristic (see Appendix E). One sample from Feature 4 was clearly not in the Liliaceae family and appeared to be a swollen underground stem or rhizome. I compared this sample with several rhizomes and swollen underground stems but the specimen lacked diagnostic characteristics and I was unable to make a positive identification.

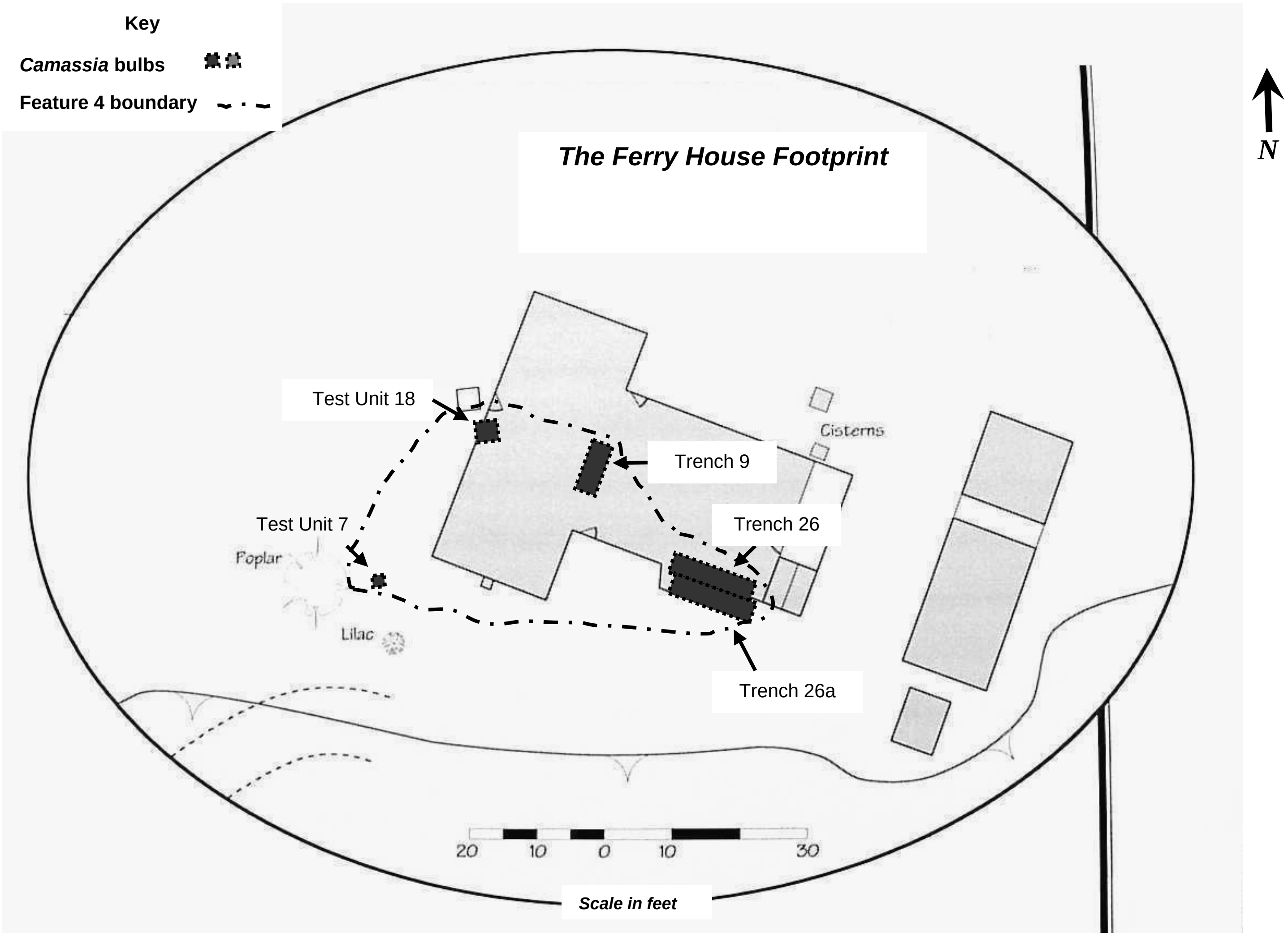
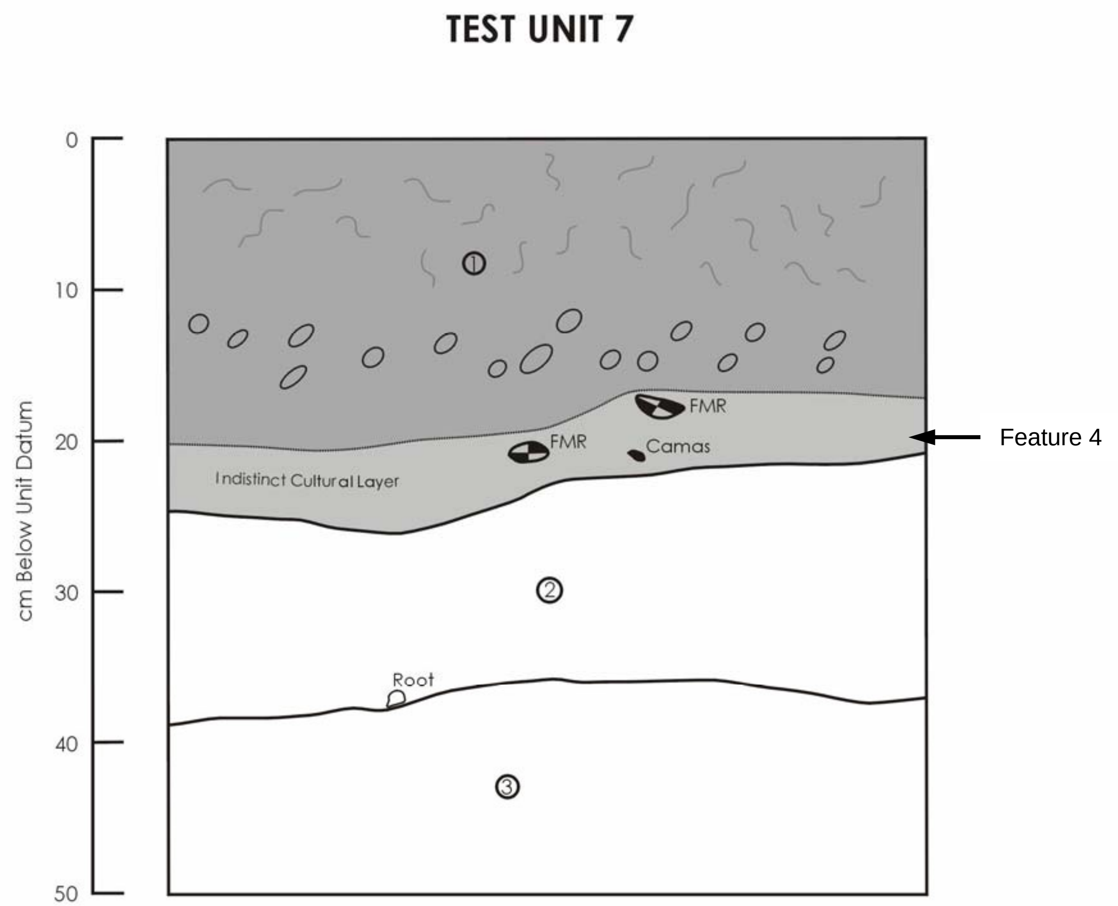


Figure 24. Distribution of *Camassia* in Feature 4, recovered from trenches and test units under and adjacent to the Ferry House. Base map created by Keith Garnett.



Soil	Descriptive Unit	Stratigraphic Description
A and Ap	1	Black (10YR 2/1) silt loam with many feeder roots; minimal gravel ca. 5 % grading to more gravel ca. 2.5 cm diameter ca. 35 %. Two fire-modified rocks near the bottom; gravel content decreases; charred camas collected in situ at -22 cm BS.
B	2	Very dark brown (7.5YR 2.5/2) loamy sand, velvety, soft, does not form a ribbon. Very few pebbles.
BC	3	Dark brown (10YR 3/3) silt loam with very few tiny pebbles.

Figure 25. Stratigraphic profile of Feature 4 in Test Unit 7 of the Ferry House Site. Original drawing by Andrea Weiser, digital graphic by Monika Nill.

For the archaeological specimens I examined, epidermal cells were visible but clear photomicrographs were difficult to obtain. Epidermal cell patterns were often eroded, surfaces were uneven, and bulb leaf scales had been fused when charring occurred. This meant that I could see very small patches of epidermal cells on bulb surfaces but could not get a thin enough sample of epidermal tissue for light to pass through it and create clear photographic images. However, I was able to produce micrographs of three archaeological plant bulbs, showing examples of the epidermal cells from archaeological specimens (Appendix E).

Two of the camas bulbs, recovered from Test Unit 7 and Test Unit 18, were submitted for radiocarbon analysis. The sample from Test Unit 7 indicated an age range of 470-290 cal. BP (2-*sigma*; 95% probability) (Figure 22). The sample from Test Unit 18 indicated an age range of 520-320 cal. BP (2-*sigma*; 95% probability).

Interpretation of Feature 4

Several attributes of Feature 4 indicate intentional plant processing by humans. The completely charred plant bulbs in Feature 4 are similar to those found in camas cooking features in archaeological contexts elsewhere (Andrefsky et al. 2000; Cheatham 1988; Kramer 2000; O'Neill et al. 2004; Thoms 1989). The fact that these bulbs were clustered in concentrated areas (Figure 24) and associated with wood charcoal and fire-modified cobbles is an indication of human agency. Cobble selection is suggested because the cobbles are uniform in size and composed of stone types which can withstand multiple episodes of heating and cooling before breaking down (e.g., quartzite). Such cobbles do not occur naturally on the site (this can be demonstrated through non-cultural stratigraphic contexts) and had to be transported to Feature 4 from another location (likely the local beach where many are available). The cobbles show signs of being baked or boiled, and were likely used as a heating element in an earth oven or boiling basket. This is evidenced by heat oxidization and reddening, and the crazing and fracturing typical of repeated heating and cooling in a moist environment (Thoms 1989; Wandsnider 1997). Taken together, evidence from Feature 4 demonstrates that a slow-cooking method was used to cook edible lily bulbs.

Feature 4 does not appear to have the signature of many of the camas roasting pits described by Thoms (1989) and others (Cheatham 1988; O'Neill et al. 2004) — namely basin-shaped with steep sides. Feature 4 more likely represents a disassembled platform oven (*cf.* Thoms 1989:398-399) or refuse from an earth oven dumped in a secondary location. Platform ovens were built on top of the ground with soil mounded over the top and were much more common on the Northwest Coast than the Interior (Thoms 1989:273) (Figure 26). Whether Feature 4 is the remains of a platform oven or represents secondary refuse from a camas roasting site is still unclear, but it contains an unusually low density of fire-modified rock compared to the camas features described by Thoms and others (Table 13).

There are several possible explanations for the low density of fire-modified rocks in Feature 4. The cobbles from a disassembled cooking feature may have been subsequently collected and reused elsewhere. Or perhaps the large number of cobbles typically used for a heating element in basin-shaped ovens was not necessary on Ebey's Prairie. To test this hypothesis, I constructed a small (ca. 40 cm in diameter) platform-hearth at my home (Figure 27) using the same number of cobbles (n=50) found to be fire-modified and scattered throughout Feature 4. I found that this small assemblage of cobbles used in a small, above-ground hearth was effective for cooking camas (Figures 28 and 29).

The archaeological signature of Feature 4 may also offer a subtle reflection of the difference between demographics and seasonal rounds on Ebey's Prairie when compared to larger inland camas prairies. On Ebey's Prairie, perhaps camas was not the primary focus, but was instead one of many resources within a culturally-preferred ecosystem.

Feature 4 does not appear to be contiguous or directly overlapping with any of the other features at the Ferry House Site based on stratigraphic evidence. However, as mentioned earlier, Feature 1 and Feature 4 may be indirectly related in other ways. The presence of Liliaceae bulb fragments, fire-modified rock, the potential association with steam cooking in both features, the similar age range of each, and the fact that both features were discovered in a similar stratigraphic unit, all suggest indirect connections between the two features.

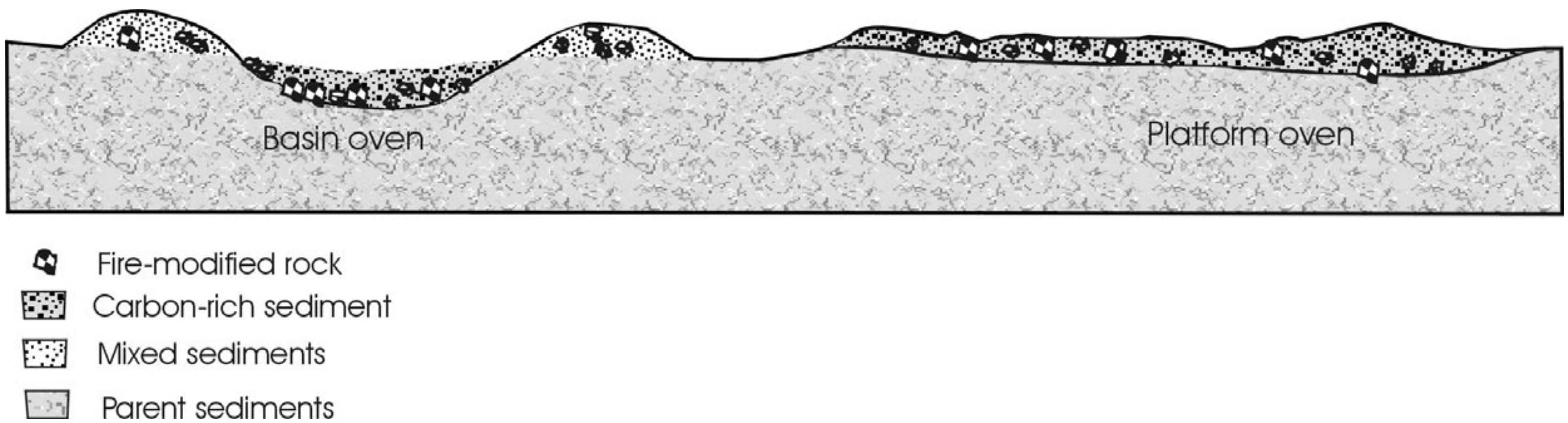


Figure 26. Two common types of dissasembled ancient camas ovens based on research by Thoms (1989:399).

Table 13. Features 1 and 4 at the Ferry House Site compared to common characteristics and contents described for earth ovens in the Northwest.

Characteristics and Contents	***Types of Features***[1]			***Ferry House Feature***	
	Platform oven	***Basin oven***	***Refuse dump***	***1***	***4***
Basin-shaped with steep sides		**X**			
Shallow and hummocky	**X**				**X**
Abundant charcoal	**X**	**X**	**X**		**X**
~100-200 scattered FMR[1]		**X**			
~100-200 clustered FMR[1]	**X**				
<100 scattered FMR[1]			**X**	**X**	**X**
<100 clustered FMR[1]				**X**	
Carbon-stained sediment	**X**	**X**	**X**	**X**	**X**
Charred *Camassia* and/or unidentifiable Lillaceae bulbs	**X**	**X**	**X**	**X**	**X**
Constructed in silty soil	**X**			**X**	**X**
Constructed in sandy soil	**X**	**X**			

[1] Characteristics and contents are based on camas roasting ovens described by Cheatham (1988), O'Neill et al. (2004), and Thoms (1989). [2] Fire-modified rock.

Figure 27. Disassembled experimental earth oven. Unpublished photograph by Rob Klengler, used with permission.

Figures 28 and **29**. Camas bulbs after roasting. Photograph on left shows salal and lettuce leaf wrapping. On right, note variation between uncooked and completely charred bulbs. Unpublished photographs by Rob Klengler, used with permission.

Features 5 and 6

Features 5 and 6 were sampled from the wall of an expedient stratigraphic pit (described in the Methods chapter) which was excavated as part of a study of soil deposition on Ebey's Prairie by Stein et al. (2006). Features 5 and 6 were each recognized as a dark soil lens which appeared anomalous in the surrounding soil strata and contained fragmented marine shell (Figures 30 and 31). Both Features 5 and 6 also appeared to be associated with large unmodified cobbles (i.e., 6-8 cm diameter) which were otherwise absent in the soil profile.

I collected and analyzed bulk samples from Features 5 and 6. In Feature 5, both ring-porous and diffuse-porous deciduous woods were noted, and many of the charcoal fragments were small diameter (i.e., ~1mm) twigs. Feature 6 included larger (i.e., 2-4 mm) pieces of wood charcoal, one small fish vertebra and fragmented rodent bone (Table 8). Both features contained large quantities of beach sands and small gravels.

The ages of Features 5 and 6 were obtained from charcoal recovered in bulk samples 556-1 and 558-1. Radiocarbon analysis revealed an age range of 290 to 0 cal. BP (2-*sigma*, 95% probability) for Feature 5, and 1080-940 cal. BP (2-*sigma*, 95% probability) for Feature 6 (Table 11).

Figure 30. Features 5 and 6 bulk sample locations in Strat Pit Expanded 5. This uncatalogued photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Small bars on north arrow indicate cm.

Interpretation of Features 5 and 6

Features 5 and 6 appear to be refuse lenses associated with shellfish steaming or roasting. Compared to thick shell middens elsewhere on the Northwest Coast, these lenses contain very low densities of highly fragmented shell. This light accumulation of remains may indicate a shorter period of use (i.e., temporary camping versus winter village settlement) or perhaps marks the outer limit of more substantial shell middens which have eroded significantly. The highly fragmented nature of the buried calcined shell in Features 5 and 6 may indicate human trampling, which would be consistent with impact from foot trails or living surfaces.

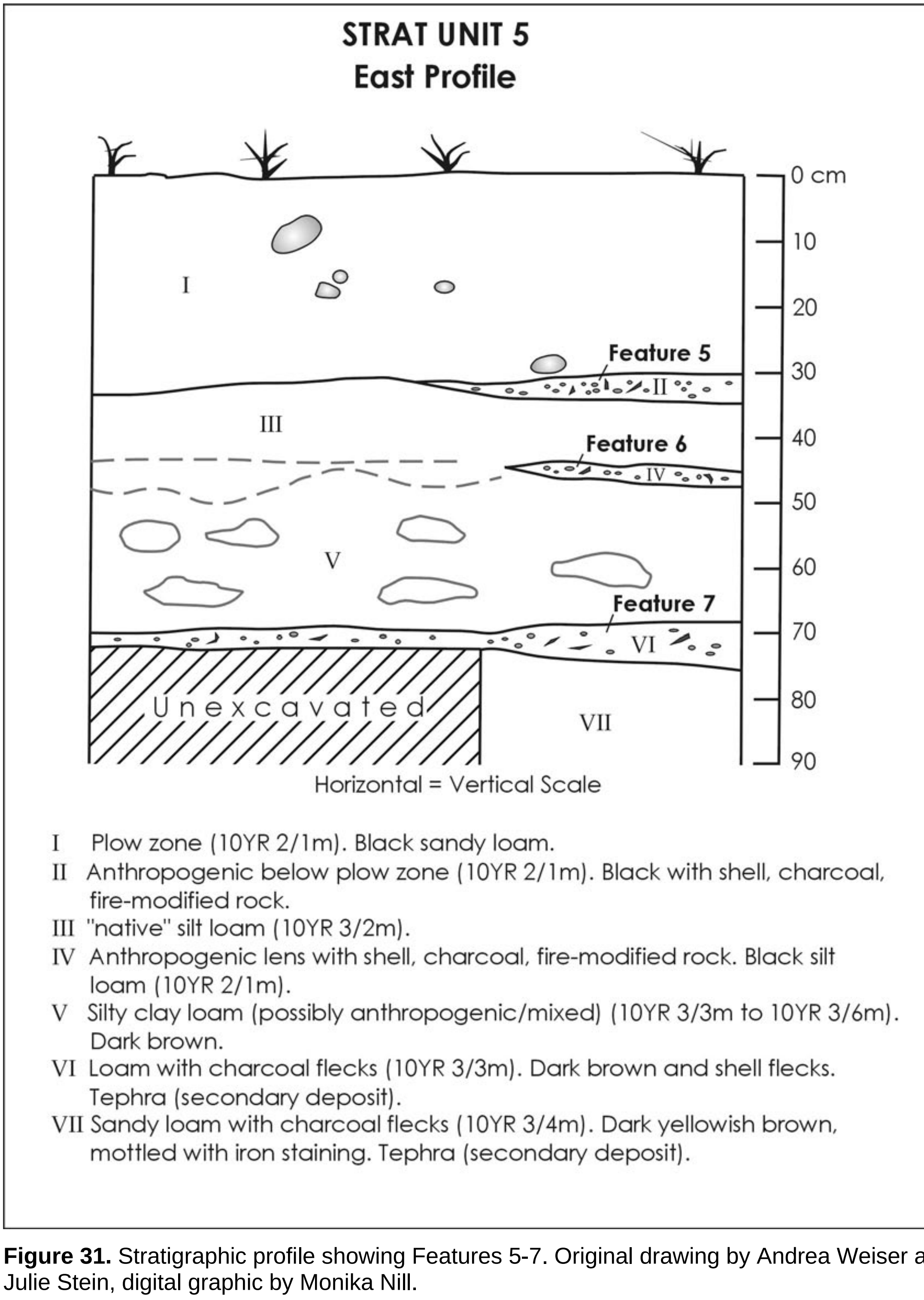


Figure 31. Stratigraphic profile showing Features 5-7. Original drawing by Andrea Weiser and Julie Stein, digital graphic by Monika Nill.

Feature 5 is potentially associated with the village described by Father Blanchet 166 years ago in this vicinity or periodic camping events described by the Ebey family between 1850 and 1860. The age (290 to 0 cal BP) and content of Feature 5 are the basis for this assertion. Blanchet did not identify the exact location of the village he visited, but he did mention that it was situated on a bluff 50 feet above the beach now known as Ebey's Landing (Kellogg 2001:8). Today, there are two shell concentrations near the terrace edge above Ebey's Landing; one of these is the location of Feature 5 and the other is above Ebey's Prairie and outside of my study area (ca. 30 m or 100 feet above the beach). There is no clear evidence of a village surrounding Feature 5 today, but it is located very near a steep eroding terrace edge. It is possible that a more substantial shell midden and village remnant has sloughed off at the terrace edge and been distributed across beach sands, partially washed out during high tides and partly redeposited on the shoreline. An undated shell midden (site 45IS88) is situated on the shoreline about 15 m below Feature 5 and may be associated. Feature 5 could also reflect periodic camping by indigenous people near the Ebey family homestead which the Ebeys described between 1850 and 1860 (Ebey 1855; Farrar 1916, 1917).

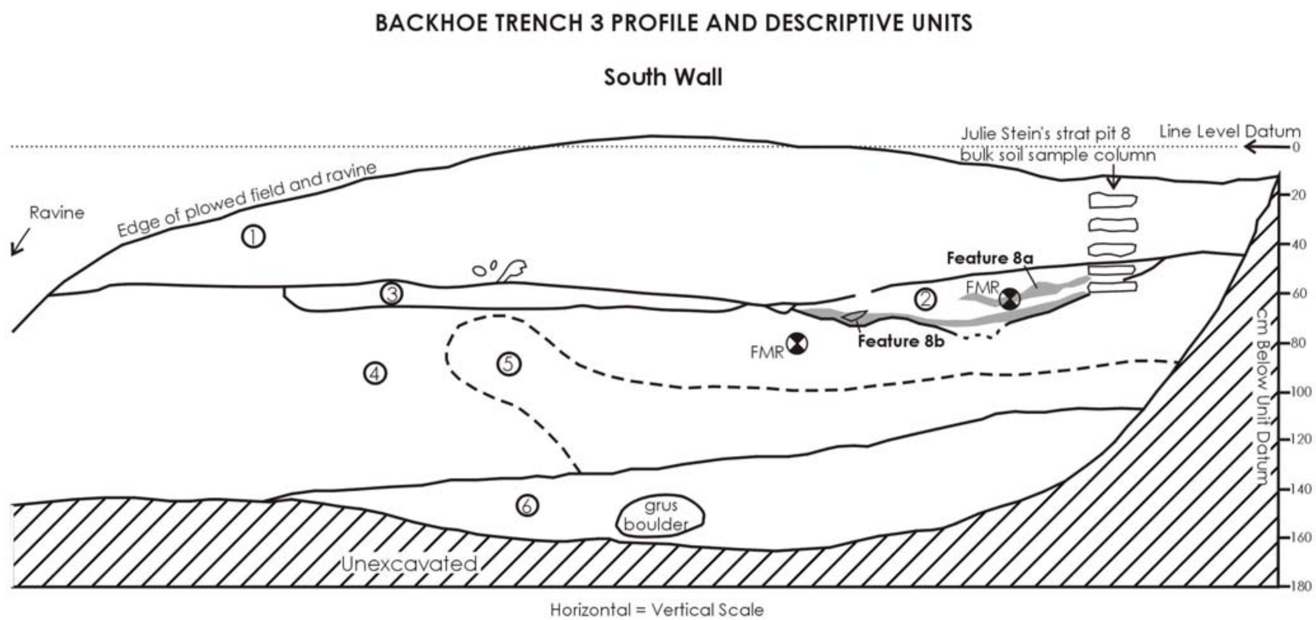
Features 8a and 8b

Features 8a and 8b were discovered and documented in a backhoe trench near the ravine of an intermittent creek. They were recognizable by distinct carbon-rich black

Figure 32. Features 8a and 8b in Strat Pit Expanded 8 and Trench 3. This photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Scale bars on meter stick are 10 cm increments.

lenses of soil, were slightly basin-shaped, and framed by orange-tinted oxidized soil lenses (Figures 32 and 33). The two black lenses, separated vertically by an oxidized soil lens, appeared to represent at least two episodes of human use and were therefore bulk sampled separately.

Charcoal recovered from bulk samples 579-1 and 577-1 were submitted for radiocarbon analysis to determine the age range of Features 8a and 8b. Radiocarbon analysis of charcoal collected from the features revealed an age range of 3460 to 4960 cal. BP (2-*sigma*, 95% probability) for Feature 8a and 5300-4960 cal. BP (2-*sigma*, 95% probability) for Feature 8b (Table 11).



Descriptive Unit	*Stratigraphic Description*
1	**Black (10YR 2/1m) sandy silt, strong medium granular peds. Plowzone.**
2	**Stratified Feature 8 fill.**
3	**Brown (7.5 YR 4/3m) sandy silt, heat-oxidized; anthropogenic burning. Association with Feature 8 uncertain.**
4	**Light gray, indurated, compact sandy silt with coarse subangular blocky structure (strat unit 5a in TU-18).**
5	**Gray, silty coarse sand (strat unit 5b in TU-18).**
6	**Gray, moderately sorted sand, mottled with iron bands and concretions and iron-rich silt lamellae; encased a rounded granite boulder that had entirely weathered to grus and crumbled at the touch of a trowel, interpreted as a dropstone, suggesting this unit reflects glacial outwash and/or isostatic land rise. Same as Unit 6 in TU-6 and TU-18 strats.**

Figure 33. Stratigraphic profile showing Features 8a and 8b. Original drawing by Bob Mierendorf, digital graphic by Monika Nill.

Interpretation of Features 8a and 8b

Features 8a and 8b appear to be hearths, constructed in the same location but separated in time. It is unclear whether these hearths were used as cooking fires, heating fires, or both. Both features contain evidence of open flame as opposed to smothered fires at least during part of their histories, as indicated by mottled oxidized soil above the black lens of Feature 8a and the continuous oxidized layer overlying the black lens of Feature 8b. Charcoal was highly fragmented in both samples and perhaps much of the charcoal content, observable as carbon-rich soil lenses in the field, was from particles smaller than 0.250 mm in size which could have washed away during the flotation process.

Feature 8a contained seeds from forbs (*Brassica*, *Trifolium*, and *Polygonum*) and at least one piece of diffuse porous hardwood which was the basis for the age determination of this feature. The three seeds from Feature 8b were highly eroded and lacked diagnostic characteristics. No clear associations can be made between Features 8a and 8b and any other features in the vicinity of the Ferry House Site.

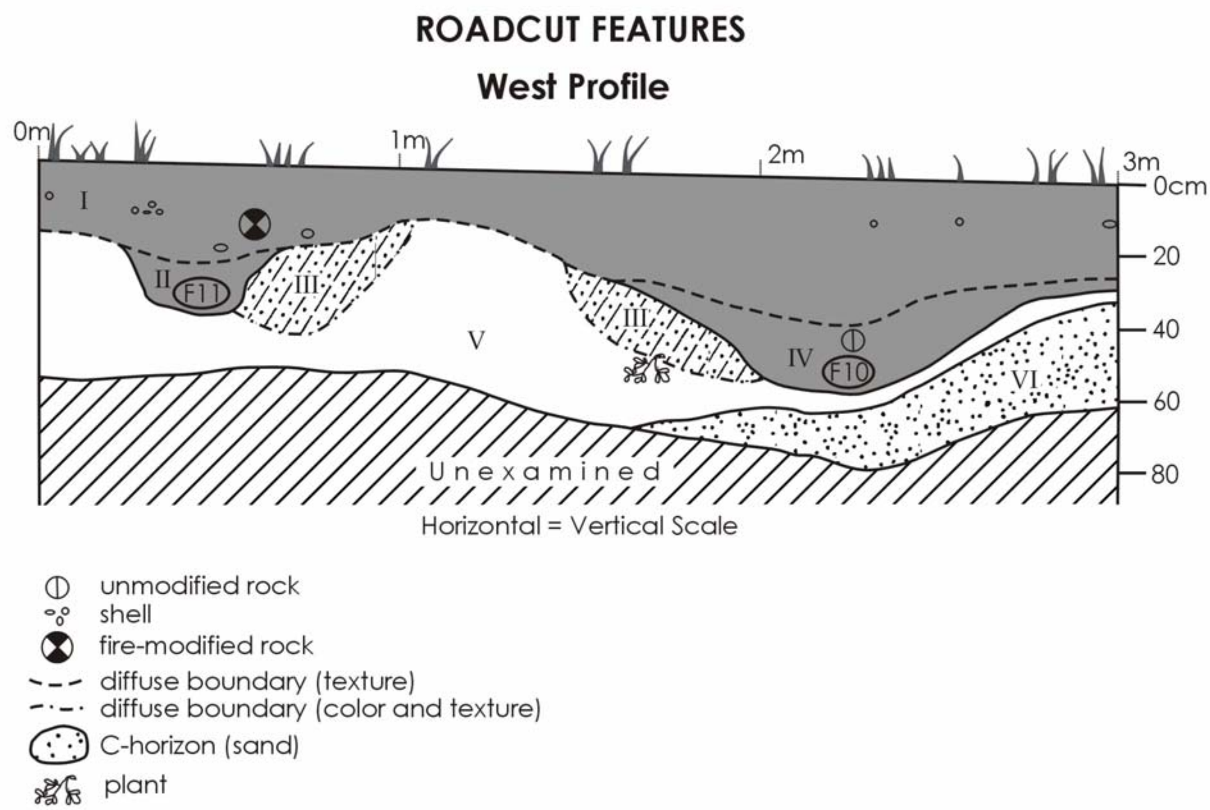
Features 10 and 11

Features 10 and 11 were observed in the cutbank of a road near the western edge of the Ferry House Site. Feature 10 is a large basin-shaped pit containing carbon-rich soil, fire-cracked rock, and at least one lithic flake which fell from the profile during wall scraping (Figures 34 and 35). The contents of Feature 10 generally appeared mixed and

Figure 34. Feature 10 in roadcut before bulk sampling. This photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Scale bars on meter stick are in 10 cm increments.

homogeneous with one carbon-rich lens. A bulk sample was collected from the deepest, most discernible part of this pit and likely represents one of the earliest deposition episodes in this feature. Feature 11 was observed as a steep-sided pit about a third of the size of Feature 10 (Figures 35 and 36). It contained mixed, homogeneous carbon-rich soil and no discernible lenses or laminations.

I collected and analyzed contents of bulk soil samples from Features 10 and 11. The soil was deeply stained from charred material in Features 10 and 11, yet analysis of bulk samples from them yielded only a trace of charcoal (Appendix F). Charcoal was collected from the deepest carbon-rich context clearly within the outline of the feature and is the basis for age determination for Feature 10. Radiocarbon analysis revealed an



I A-Horizon (plow zone). Black (10YR 2/1) silt loam.

II Feature 11 fill. Black (10YR 2/1) fine silt with a very small fraction of sand. Flecks of dark yellowish-brown (10YR 3/4) are also present (sandy silt). Bulk sample collected (Bag 580). Feature was shallow, ca. 5 cm into wall.

III Dark stain associated with features (10YR 4/1), dark grey sandy silt.

IV Feature 10 fill. Black (10YR 2/1) silt with flecks of iron oxide (7.5YR 5/8), strong brown. Bulk sample Bag 575.

V B-C Horizon. Compact sandy silt (10YR 3/3), dark brown.

VI C-Horizon. Poorly sorted loose sand (10YR 4/3), brown medium grain.

Figure 35. Stratigraphic profile of Features 10 and 11. Original drawing by Andrea Weiser, digital graphic by Monika Nill.

age range of 6900-6730 cal. BP (2-*sigma*, 95% probability) (Table 11). There is currently no basis for age determination of Feature 11. However, the stratigraphic context of Feature 11 and its apparent lack of bioturbation when compared to Feature 10 (as demonstrated through easily distinguished outlines) suggest that it is younger than Feature 10.

Interpretation of Features 10 and 11

Features 10 and 11 appear to be refuse pits, based on the mixed homogeneous appearance of feature fill. Though one carbon-rich lens appears in Feature 10, it is mixed, mottled and does not appear comparable to a primary hearth deposit. Instead, this lens likely reflects one early episode of secondary deposition (perhaps hearth cleanings) within the feature. Since the matrix of both features appeared mixed and homogeneous and lacked individual laminations which could demonstrate multiple deposition episodes, I concluded that each feature was likely deposited in a single episode. The age range derived from this lens can only be representative of a single depositional event. No clear associations can be made between Feature 10 and Feature 11 and any other features in vicinity of the Ferry House Site.

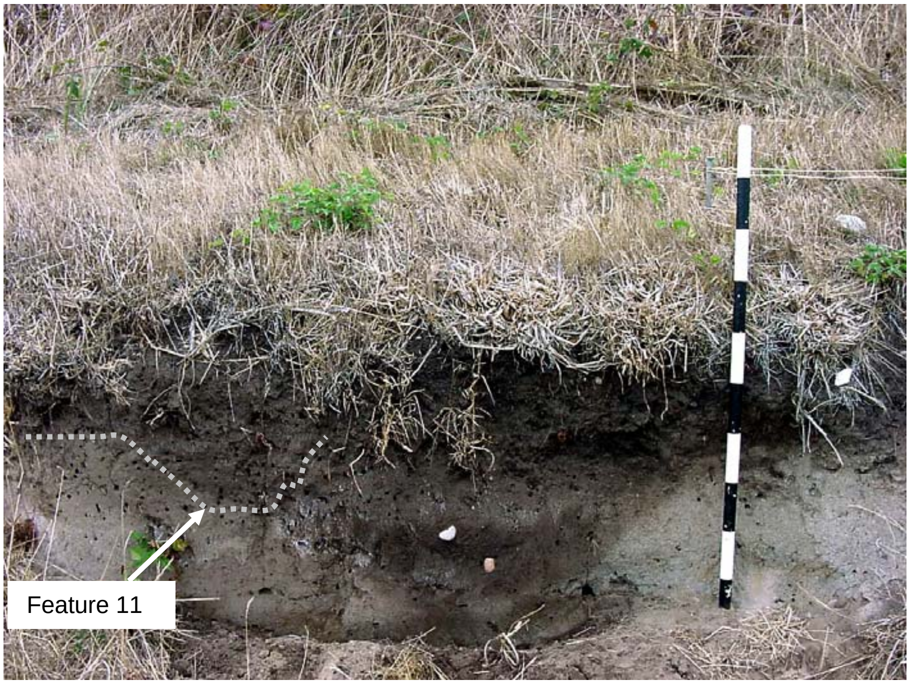


Figure 36. Feature 11 in roadcut before bulk sampling. This photograph is part of the collection of North Cascades National Park Service Complex. Photograph courtesy of the National Park Service. Scale bars on meter stick are in 10 cm increments.

Summary of Archaeobotanical Remains Recovered from Features

The archaeobotanical remains from all but one feature (Feature 4) were recovered by flotation. I was able to make taxonomic identifications based upon a variety of remains such as seeds, needles, bulbs, a glume, and a single fruit (Figure 37 and Appendix F). Wood charcoal was apparent in all samples during flotation as highly fragmented particulate blended into the soil matrix. Most charred wood pieces were smaller than 1 mm and were weighed but problematic to identify. However, by examining some of the largest charred wood pieces (i.e., 2 mm in size or greater) I was able to establish that both hardwoods and softwoods were represented in the assemblage and that the majority of the pieces were small diameter twigs.

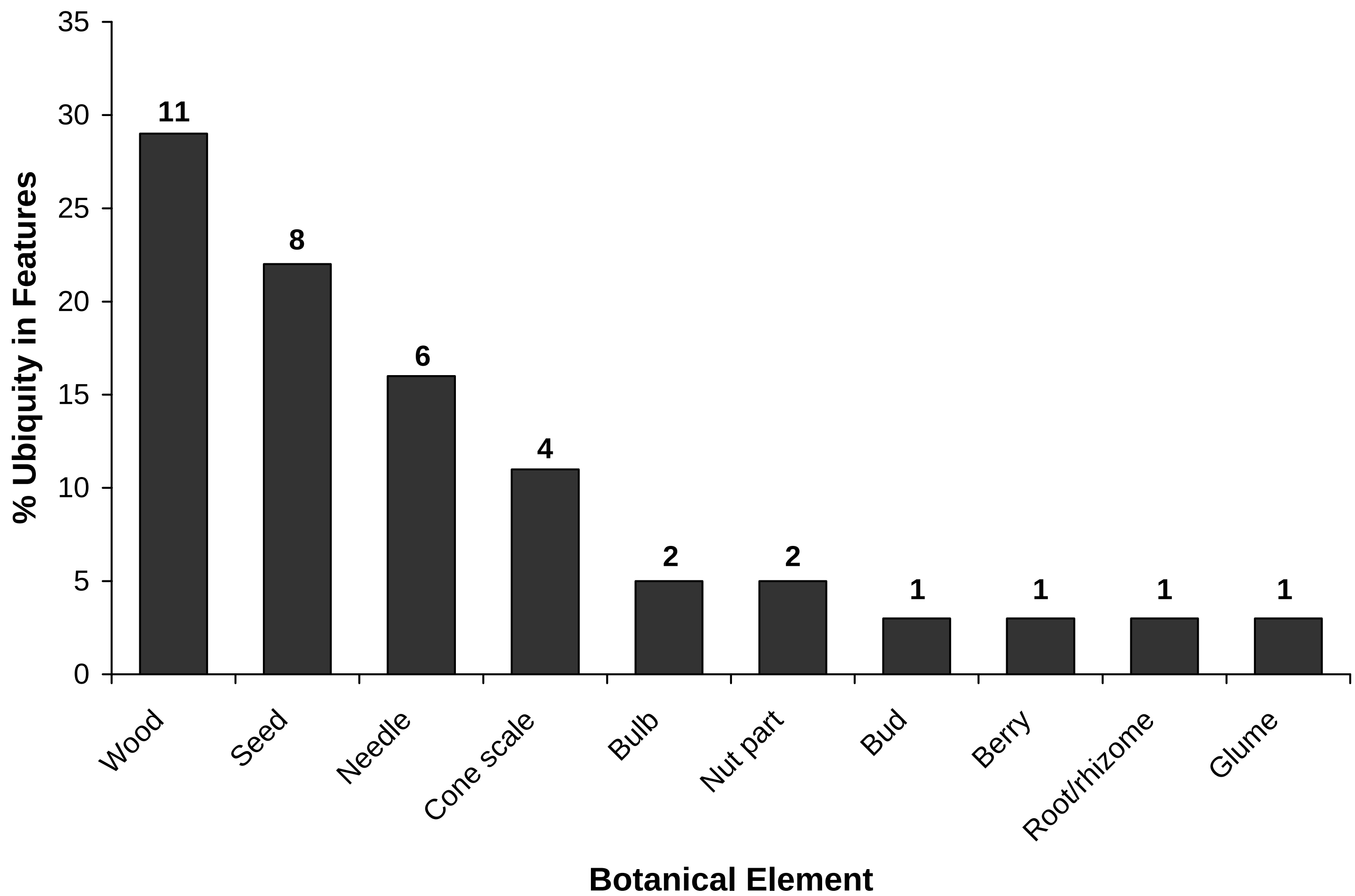


Figure 37. Relative ubiquity of charred archaeobotanical elements in features from the vicinity of the Ferry House Site on Ebey's Prairie. Numbers above each bar indicate number of features which contain each botanical element.

Overall, the density of archaeobotanical remains in all samples was low but I was able to gain useful information about the types of plants (i.e., grasses and grasslike plants such as sedges, forbs, shrubs and trees) represented by features in the Ferry House Site and vicinity (Table 14). The majority of ancient plants identified from the features were also native to the anthropogenic prairies of western Washington in the early historic period (listed in Appendix A). Like anthropogenic prairies, the archaeobotanical assemblage is dominated by forbs (Figure 38), and includes a variety of edible and useful plants (Figure 39). Both prairie and forest vegetation is represented, by the presence of annuals, perennials, hardwoods, and softwoods in feature deposits. Four of the plants identified from ancient seeds in Features 1 and 5 derive from freshwater aquatic plants.

Table 14. Plants identified in the archaeobotanical assemblage of the Ferry House Site and vicinity.

Taxon	***Feature Number***							
	1	**2a**	**2b**	**3**	**4**	**5**	**6**	**8a**
Grasses & grass-like								
Cyperaceae							**X**	
cf. Cyperaceae	**X**							
Poaceae						**X**		
cf. Poaceae (glume)		**X**						
*cf. Ruppia**	**X**							
*Scirpus**	**X**							
*cf. Sparganium**	**X**							
Forbs								
Allium	**X**				**X**			
Asteraceae	**X**							
Brassica						**X**		**X**
Camassia					**X**			
Chenopodium	**X**		**X**			**X**		
Claytonia								
Euphorbia	**X**							
cf. Fragaria	**X**							
Galium	**X**					**X**		
cf. Lamiaceae						**X**		
Plantago	**X**					**X**		
Polygonum								**X**
Portulaca						**X**		
cf. Portulaca	**X**							
*cf. Potamogeton**	**X**							
Ranunculus	**X**							

Taxon	***Feature Number***							
	1	**2a**	**2b**	**3**	**4**	**5**	**6**	**8a**
cf. Ranunculaceae						**X**		
Silene						**X**		
Trifolium								**X**
cf. Viola	**X**							
Shrubs								
cf. Amelanchier	**X**							
?Caprifoliaceae			**X**			**X**		
?*Cornus*^	**X**							
Ericaceae	**X**							
cf. Rosa		**X**						
Rosaceae^			**X**					
Rubus	**X**							
cf. Rubus		**X**						
Sambucus	**X**					**X**		
cf. Sambucus						**X**		
Trees								
Abies	**X**							
Picea	**X**	**X**	**X**	**X**				
Pinus	**X**	**X**	**X**					
Pseudotsuga menziesii		**X**						
Tsuga	**X**	**X**						

* freshwater aquatic plants ^taxon may also fit into "forb" category (e.g., *Cornus nutallii*, a shrub, or *C.canadensis*, a forb)
cf.=probable identification, ?=possible identification

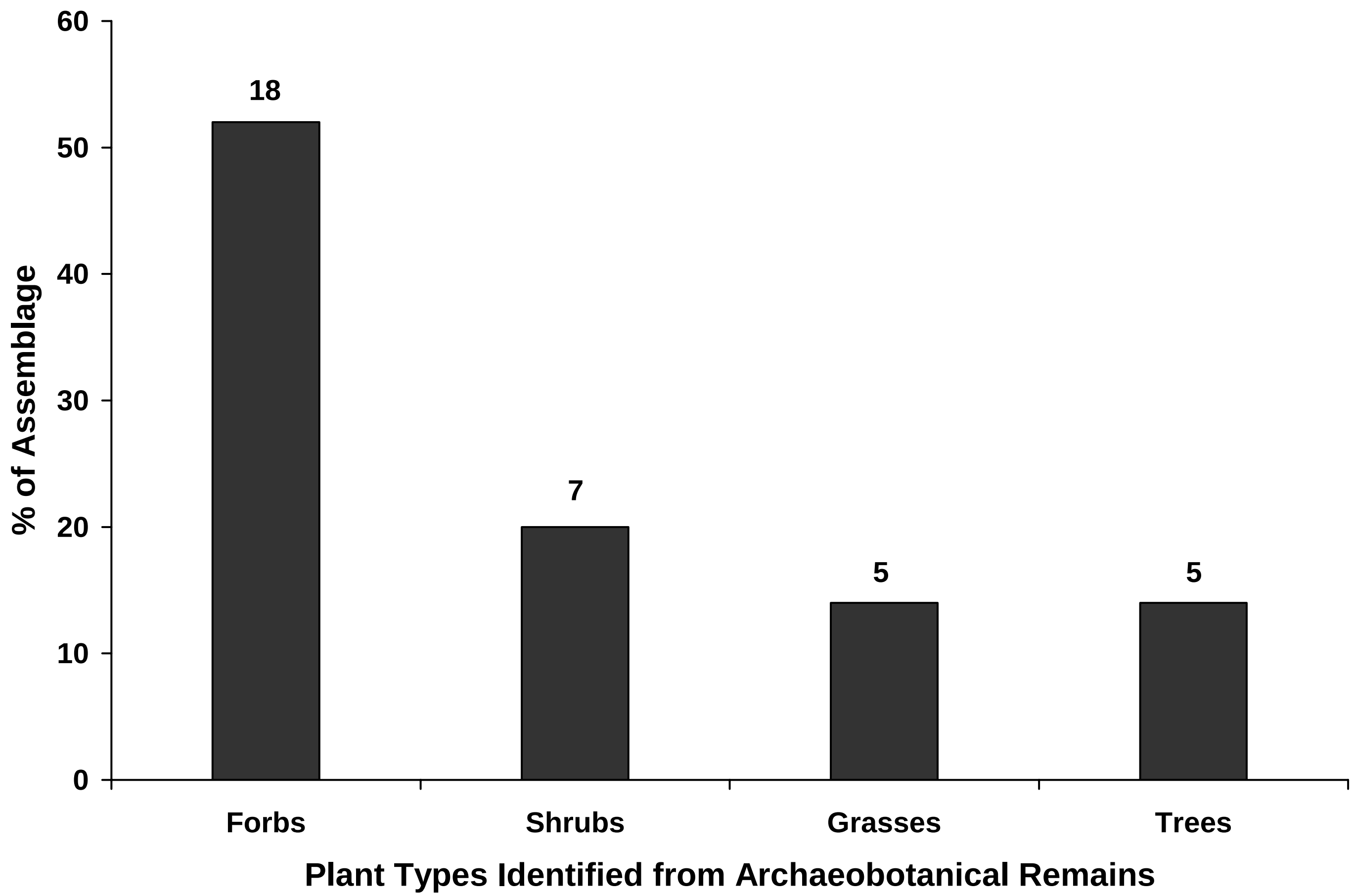


Figure 38. Relative ubiquity of plant types based on taxonomic identifications from the archaeobotanical assemblage of the Ferry House Site and vicinity. Numbers above each column indicate number of plant taxa per category.

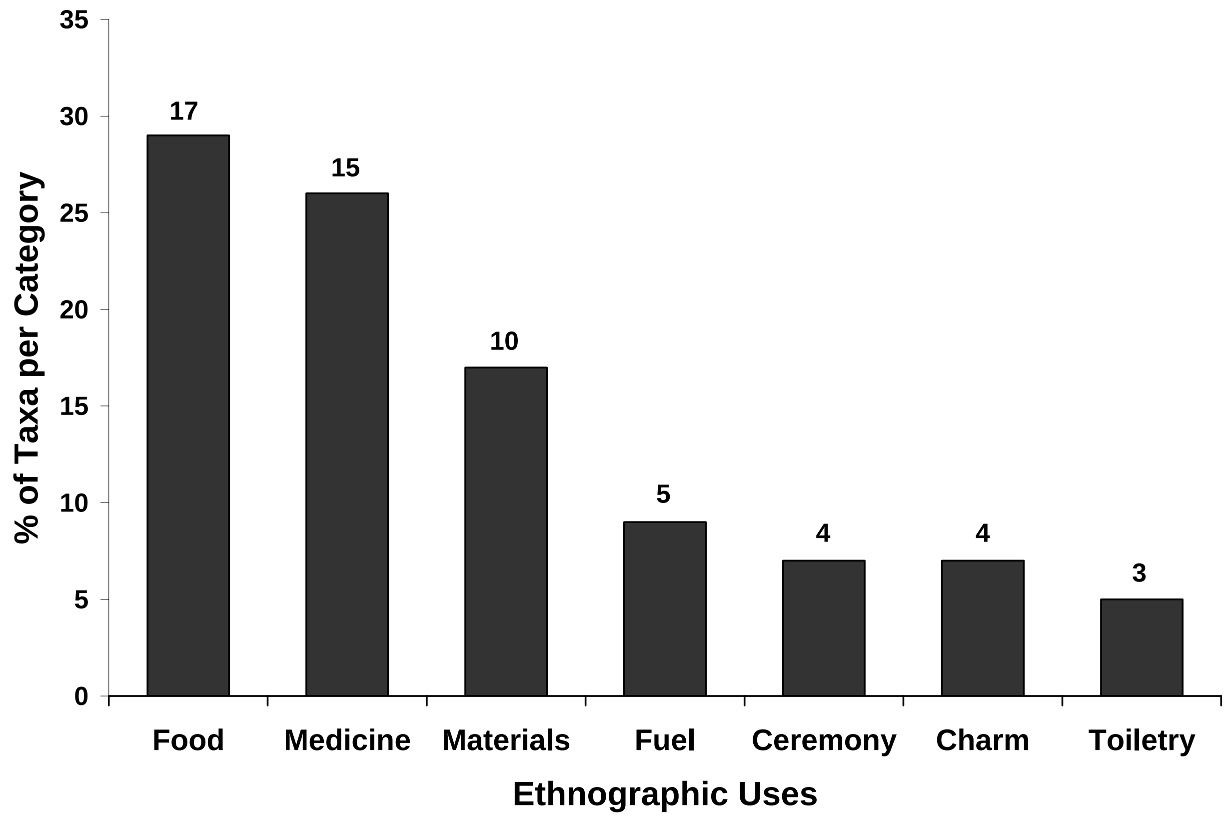


Figure 39. Potential uses of the plant taxa identified from features in the vicinity of the Ferry House Site. Number above each column indicates number of taxa identified which correspond to each use category. Uses of plants are based on ethnographic references (Collins 1974; Ebey 1855; Farrar 1916, 1917; Gibbs 1877; Gunther 1973; Norton 1979b; Suttles 1974, 1990; Turner 1975, 1998) for Northwest Coast Peoples. Some taxa will fit into multiple categories, like Rosa which was used for food, medicine, materials, and toiletry. Ethnographic records are often biased toward food plants and the strong representation of medicines, shown here, may be significant for prairies. Further study would be needed to demonstrate whether this pattern is truly representative.

Summary of Other Remains Recovered from Features

In addition to archaeobotanical remains, feature deposits contained a number of other materials including beach sand, faunal remains, and lithic debitage (Table 9 and Figure 40). Those features which had been described in the field as mixed secondary deposits (i.e., refuse pits or lenses) rather than hearths were found to contain medium to high densities of sand and gravel in the laboratory. This discovery helped to verify secondary deposition. Lithic debitage from features was primarily composed of materials available on the nearby shoreline (a distance of ~15 meters from the features that contained them). Only one flake recovered from a feature (Feature 11) was composed of an exotic raw material — obsidian.

Faunal remains include bone, shell and urchin spines found in four of the features (Table 15). These were retained for future analysis and are stored in the National Park Service Marblemount Curation Facility. Bone and shell pieces were calcined or charred, most were highly fragmented and many were non-diagnostic. Given the time required, these remains were not systematically identified. However, during sorting and quantification, I noted that the samples contained the remains of mussels, clams, urchins, and fish. The bones of a small rodent and a more robust animal were also present.

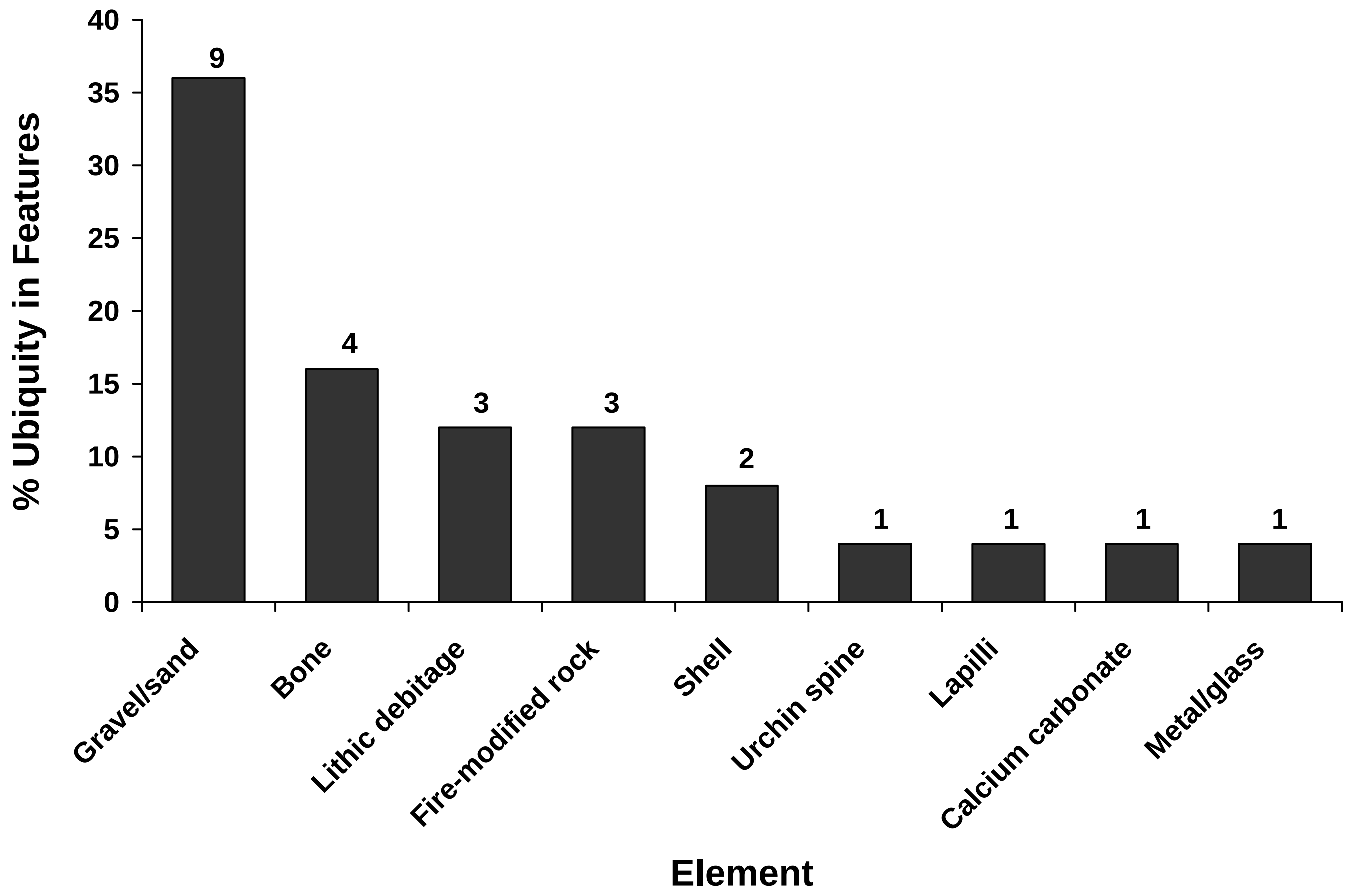


Figure 40. Relative ubiquity of non-botanical contents in features from the vicinity of the Ferry House Site on Ebey's Prairie. Numbers above each bar indicate number of features which contain each element.

Table 15. Faunal remains present in features in the vicinity of the Ferry House Site.

Feature No.	***Faunal Remains***					
	Clam	Mussel	Urchin	Fish	Rodent	Unknown mammal
1						x
5	x	x		x	x	
6	x		x	x	x	
8a				x	x	

Activities Indicated by Features and Archaeobotanical Remains

I developed my interpretations of features by reviewing the appearance, contents (Table 8), relative density of remains (Table 16) and age (Table 11) of each. I then used these data to make inferences about the use of Ebey's Prairie more generally (Table 17). Many of the archaeobotanical remains recovered from bulk samples and from screens at the Ferry House Site demonstrate that people were processing plants on Ebey's Prairie throughout history since about 2,300 BP. Some of the plants found in the Ferry House Site features were locally available in Ebey's Prairie and others were carried in from just beyond the prairie ecosystem. Archaeobotanical remains in these features indicate that a broad array of edible and useful plants from both prairie and forest ecosystems were used by people on Ebey's Prairie. An apparent increase in features since about 2,300 BP (see Table 11) may indicate that the Ferry House Site was more intensively used during the late Holocene.

Cooking Methods

Based on my field observations and the contents of feature deposits, it appears that various cooking methods were employed at the Ferry House Site. A variety of

Table 16. Density of archaeobotanical remains per liter of soil analyzed.

Feature	***Total volume analyzed (l)***	***Archaeobotanical Items Per Liter of Soil***					
		Seeds (N)	Needles (N)	Cone parts (N)	Charcoal (g)	Other	
						(g)	(N)
1	9.60	13.75	3.13	0.42	1.00	0.87	-
2a	0.87	1.14	65.14	370.28	1.99	-	1.14
2b	3.50	1.14	5.71	21.43	1.90	-	0.28
3	0.33	9.09	33.3	-	2.06	-	-
5	2.00	23.50	-	0.50	0.25	-	-
6	0.35	22.86	2.86	-	7.71	-	-
8a	1.20	5.00	0.83	-	0.83	-	-
8b	1.00	3.00	-	-	0.10	-	-
10	0.95	-	-	-	0.11	-	-
11	0.50	-	-	-	0.04	-	-
NA*	2.30	0.86	-	-	0.01	-	-

*Not applicable; this bulk sample was associated with an anthropogenic soil horizon but was not part of a feature.

woods were used and the presence of oxidized soil layers in hearth deposits (Features 2a, 2b, 8a, and 8b) provide evidence of high heat and open flame, for some episodes of use, while the remains of highly combustible materials like small diameter twigs, conifer needles, and liliaceous bulbs are evidence that low to moderate temperatures were also maintained in features (i.e., smothered fires). The fire-modified rock in several features provides evidence of a heating element which could help accomplish a low temperature slow cooking environment for steaming or roasting.

The recovery of camas and onion bulbs from the Ferry House Site is a significant result. According to Northwest Coast ethnographic sources camas, in particular, was a critical food resource yet the cooked bulbs have been rarely found in archaeological sites of the region (see Chapter 1). Accounts state that onion provided flavouring for foods (Gunther 1973; Turner 1995) and was sometimes cooked with camas (Pojar and MacKinnon 1994:106). Finding both genera in Feature 4 suggests that the occupants of Ebey's Prairie may have also cooked the two foods together. The seeds of various non-edible forbs found in Ferry House features are from genera which would be conducive to steam cooking in earth ovens — typical methods of preparing camas and onion bulbs on the Northwest Coast (Collins 1974; Gunther 1973; Reagan 1917; Turner and Kuhnlein 1983, Turner 1995). Only a few of the many plants used to promote steam in steaming and roasting pits are specifically mentioned in ethnographic literature. It is known, however, that plants which retain water (e.g., *Lysichiton americanum* or skunk cabbage) were desired for such a purpose (Gunther 1973; Turner 1995, 1998). The seeds of

Table 17. Inferences about human activities on Ebey's Prairie based on features.

Feature Content	***Evidence of***	***Inferences about Activities***
Hardwoods and softwoods	Fuel variety	Fuels with different btus[2], burn rates, and volatility used, which are only available off prairie (i.e., in forest or driftwood)
Conifer needles and other combustibles	Low to moderate temperatures in features and use of non-driftwood fuels	Use of vegetal material conducive to steam cooking or smoldering
Wide variety of edible and other useful plant remains	Broad fruit and vegetable diet, mature seeds indicate summer-fall seasonality	Selection of particular plants from a rich anthropogenic prairie, and a seasonal preference for cooking at this site
Forbs dominant but grasses, shrubs and trees present	Archaeobotanical assemblage similar to native prairie vegetation mosaic but includes more shrub and tree species and fewer grasses	Selection of edible plant materials local to Ebey's Prairie and vicinity
Fresh water aquatic plants	Ecological changes on Ebey's Prairie (i.e., wetter in the past than today) or plants may have been imported from nearby wetlands	Possible selection of vegetal material conducive to steam cooking
Consistently low densities of archaeobotanical remains	Short term use of features or perhaps use of cooking baskets or boxes which leave minimal charred botanical evidence	Temporary camping or day use, or plants may not have been used intensively
Stratified hearth deposits, separated in age by thousands of years	Repeated use of the same locale for a hearth	Selection sites for particular activities over a broad time scale
Charred *Camassia* and *Allium* bulbs associated with FMR[3] and charcoal in a subtle sooty soil lens	Edible bulbs thoroughly charred, associated with imported wood (charred) and rock (cracked and oxidized	Roasting/steaming of *Camassia* and *Allium* for consumption in an earth oven with rock as heating element. Early spring or fall based on ethnographic accounts for this practice

[2] btu refers to British Thermal Unit or the amount of heat required to raise the temperature of one pound of water one degree Fahrenheit.
[3] FMR refers to fire-modified rock or rock reddened by heat oxidization and/or crazed and cracked by repeated heating and cooling

Feature Content	*Evidence of*	*Inferences about Activities*
FMR[2] (ca. 40) of uniform sizes and material types associated with charcoal and *Camassia* and *Allium* bulbs in a subtle sooty soil lens	Cobbles heated and cooled repeatedly, wood charcoal is evidence of imported fuel, plant bulbs edible and locally available. The associations and sooty lens indicate roasting in earth ovens but without evidence of pit or basin construction	Intentional selection and import of both cobbles and wood to serve as a heating element for an earth oven to cook highly desirable edible prairie plants. Earth oven perhaps built on top of the ground or so thoroughly disassembled that pit or basin is not visible
Gravel and sand densities higher in non-hearth features than in native soils	Beach materials imported to prairie and mixed with native soils	Secondary deposits of refuse dumped in the form of pits and lenses. Accumulation of refuse may indicate longer-term use of the prairie or multiple short-term episodes
Highly fragmented and degraded shell and calcined bone near prairie edge (i.e., near shore) but with less accumulation than in local shell middens	Cooked shell and bone were imported to the prairie edge (perhaps from 45IS88) and subsequently trampled extensively	People using the prairie also consumed marine foods. Shellfish were likely cooked on the beach and dumped on the prairie edge. Low accumulation of remains could be a measure of short term episodes or may indicate the edge of a larger more substantial midden. Trampling may indicate a living surface or pathway
Shell lenses visible in the same horizontal locations but separated by culturally sterile soil lenses and differing in age by hundreds of years	Repeated use of the same locale for dumping of cooked shell and bone	Selection of key locales for particular activities over a broad time scale
Tertiary obsidian flake in a refuse pit	Imported high quality lithic material and flintknapping (pressure-flaking)	Link to trade network and evidence of stone tool sharpening or finishing

freshwater aquatic plants recovered from Features 1 and 5 may have derived from plants which were selected to promote steam cooking of foods.

Evidence of berries recovered in the assemblage could indicate that they were steamed, roasted, or eaten fresh around the fire — all common customs among Northwest Coast people (Collins 1974; Gunther 1973; Turner and Kuhnlein 1983; Turner 1995, 1998). Berries were sometimes cooked in association with shellfish (Turner 1998), and the berry seeds and calcined shell remains in Features 5 and 6 may be indicative of this practice on Ebey's Prairie. Alternatively, berry seeds may have been tracked in by people and charred unintentionally or deposited by animals and other natural processes and subsequently charred, though these explanations seem unlikely given the association with wood charcoal, shellfish, and artifacts.

Camping and Longer-term Settlement

The consistent low densities of archaeobotanical remains in features suggest that the Ferry House Site was used only for short-term camping events in prehistory. Of course, a variety of taphonomic processes could account for the low recovery rates (Lepofsky 2000a, 2002; Pearsall 2000). Further, there is a lack of evidence for permanent structures. While some of the features (e.g., the stratified hearths and shell lenses), indicated repeated activities in the same locations, none of the deposits were abundant enough to suggest substantial settlements. The repeated camping episodes, however, probably reflect that Ebey's was a preferred resource gathering area. At the Ferry House Site these resources include prairie plants such as *Camassia* sp. and *Allium* sp. bulbs, and berry-producing forbs and shrubs which can grow in prairies or on prairie edges (*cf. Amelanchier*, ?Caprifoliaceae, Ericaceae, *cf. Fragaria*, *Rubus*, and *Sambucus*).

Seasonal Use of the Ferry House Site

The paleoethnobotanical assemblage suggests that the Ferry House Site may have been used by people throughout the year. The seeds and fruits of perennials and annuals indicate that the site was used by people in summer through early fall seasons when the seeds of these plants reach maturity. The presence of charred *Camassia* sp. and *Allium* sp. bulbs in Feature 4 suggests early spring or fall seasonality of the site, based on ethnographic information on bulb harvesting and processing (e.g., Collins 1974; Cooper 1860a; Gibbs 1877; Gunther 1973; Ebey 1855; Olson 1936; Suttles 1974, 1990). Remains like rose seeds and grass glumes (found in Feature 2) can remain intact on dried plants throughout the winter in this locale.

Results of Artifact Analysis

Artifacts from Excavation

Prehistoric artifacts were found sparsely scattered across the Ferry House Site (Figure 41) from a variety of soil depths. The majority of artifacts recovered from excavation (n=355) were not temporally diagnostic nor could they be ascribed relative dates based on their context. Exceptions to this are the three dacite projectile points and a greenstone core (Figure 42 and Table 18).

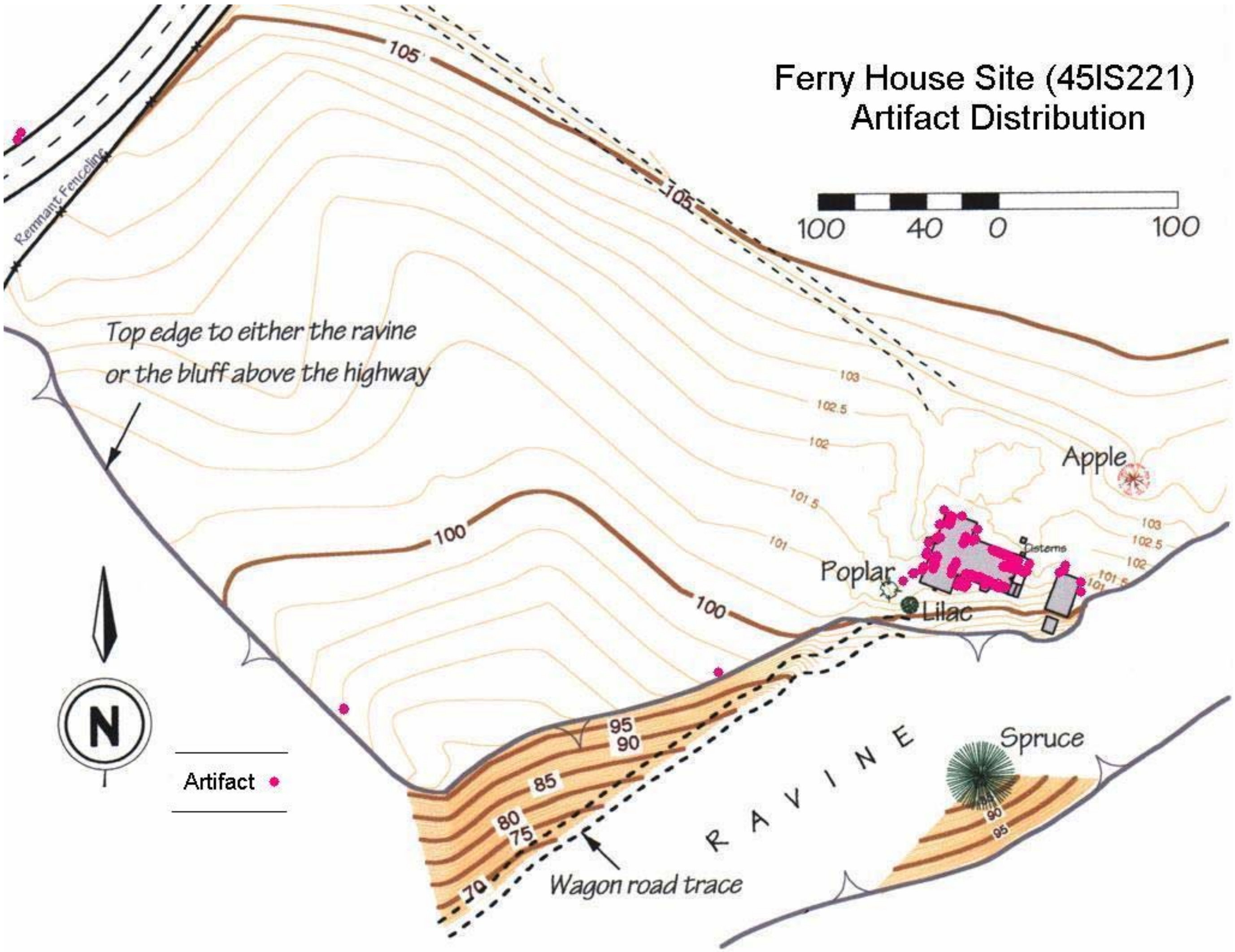


Figure 41. Distribution of artifacts excavated from the Ferry House Site. Base map created by Keith Garnett.

Nearly all prehistoric artifacts recovered from the Ferry House Site, except one bone tool, were made of stone (Figure 43). The lithic artifacts were composed of a number of material types, most of them locally available in the shoreline gravels below the site such as dacite, quartzite, and metasediment (Figure 44). Some non-local exotic materials like chalcedony, jasper, chert, and an obsidian flake (from Feature 11) were also present in the assemblage. The majority of artifacts are flakes and shatter resulting from lithic reduction and are composed of dacite.

Figure 42. Temporally-diagnostic artifacts from the Ferry House Site. On the left is a stemmed triangular projectile point (EBLA 1989) about 4,000 to 1,500 years old (Type 10A; Mierendorf et al. 1998:508). In the center is a stemmed and shouldered triangular projectile (EBLA 116) about 5,000 to 3,000 years old (Type 7; Mierendorf et al. 1998:505). On the right is the base of an early stemmed lanceolate (EBLA 1802) about 10,800-7,000 years old (Type 2C; Mierendorf et al. 1998:498). Age ranges are uncalibrated, approximate, and based on data from Northwest Coast and Plateau archaeological sites. These items are in the collection of North Cascades National Park Service Complex. Photograph by Andrea Weiser, used by courtesy of the National Park Service. Scale in cm.

Table 18. Ages of artifacts recovered from the Ferry House Site and vicinity during excavation.

Artifact	***Association***	***Style***	***Age Range***
Greenstone core	Radiocarbon dated charcoal in same stratigraphic unit	Not applicable	8360 ± 50 BP
Spear point	On surface above Features 5-7	Early stemmed lanceolate	10,500-7,000 BP
Dart point	Under the house in vicinity of Feature 4	Stemmed and shouldered	5,000-3,000 BP
Arrow point	From a refuse pit above Feature 8a	Small stemmed style	1,200-500 BP

Projectile point identifications and ages were primarily based on hafting morphology and secondarily on size using a typology key provided by Mierendorf et al. (1998:496-514). Ages reported here are based on conventional radiocarbon ages (i.e., uncorrected)

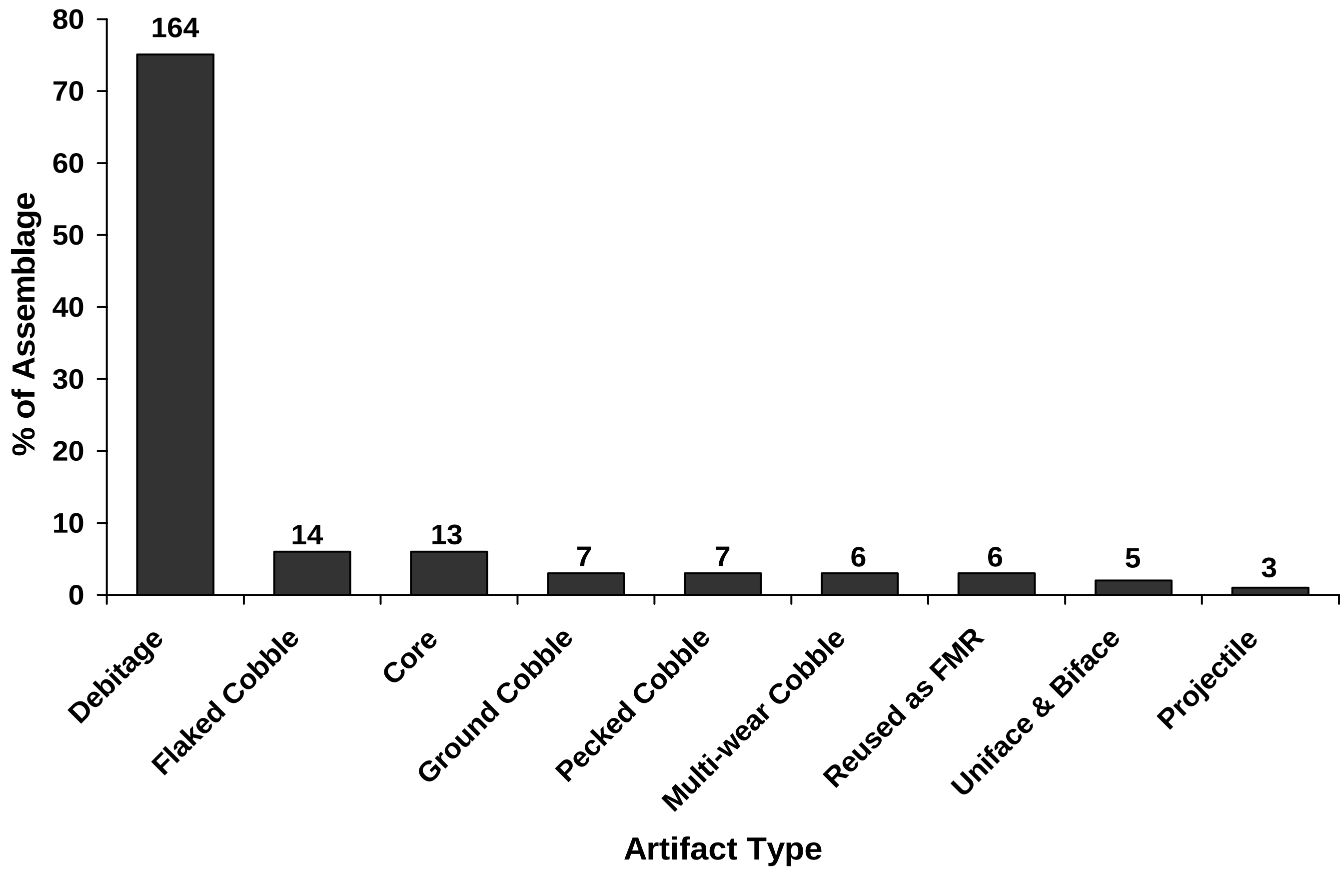


Figure 43. Lithic artifacts excavated from the Ferry House Site and vicinity in 2001-2004. Columns illustrate percentages of artifact types. Number above each column indicates the number of specimens per category. Debitage is a combination of lithic flakes and shatter. Multi-wear indicates multiple types of wear on a single specimen such as pecking, grinding and flaking. Reused as FMR refers to tools or cores which were subsequently cracked, crazed or reddened from exposure to heat and usually in association with cooking features. Quantities include artifacts identified in flotation samples.

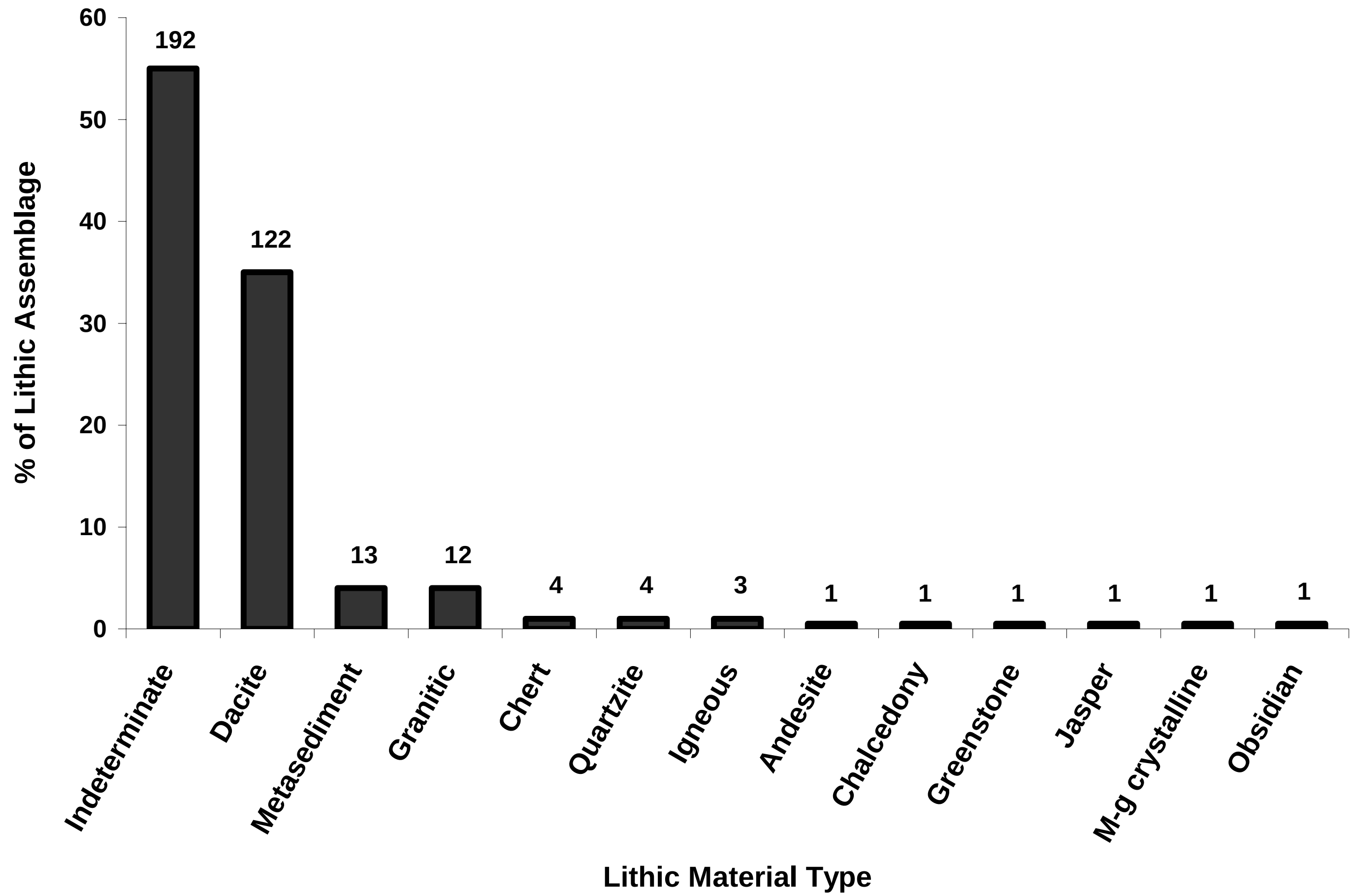


Figure 44. Lithic material types identified from artifacts excavated in the Ferry House Site and vicinity in 2001-2004. Columns illustrate percentage of each material type. Number above each column indicates the number of specimens per category. Quantities include artifacts recovered from flotation samples and fire-modified rock. Lithic material types were identified using a comparative collection housed at the National Park Service Marblemount Curation Facility. M-g crystalline refers to medium-grained crystalline.

This assemblage of flaked lithics demonstrates early to late-stage lithic reduction using both free-hand percussion and bipolar percussion techniques. Cobble cortex is evident on 59% of the flakes and shatter (indicating early-stage reduction), while 41% exhibit no cortex (indicating late-stage reduction). Five small pressure flakes, composed of exotic materials, indicate late-stage reduction or resharpening of fully formed imported tools. Three artifacts show evidence of bipolar percussion indicated by impact scars on both ends and impact cones of force originating from opposite ends and expanding toward one another. These artifacts include two bipolar cores and a biface. One of these bipolar cores was subsequently fire modified. The majority of cores (n=11) exhibit evidence of freehand percussion; two of these served additional functions, one as a cutting or scraping tool and one as a heat source in a cooking feature.

Many of the tools in the artifact assemblage are cobbles which also appear to have served multiple functions. That is, they exhibit a combination of flaking, grinding, and pecking or battering and also show signs of subsequent exposure to fire. Many of these had become part of the heating element in Feature 1, and were found clustered with other fire-modified cobbles. The flaked cobbles in the assemblage were likely produced expediently — they typically exhibit only two or three adjacent flake scars on the same margin. This type of artifact has been found associated with camas processing locales elsewhere (Thoms 1989:311).

The artifact assemblage derived from excavated contexts illustrates that multiple techniques were used to create, use, and reuse tools derived from cobbles locally available on the nearby beach. Many of the tools were expediently produced and likely used for activities like scraping, hammering, grinding and perhaps digging. Flakes from exotic fine-grained materials like chalcedony and obsidian made up only 3% of the assemblage, indicating a link to larger trade networks.

Artifacts from Private Collections

Most of Ebey's Prairie has not been systematically examined by archaeologists. However, artifacts have been found scattered across the surface of the landscape and collected by land owners and farm hands. The highest density of these surface artifacts were found in plowed fields near the Ferry House Site on the west side of Ebey's Prairie (Trebon 1998).

Precise location information on the majority of finds in private collections is not available in most cases. However, through Trebon's interviews (1998) with artifact collectors, I was able to construct a general artifact distribution based on property boundaries. These data demonstrate that projectiles and other artifacts were scattered widely across Ebey's Prairie and bordering low ridges (Figure 45). The great majority of these artifacts were projectiles (Figure 46). Other artifact categories were identified by Trebon (1998) though clear definitions of the terminology were not provided. These artifact categories include adzes, an antler wedge, grinders, a mortar, abraders, trade beads, and a knife (Trebon 1998) (Figure 47). Though most of these artifact categories seem self-explanatory, terms like "grinder," "mortar," and "abrader" can be especially problematic (Lepofsky 2004).

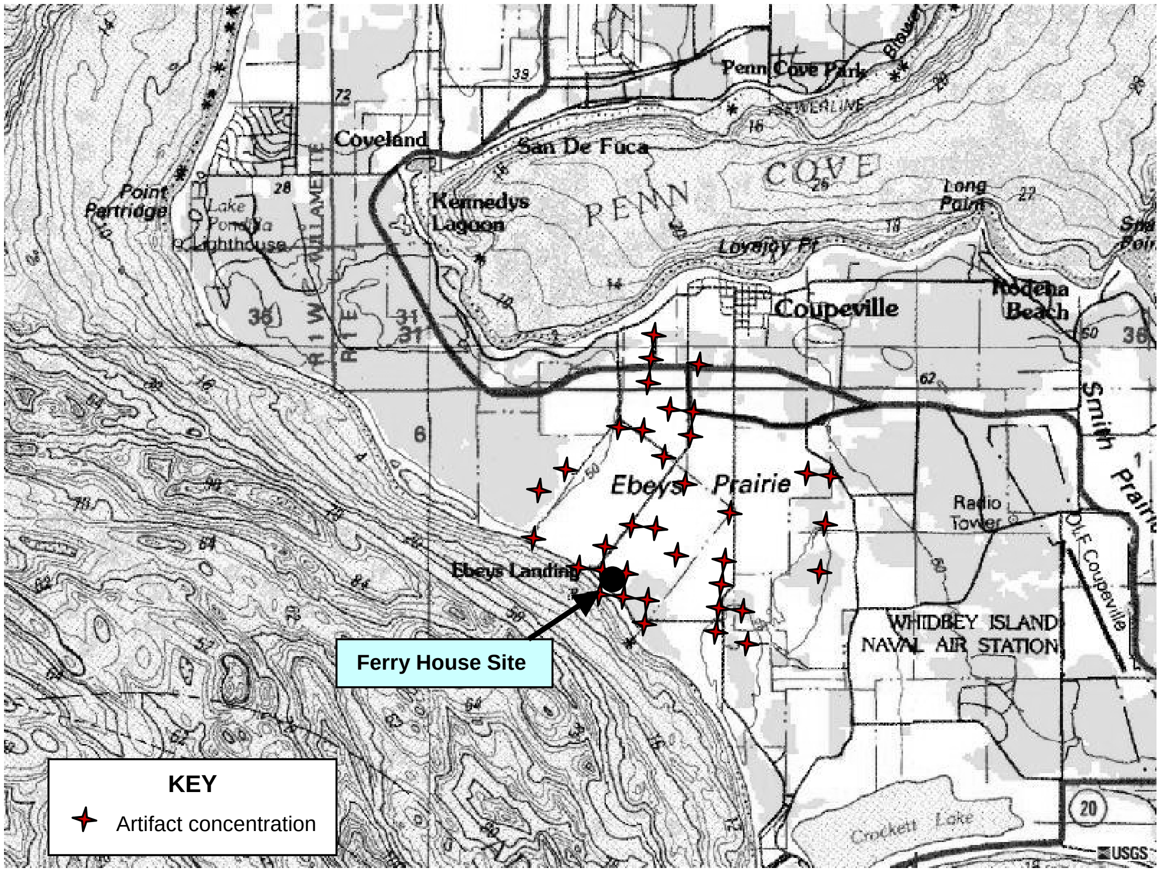


Figure 45. Distribution of artifacts collected from Ebey's Prairie. Base map acquired from http://terraserver-usa.com, accessed October 23, 2005. Data points based on surface collections reported by Trebon (1998) and archaeological excavation at the Ferry House Site.

I evaluated 400 of the projectile points which were photographed during five interviews conducted by Trebon (1998) and compared them to a key compiled by Mierendorf et al. (1998:495-514). In Mierendorf’s key, hafting styles of projectiles are classified into age categories based on stratigraphic and radiocarbon evidence from Northwest Coast and Interior sites. Based on the 400 projectiles I evaluated from Ebey’s Prairie, I found that the oldest spear points were deposited between 10,800 and 7,000 years ago (Table 19). This was shortly after glacial ice receded and Ebey’s Prairie emerged from melt water ~11,840 years ago (Easterbrook 1966a, 1966b, 1994; Kovanen and Slaymaker 2004; Polentz 2005). The majority of projectile points found on Ebey's

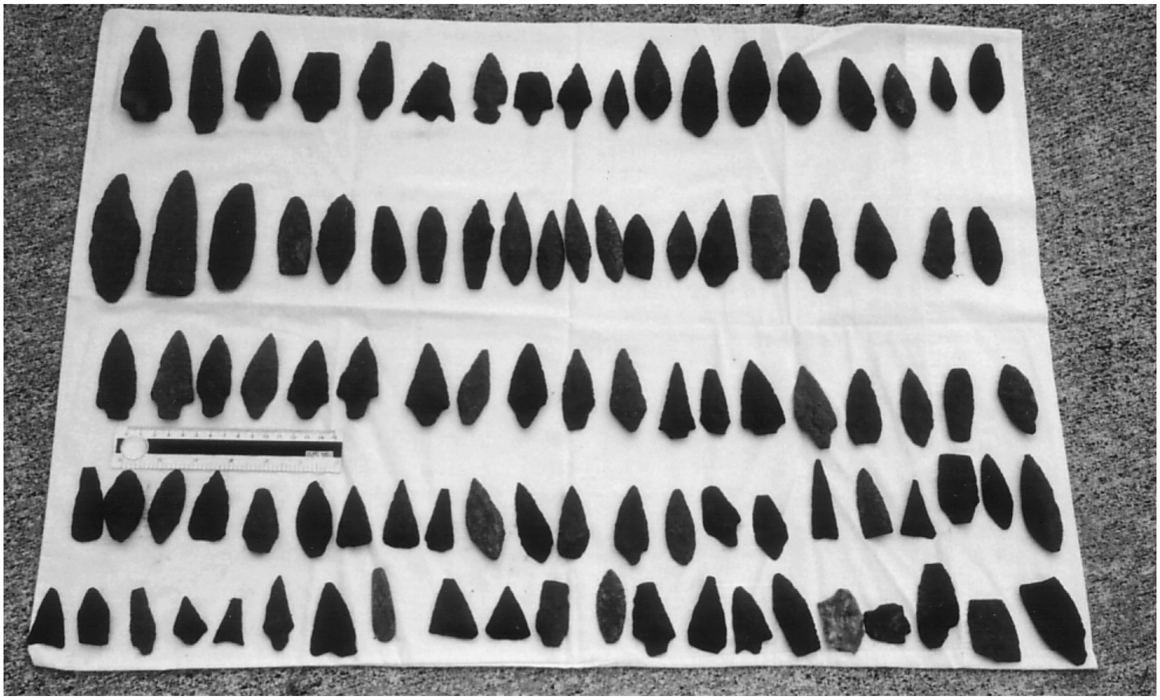


Figure 46. Artifacts from a private collection reported on in this thesis. Photograph by Teresa Trebon. Used by courtesy of Ebey's Landing National Historical Reserve.

Prairie fit within an age range of 9,000 to 1,500 years ago (Figure 48). The most common styles represented were Olcott or bi-pointed lanceolates (dating to 9,000 to 4,000 BP) and stemmed triangular points (dating to 4,000 to 1,500 BP).

These private collections are valuable data sets because they contain large numbers of diagnostic artifacts; however using them perpetuates a sampling bias toward formed tools. Based on my unsystematic observations of plowed farm fields in Ebey's Prairie, I noted numerous clusters of fire-modified rock and scatters of expedient cobble tools which would not catch an artifact hunter's eye. These artifacts and possible features have potential to yield more information about prairie activities.

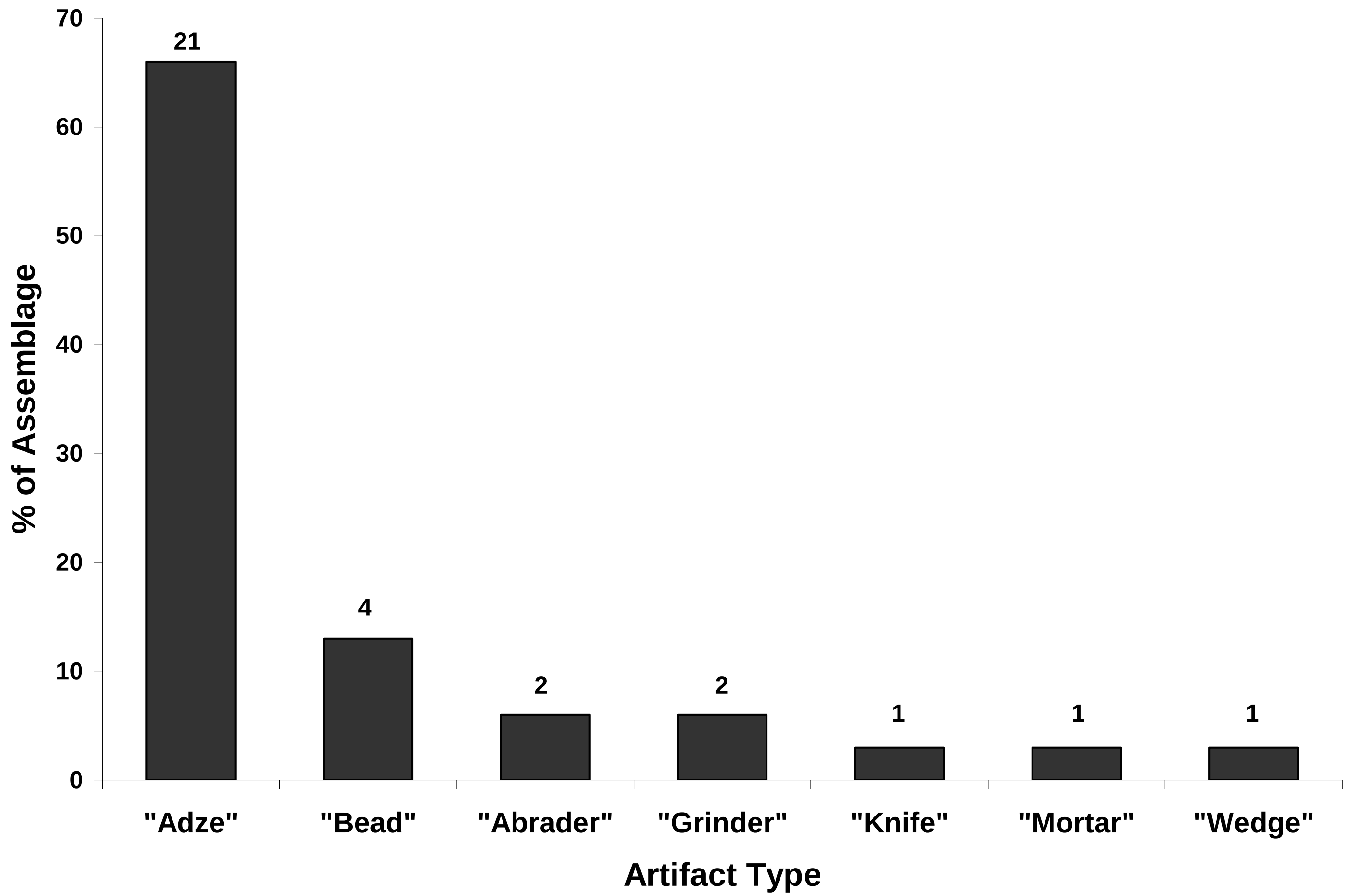


Figure 47. Artifacts from Ebey's Prairie and edges in private collections recorded by Trebon (1998). Artifact categories are listed in quotations because they were designated by collectors but not clearly defined. This figure excludes projectiles which dominate the assemblage (i.e., n=856), but see Table 31 and Figure 50 for analysis of 400 of them.

Table 19. Projectile points examined from Ebey's Prairie private collections and their age ranges based on hafting morphology.

Interview Numbers (from Trebon 1998)		**20**	**24**	**25**	**26**	**27**	
Age Before Present	***Style***	***Quantity per Interview***					***Number of Projectiles per Style***
10,800 to 7,000	Early stemmed lanceolates	5	21	7	-	5	38
9,000 to 4,000	Bi-pointed lanceolates	15	75	27	15	23	155
7,000 to 4,500	Obliquely-notched lanceolates	1	-	-	-	-	1
~7,000 to 3,500	Large side-notched series	-	2	-	3	1	6
~5,500 to 3,500	Side-notched lanceolates	1	3	-	1	1	6
5,000 to 3,000	Stemmed and shouldered triangular	3	12	1	3	3	22
4,000 to 2,800	Triangular eared series	-	2	-	-	-	2
4,000 to 2,800	Corner-notched triangular type A	-	9	-	1	-	10
~4,000 to 2,500	Stemmed concave base lanceolates	-	3	-	-	1	4
4,000 to 1,500	Stemmed triangular series	5	52	9	21	15	102
3,000 to 2,000	Corner-notched triangular type B	-	15	1	2	-	18
2,500 to 1,200	Basal-notched triangular series	-	5	-	1	1	7
2,000 to 150	Small stemmed triangular series	-	4	-	-	2	6
2,000 to 150	Corner-notched barbed series	1	-	10	1	4	16
1,200 to 150	Small side-notched series	1	6	-	-	-	7
	Totals	32	209	55	48	56	400

Projectile points were examined from enlarged photographs taken by Trebon (1998) of private artifact collections. Specimens included here were completed projectile points (i.e., not earlier stage bifaces) with a clear hafting element. Identifications were made primarily on hafting morphology and secondarily on size using a key provided by Mierendorf et al. (1998:496-514) which compares projectile point styles and radiocarbon age correlations from numerous archaeological sites across the Northwest Coast and Interior.

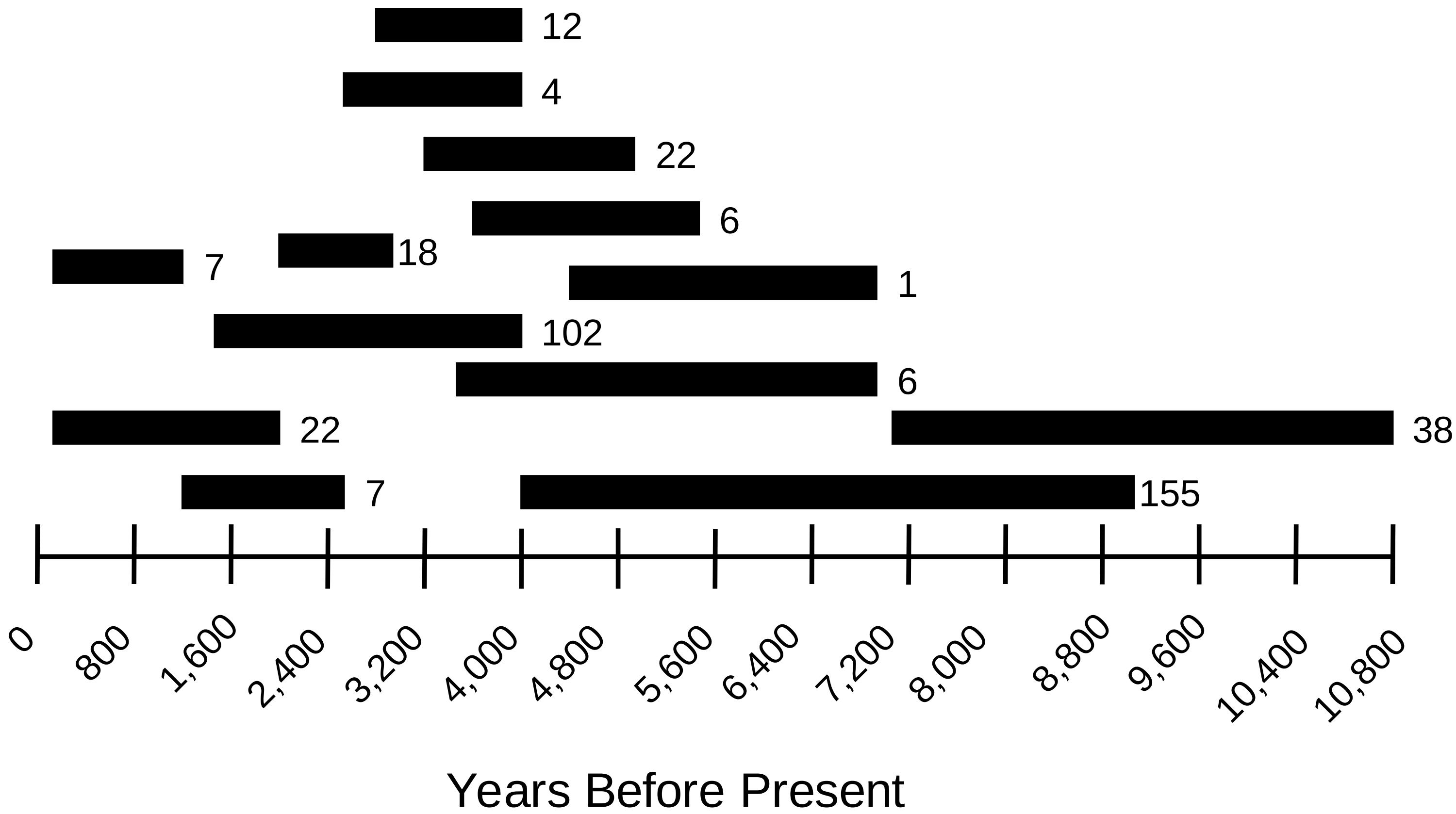


Figure 48. Age Ranges of 400 projectile points found on Ebey's Prairie, recorded by Trebon (1998). Bars illustrate the age ranges of projectiles based on style categories. Numbers to the right of each bar indicate number of specimens in each age range. Age ranges are based on uncalibrated and approximate dates identified for each style category (see Table 19) in a typology presented by Mierendorf et al. (1998:496-514). Note that a high number of projectiles is consistent through the Holocene suggesting that the habitat for game remained open despite the regional shift to closed canopy forests during the Middle and Late Holocene.

Activities Indicated by Artifacts

The artifact assemblage of the Ferry House Site and the greater Ebey's Prairie represent the variety of human activities that were conducted on the prairie (Table 20). Many of the lithic raw materials found on the Ferry House Site and vicinity are available on the nearby shoreline where they could have been collected and then transported to the prairie where they were used.

Hunting

Hunting is strongly demonstrated by the large number of projectile points varying in style, size, and age found scattered across Ebey's Prairie and the surrounding ridges (Mierendorf and Weiser 2006; Trebon 1998). To date, one projectile has been found about every 3 square meters based on the total assemblage of projectiles (n=859) spread across Ebey's Prairie (~2,500 square meters). Based on the hafting element of 400 of these, hunting big game animals with spears began shortly after ice receded, developed into a long period of hunting with atlatls and darts, and shifted in the Late Period to bow and arrow technology. The high density of projectile points, shown consistently across time, suggests that a high density of game was likely also consistent. Further, an open habitat with rich forage is likely to have attracted animals to this location.

To determine a rough proxy for hunting intensity through time, I compared number of projectiles in different time periods. I observed a slight increase in hunting implements since about 4,000 years ago (for pre-4,000 BP, 194 projectile points over a span of 6,800 years represent 0.03 projectile points per year, for post-4,000 BP, 172 projectiles over a span of 3,850 years represent 0.04 projectile points per year) which may indicate an increased intensity. Of course this measure relies on the premise that all other factors are held constant. For example, my analysis does not account for the likelihood of a collector to find a certain size or style of projectile versus another, nor does it address whether hunters were more likely to lose spear points, dart points, or arrows most frequently. However, based on the present data set this analysis is the only way of roughly assessing hunting intensity through time. The fact that hunting is consistent through time suggests it was consistently preferred by game animals and hunters alike. This data helps to substantiate the idea that the landform had not hosted a closed canopy forest at any time during the Holocene.

Plant Processing

Plant processing on Ebey's Prairie is indicated by a variety of artifact types comparable to those found associated with plant roasting features throughout the Northwest (e.g., Thoms 1989). One "mortar" and two "grinders" (Trebon 1998) now in private collections (Trebon 1998), and several cobbles with ground surfaces from the Ferry House Site indicate mashing and grinding. Such artifacts have been linked to plant food processing in the Northwest and Interior (Thoms 1989; Lepofsky 2004). Pecked cobbles from the Ferry House Site could suggest a number of activities relating to plant use including fire wood procurement (e.g., to hammer a wedge) and placement of racks used for drying plants. Cobbles with only a few flakes removed (expedient tools) could have been used to scrape away ground vegetation or excavate pits. This is the type of tool kit associated with camas processing in the Interior (Thoms 1989) and by association may represent the same activities on Ebey's Prairie. In addition, many flaked, ground, pecked, and unmodified cobbles found on the Ferry House Site were associated with charred plant remains and they showed signs of heat oxidation. They were therefore likely to be heating elements for cooking plants and perhaps other foods.

Table 20. Inferences about human activity on Ebey's Prairie based on artifacts.

Artifacts	***Evidence of***	***Prairie Use Implications***
Moderate quantity of spear points	Hunting large game with spears (10,800-3,500 BP)	Hunting large game animals on Ebey's Prairie through the early to mid Holocene, beginning shortly after glacial ice receded
Large quantity of dart points	Hunting game with atlatls and darts (5,000-1,200 BP)	People changed their tool technology and tactics and were able to hunt animals on Ebey's Prairie from greater distances throughout the mid Holocene (perhaps losing more tools this way too). Hunting intensity increases since 4,000 BP.
Low quantity of arrow points	Hunting game with bows and arrows (2,000-150 BP)	People continued to develop technology for hunting from a greater distance with better accuracy into the late Holocene yet density of projectiles decreased--perhaps due to an increased use of alternate tactics, like duck netting, or a change in focus to non-terrestrial resources, like shellfish
Primary and secondary lithic flakes, cores, and flaked cobbles composed of locally available stone and displaying clues of percussive and bipolar manufacture	Initial or expedient stone tool manufacture using nearby material	Raw stone material was likely collected on the shoreline and carried to the prairie to manufacture into tools (using percussion and bipolar techniques)
Exotic lithic materials expressed in	Importing tools and/or blanks and	People using Ebey's Prairie were

Artifacts	***Evidence of***	***Prairie Use Implications***
tertiary flakes, and exotic beads	sharpening them and acquiring finished beads from outside sources	connected to broader trade networks
Ground cobbles and mortars	Grinding of semi-resistant materials	Importing cobbles to Ebey's Prairie (likely from the shoreline) to grind plants and perhaps other materials
Pecked cobbles	Use of cobbles as hammers or anvils	Importing cobbles to Ebey's Prairie to use as hammers or anvil stones perhaps for flintknapping and for constructing temporary structures like drying racks
Adze blades, antler wedge, and flaked cobbles	Woodworking and firewood procurement	Collecting firewood along the edges of Ebey's Prairie and carrying some woodcutting tools to the Ferry House Site
Knives, unifaces, and bifaces	Cutting and perhaps butchering and scraping hides	Perhaps butchering animals on Ebey's Prairie
Cobbles, cores and cobble tools with heat oxidation, cracking, and crazing	Heat modification	Using imported cobbles, including those previously used as tools, to provide a heat source for cooking

Expedient Tool-making and Settlement

Collectively, scatters of lithic detritus and expedient tools, fire hearths, and refuse pits, provide evidence for camping activity on Ebey's Prairie. The majority of the artifact assemblage demonstrates that people at the Ferry House Site and vicinity manufactured expedient tools, from locally-available lithic material, but did not manufacture fine finished tools. The presence of expedient tools likely indicates short-term use episodes such as camping or day use. A few artifacts are composed of exotic cherts, chalcedony, jasper, and obsidian. These were all small interior flakes which likely represent detritus from sharpening finished tools which were imported from elsewhere.

While most artifacts found on Ebey's Prairie suggest short term camping, a few artifacts indicate longer term settlements in the near vicinity. Adze blades and wedges found on Ebey's Prairie (Trebon 1998), indicate wood procurement and woodworking. Unlike cobble choppers, which could be expediently made from local materials, adze blades were more time-consuming to create and composed of stone material that was unique for its hardness (e.g., serpentinite). Further, adze blades were useful for more precise carving and shaping (such as for canoes) (Stewart 1984, 1986; Suttles 1990).

Trade

Two types of items found on Ebey's Prairie indicate trade: beads and exotic lithic materials. Trade items were widespread throughout the Northwest Coast (Suttles 1990) and finding these items on Ebey's Prairie simply suggests that people using this ecosystem were somehow linked to the broader trade networks of the region. The small assemblage of exotic lithic materials (e.g., chert, jasper, chalcedony, and obsidian) is indicative of trade, exchange, or diffusion because these materials are not available from any local or nearby sources.

Activities Across Time and Space

Taken together, my analyses of features, artifacts, archaeobotanical remains, ethnographic, and ethnohistoric records indicate that indigenous people participated in a range of activities on Ebey's Prairie between about 150 and 10,000 years ago. The range of activities is partly evidenced by diversity of feature types and contents. Despite a small sample size, the thirteen prehistoric features discovered at the Ferry House Site reflect cooking using a number of methods and ingredients including edible berries, plant bulbs, and shellfish (Table 8). People chose to use fuel wood in hearths and roasting features that included both conifer boughs and hardwoods and they utilized open flame, smothered coals, and hot cobbles to achieve desired cooking and heating temperatures and durations (Table 17). The stratified hearths and accumulation of refuse near the Ferry House also indicates that the site was used repeatedly — most likely for repeated camping episodes. Finely crushed shell in some features may indicate human trampling on pathways near the terrace edge, overlooking the shoreline and Admiralty Inlet.

The artifact assemblage also indicates a number of activities. Hunting was clearly practiced long term on Ebey's Prairie as evidenced by a wide variety and high density of spear, dart, and arrow points. Though flintknapping is also represented by hammerstones and lithic detritus on the Ferry House Site, the focus seems to have been on creating, using, and reusing expedient tools which served multiple functions, rather than a focus on production of bifaces or projectiles (Table 20). Lithic tools found on the Ferry House Site include a number of implements useful for woodcutting, plant processing, cutting and scraping. Artifact data helps substantiate the pattern of camp episodes seen through features, and further illustrates a potential focus on plant processing.

The broad time scale of these activities on Ebey’s Prairie is reflected in the artifact styles as well as through carbon dating of feature deposits (Figure 49). Artifact seriation using the only temporally-diagnostic artifacts from Ebey’s Prairie — projectiles — provides broad age categories associated with different tool styles and hunting techniques. Based on these alone, the history of hunting on Ebey’s Prairie potentially began about 1,000 years after glacial retreat (10,800 years ago). Though no features of this age have yet been discovered on the prairie, the oldest radiocarbon-dated context (~9,490-9,265 BP) still indicates that people deposited flaked stone and wood at the Ferry House Site in the Early Holocene at a time when the ground surface was marine sand with minimal organic content (Mierendorf and Weiser 2006). Ten additional radiocarbon dates from features (Table 11) provide more precise age ranges corresponding to human activity on the prairie.

Intensity of prairie use appears to have increased over time based on an increase of features and artifacts over time. The frequency and density of features increases in the Late Holocene (Figure 49), as does the number of projectiles scattered across the prairie. Evidence from the vicinity of the Ferry House Site suggests artifacts

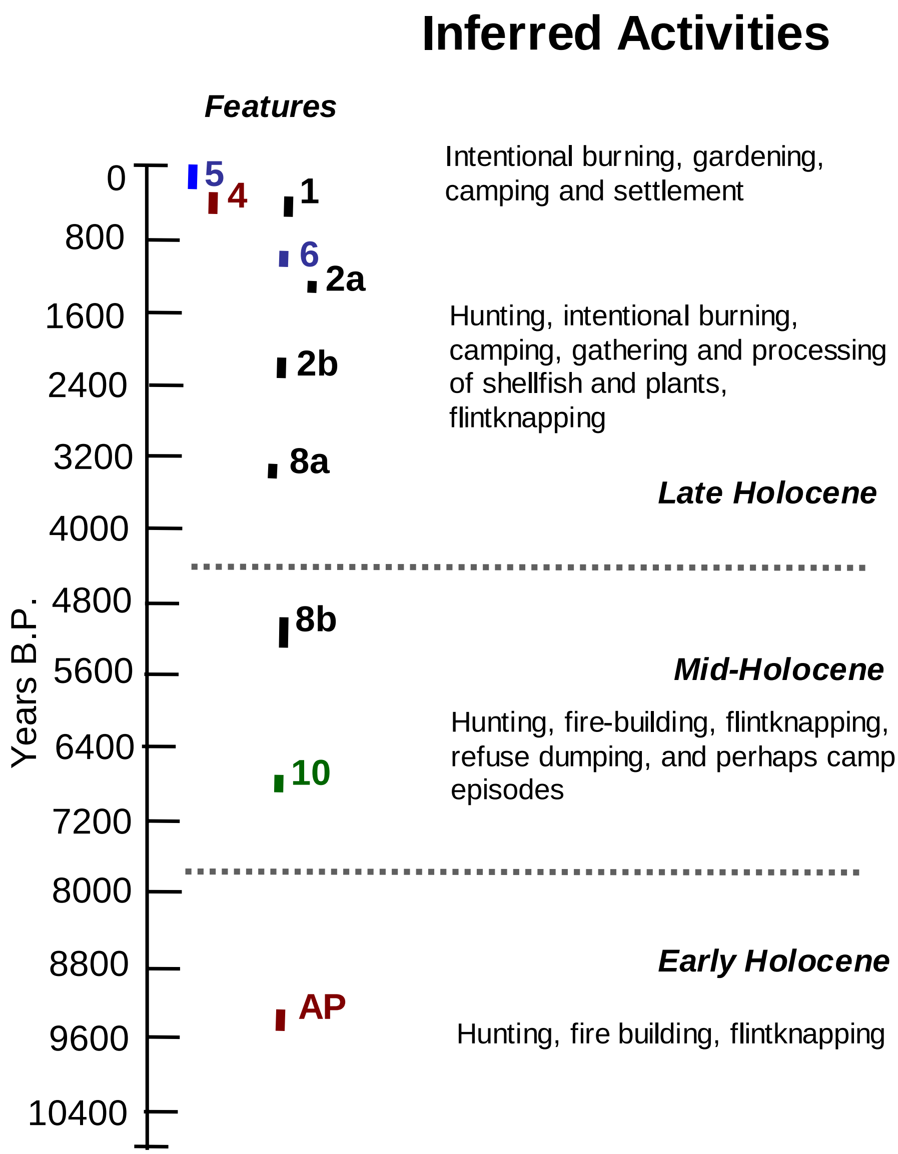


Figure 49. Chronology of inferred human activities on Ebey's Prairie in the Holocene based on artifacts, features, and archaeobotanical remains. AP refers to anthropogenic charcoal from a sandy matrix associated with chipped stone tools. Note an increase in features since about 2,300 BP.

and features may be concentrated in particular areas (Figure 50). The vicinity of the Ferry House Site which is in close proximity to water, the forest edges, canoe pullouts, and dry ground for camping, had a higher density of projectiles on the surface than other parts of the prairie (Trebon 1998). As well, the features at the Ferry House site were clustered and some were directly overlying other features indicating repeated use. The highest density was four features per cubic meter, and 2 features per square meter were common.

Ethnohistoric data provided a record of events in the historic era and offered a glimpse of activities which would not preserve in the archaeological record. Traditional indigenous practices were recorded during a short period between the time Captain Vancouver and his crew first witnessed Whidbey Island in 1792 and the Ebey family began to exercise their rights as landowners on Ebey's Prairie, in the mid to late 1850s. Evidence of indigenous burning and use of specialized tools like digging sticks early in this period indicate that these techniques were already in place by the time Euroamericans arrived in the region. Prairie burning and other management techniques appear to have become necessary thousands of years earlier, to increase productivity of especially valued resources like camas, which would otherwise suffer habitat loss as the forest closed in. This assertion is based on ecological changes throughout the Holocene which are discussed in the following section.

Exploring Prairie Longevity

My analyses provide evidence that while the Ebey's landform was used throughout the Holocene, the intensity and nature of use shifted through time.

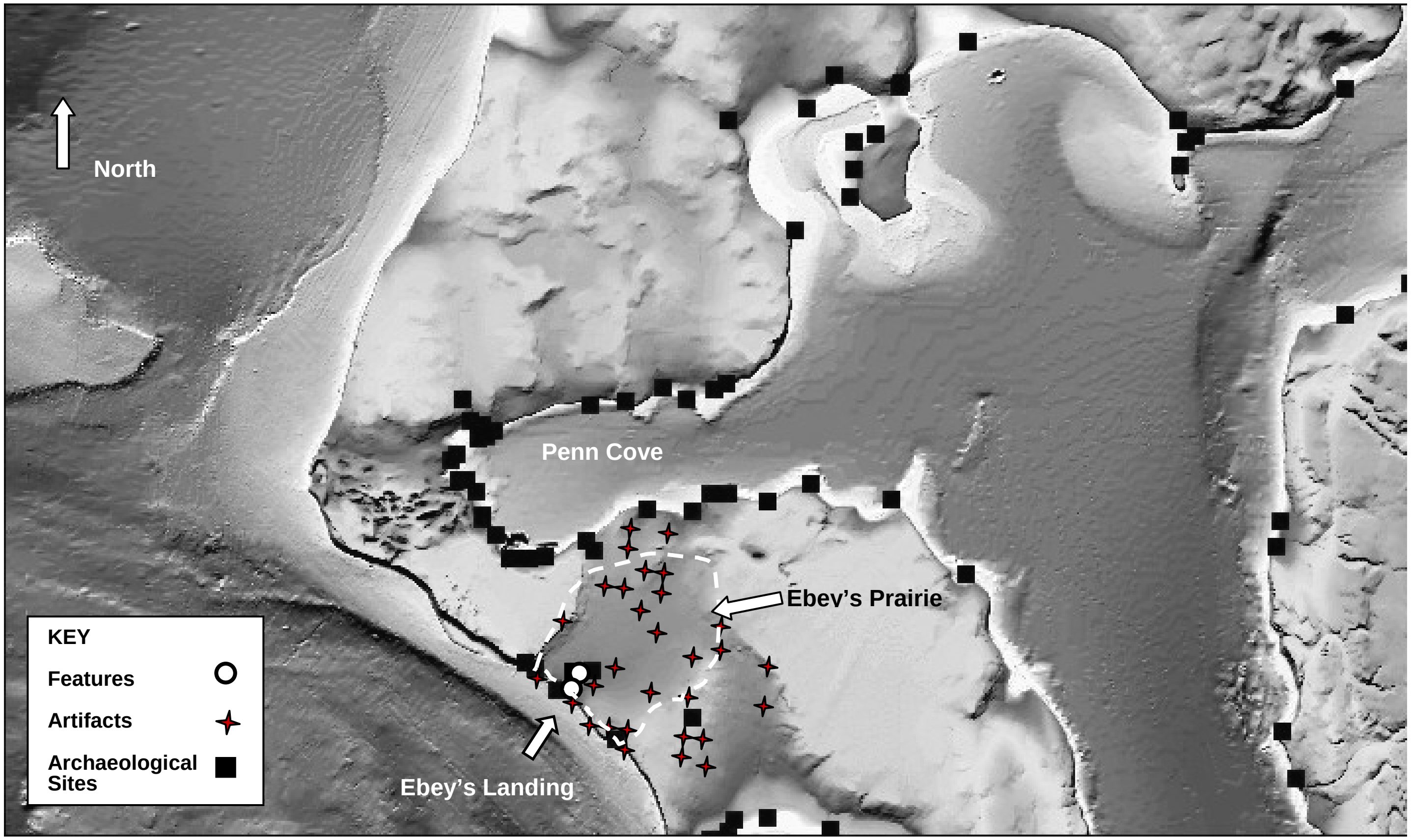


Figure 50. Features and artifacts on Ebey's Prairie and archaeological sites in the vicinity. Most of Ebey's Prairie has not been systematically surveyed by archaeologists. Note the concentration of archaeological sites along the shore of Penn Cove and near Ebey's Landing. Also note concentrations of artifacts in Ebey's Prairie. Features and artifacts on Ebey's Prairie and archaeological sites in the vicinity. Base map created by Doug Littauer. Data points for scattered artifacts generated from records collected by Trebon (1998), data points for features derive from this thesis, and data points for recorded archaeological sites from Washington State Department of Archaeology and Historic Preservation Records, Olympia.

Intensification or increased human energy investment per unit area to produce a greater output is most aptly reflected by intentional burning of Ebey's Prairie to encourage edible and useful resources. The compiled evidence suggests that sometime in the last 2-3 millennia, the inhabitants of Ebey's Prairie began setting fires. I determine this by establishing the natural succession of vegetation on Northwest Coast Prairies and then comparing it to local archaeobotanical evidence which counters these natural patterns (Table 21).

Using evidence of glacial history and regional vegetation patterns throughout the Late Glacial and Holocene, I found that Ebey's Prairie emerged from glacial meltwater/marine water as a landform about 12,000 years ago (Easterbrook 1966a, 1966b, 1994, Kovanen and Slaymaker 2004; Polentz 2005) and remained relatively open until about 8,000 years ago (Table 21). In the Mid-Holocene, Ebey's Prairie was likely encroached upon by a mixed deciduous and conifer forest as summers became cooler and wetter. This pattern is true for similar physiographic units on the Northwest Coast. By about 4,400 years ago, mixed conifer forests were clearly established regionally (Brown and Hebda 2002; McLachlan and Brubaker 1995; Pellatt et al. 2001; Whitlock and Knox 2002) yet the range of species from Ebey's Prairie is consistent with an open ecosystem. Within the general moist, cooling trend of the Late Holocene, a warm dry interval about 2,400-1,200 years ago (the Fraser Valley Fire Period) reflects an increase in fires (Hallett et al. 2003; Lepofsky et al. 2005b), but trees continued to encroach upon openings since about 1,200 BP (Brown and Hebda 2002; McLachlan and Brubaker 1995; Pellatt et al. 2001; Whitlock and Knox 2002).

Table 21. Inferred ecological history and concurrent human activity on Ebey's Prairie during the Late Glacial and Holocene.

Time Period – Regional Climatic Regime	***Conditions and Inferred Ecology of Ebey's Prairie[1]***	***Evidence from Ebey's Prairie and Inferred Human Activities[2]***
Late Glacial ~15,000-11,500 BP- rapid warming, wet climate, ice melt and flooding of marine water into Puget Sound. Floating ice, glacial depression of coastal landforms (Easterbrook 1966a, 1966b, 1994)	Ebey's Prairie landform was a seafloor until ~12,000 BP when it emerged from glacial depression. Ebey's Prairie became a bay and glaciomarine sediments were deposited next to a wasting ice margin above the prairie (Easterbrook 1966a, 1966b, 1994; Kovanen and Slaymaker 2004; Polentz 2005). *Pinus contorta* and *Alnus* likely colonized Ebey's Prairie edges toward the end of this period as evidenced similar physiographic units (SPU) in north Puget Sound	One Clovis style spear point found on a ridge ca. 1.5 km from Ebey's Prairie (Trebon 1998) indicates hunting big game animals in the vicinity→Ebey's bay likely hosted edible resources such as fish and waterfowl toward the end of this period.
Early Holocene ~11,500-8,000 BP- warmer and drier than today. Vashon Ice Sheet recedes to Vancouver, BC ~11,000 years ago, disturbance-adapted vegetation establishes in glacial-marine drift	Ebey's Prairie began to dry out. SPU[3] are open and grassy with *Alnus*, *Pteridium*, *Salix*, and a sparse overstory of *Pseudotsuga* with *Quercus*, *Abies* and *Tsuga heterophylla* in lesser amounts. → Ebey's Prairie probably grassy and open	Spear points, debitage, hearths → Hunting big game animals, flintknapping, and fire building.
Mid-Holocene ~8,000-4,400 BP- summers cooler and wetter but still drier and warmer than today.	Mixed deciduous forests developed in SPU[3] with *Quercus* savannah grasslands, *Tsuga heterophylla* and *Pseudotsuga*. Conifers begin to expand toward end of this period → Ebey's Prairie likely encroached upon by trees	Dart and atlatl points, midden, debitage, hearths → Hunting, refuse dumping, flintknapping, fire-building, and perhaps camping episodes (Feature 8b hearth ~5,300-4,960 cal. BP).
Late Holocene 4,400-present –Continuation of general cooling trend with intermittent warming episodes	Mixed conifer forests are clearly established regionally though fire-disturbance evident. Open sparse forests suggests anthropogenic burning in SPU[3] especially since about 2,500 BP (Brown	Arrow points, debitage, hearths → Hunting, flintknapping, fire-building. Slight increase in number of projectile points → better habitat for game?

Time Period – Regional Climatic Regime	***Conditions and Inferred Ecology of Ebey's Prairie[1]***	***Evidence from Ebey's Prairie and Inferred Human Activities[2]***
(e.g., the Fraser Valley fire period ~2,400-1,200 BP) (Hallett et al. 2003, Lepofsky et al. 2005b).	and Hebda 2002; McLachlan and Brubaker 1995; Pellatt et al. 2001; Whitlock and Knox 2002) → Ebey's Prairie open forest or unforested, locally wet, with disturbance-adapted open ecology plants since ~3,460 cal BP. Anthropogenic burning probable to maintain opening: ~3,460–3,340 cal. BP: *Brassica, Polygonum*, *Trifolium* in Feature 8a ~2,330–2,120 cal. BP: *Chenopodium*, Rosaceae, nutmeat or starchy seed in bean family (?cotyledon), *Picea, Pinus* in Feature 2b ~1,360–1,270 cal. BP: grass (glume), *cf. Rosa*, *Picea, Pinus, Pseudotsuga, Tsuga* in Feature 2a ~1,080-940 cal. BP: Cyperaceae, *Pseudotsuga* in Feature 6 →An increase in plant diversity since ~540 cal. BP, with numerous open ecology forbs including freshwater aquatics and shrubs. Mixed conifers also present in features. Edible berries and bulbs suggest an anthropogenic prairie ~ 540–290 cal. BP: *Abies*, *Allium*, *cf. Amelancier, Asteraceae*, *cf. Brassica, Camassia, Chenopodium, Claytonia*, *cf.* Cyperaceae, Ericaceae (seed and berry), *cf. Fragaria, Galium*, *cf.* Liliaceae (bulb fragments), *Picea* and *Pinus*, *Plantago*, *cf. Portulaca*, *cf. Potamogeton*, *Ranunculus, Rubus*, *cf. Ruppia, Sambucus,*	~3,460 BP: Hearths built on older hearths (Features 8a, 2b, 2a), disturbance-adapted, open ecology plants → camping and/or longer term settlement, reuse of same campsite, anthropogenic burning? ~1,080 BP: Shell refuse (Feature 6) →shellfish gathering and processing ~540 BP: Charred edible bulbs and berries (Features 1 and 4)→gathering and processing of plants. Increased diversity of archaeobotanical assemblage, including edible and useful plants → reflect strategies to increase productivity (anthropogenic burning, weeding, tilling, replanting?) >200 BP: Intentional burning and gardening documented in early ethnohistoric references (White 1980)→ these strategies likely began before European contact

Time Period – Regional Climatic Regime	***Conditions and Inferred Ecology of Ebey's Prairie[1]***	***Evidence from Ebey's Prairie and Inferred Human Activities[2]***
	Scirpus, *cf. Sparganium*, *Tsuga*, *cf. Viola*, and a nutshell and pericarp of unknown genus in Features 1 and 4 →Plants adapted to openings continue in the pre-contact and historic period, providing physical evidence of anthropogenic burning ~290–0 BP: *Brassica*, ?Caprifoliaceae*,* *Chenopodium, Galium*, *cf.* Lamiatae*, Plantago,* Poaceae*, Portulaca*, *cf. Ranunculus*, *cf. Rubus, Sambucus, Silene* in Feature 5	

[1] Regional ecological information is also based on Grigg and Whitlock 1998; Kutzbach and Guetter 1986; McLachlan and Brubaker 1995; Pearl 1999; Sea and Whitlock 1995; Whitlock 1992; Worona and Whitlock 1995. Ecological information for Ebey's Prairie specifically is based paleoethnobotanical analysis in this thesis.
[2]Human activity is based on the artifacts, features, archaeobotanical remains, and historic documents analyzed in this thesis.
cf.=probable identification, ?=possible identification
[3]SPU are similar physiographic units to Ebey's Prairie, i.e., low elevation, flat, xeric microclimate as influenced by rainshadow effect like S. Vancouver Island, and parts of the Olympic Peninsula

How Long was Ebey's Prairie Anthropogenic?

Indigenous burning in Ebey's Prairie was documented historically (e.g., White 1980) and my study on Ebey's Prairie provides at least some archaeological evidence to support the idea that indigenous people were also setting fires in prehistory. Based on the climatic regime, anthropogenic burning was necessary to keep prairies open in the Middle and Late-Holocene. Through my examination of artifacts and features it is clear that people were actively using the Ebey's Prairie during this time. The consistently high densities of projectile points throughout the Holocene hint at a stable, likely open habitat for game animals. The slight increase in hunting about 4,000 years ago may be tied to a concurrent change in the ecological mosaic of the landform. The intensity of human use with regard to plant resources seems to have increased over time based on the higher number of features, artifacts, and edible plant remains evident in the Late Holocene. Further, my archaeobotanical evidence shows that prairie plants were present on Ebey's Prairie since about 3,460 years ago and up to the historic period — during a generally wet, cool trend when trees should have been closing in rapidly.

The "prairie" condition at Ebey's is sparsely demonstrated by archaeobotanical remains in the early part of the Late Holocene. One 3,340 to 3,460 year old hearth (Feature 8a), with four identifiable seeds from three plant taxa which are well adapted to openings (*Brassica*, *Polygonum*, and *Trifolium*), provides the evidence that Ebey's Prairie was open. More recent features (ca. 2,300 cal. BP to present) provide stronger evidence of the prairie condition, with about 80% of the total archaeobotanical assemblage deriving from 31 plant taxa well adapted to or requiring open ecosystems (Table 14 and

Figure 38). Concurrently, an increase in features with edible plant remains during this time suggests that people had perhaps shifted their focus to plant production from a previous hunting/foraging economy. The clearest evidence for anthropogenic burning derived from the archaeobotanical assemblage is edible camas and onion bulbs in features since about 540 years ago to 290 years ago. These plants grow only in openings in coastal maritime environments and are known to have been carefully managed in agro-ecosystems by indigenous people (Deur 1999). Further, tree encroachment during this time would have been at a peak without human-set fires to maintain the opening.

The warm, dry interval known as the Fraser Valley fire period, ca. 2,400-1,200 years ago likely also contributed to the open condition of Ebey's Prairie. Though a marked increase in fires during this period has been well-researched in the Fraser Valley and coastal mountains (Hallett et al. 2003; Lepofsky et al. 2005b), higher resolution evidence is needed to establish whether this was also an active fire period on Northwest Coast prairies. The increase of features on Ebey's Prairie falls within the Fraser Valley fire period and leads me to question whether there is a causal relationship. If Ebey's Prairie was more prone to fires during this period, did naturally-ignited fire create a larger, more productive opening and spur people to focus on plant production and more intensive maintenance of that opening in subsequent years? This possibility has been suggested in regard to berry production elsewhere (Lepofsky et al. 2005b) and may very well be represented on a regional scale. It follows that as the socioeconomy of indigenous people became more complex, the demand for useful and edible plants likely increased, and so did the need to boost plant production.

Potential for Further Evidence

It appears that there is high potential for additional features and artifacts on Ebey's Prairie, based on the distribution of archaeological remains from private collections and archaeological excavations at the Ferry House Site, and distribution of other archaeological sites recorded in the vicinity (Figure 50). The artifact distribution based on those picked up by collectors show that projectiles, at least, were widespread. Since projectiles were the primary target for artifact collectors, other items they found less frequently, like grinding stones, are evidence that a broader artifact assemblage likely exists across a greater expanse of the prairie than is presently recognized. In my own unsystematic examination of plowed fields on various parts of the prairie, I noted scatters of flaked cobbles and clusters of fire-modified rock which may indicate undocumented features. Further, excavation at the Ferry House Site illustrates that prehistoric features can be found intact below the plow zone.

A systematic survey of the unexamined portions of Ebey's Prairie is needed to more accurately estimate the distribution of features and artifacts based on surface evidence. Archaeological sites along the shoreline on the east side of the prairie also indicate that additional archaeological remains may be found on the eastern portion of the prairie. At present, these sites have been minimally investigated.

CHAPTER 5: DISCUSSION AND RECOMMENDATIONS

In this thesis I focused on deciphering the history of human activity in an endangered ecosystem — the anthropogenic prairie of the Northwest Coast. Today, anthropogenic prairies of this region continue to shrink and disappear yet many of them, like Ebey's Prairie, contain intact archaeological evidence with potential to enrich our understanding of ancient ecological and human history. In this thesis, I established that prairies were essential for Coast Salish people as resource-rich ecosystems which they maintained and enhanced, particularly after the encroaching forests began to threaten prairie existence.

My limited archaeological and archaeobotanical sample from Ebey's Prairie contributes to an understanding of human use of this ecosystem throughout the prehistoric period. By using ethnographic modeling, and establishing a set of archaeological expectations from work in similar environments, I determined a strategy for finding and identifying features through archaeological excavation. My design for archaeological and archaeobotanical sampling also utilized flotation and microscopic analyses to recover and identify archaeobotanical remains which would otherwise go undocumented. The combination of methods I used has proven worthwhile and, in fact, requisite for the study of human use of Ebey's Prairie and similar ecosystems elsewhere.

The broader goal of this thesis was to emphasize the importance of research in Northwest Coast Prairies and evaluate which methods would be useful to study them. My study demonstrates that understanding how people used prairies in the past requires using landscape-level approaches and methods from multiple disciplines. Despite limitations, this approach can be successfully applied to other Northwest Coast prairies (Table 22).

Studies like this one, which illustrate the importance prairie ecosystems and human activities in them on a landscape level, must rely on multiple lines of evidence (Table 23). A study focusing solely on the archaeological excavation of the Ferry House Site would have missed the strong evidence of hunting provided through the projectile points unsystematically collected by individuals from plowed fields throughout Ebey's Prairie. Similarly, a focus only on the artifacts in private collections would have missed a variety of other artifact types as well as the features we examined. The nature and age of archaeobotanical remains from features we excavated in the vicinity of the Ferry House site has illustrated a broader scope of human activity on the prairie than surface artifacts could provide and enabled more precise estimates of time scale through radiocarbon dates.

The Distribution of Anthropogenic Prairies

One of the biggest challenges of studying ancient prairies on the Northwest Coast is determining their previous distribution throughout the region. Northwest Coast prairies have been patchy ecosystems during optimal conditions and are rapidly disappearing due to a number of land use changes, including modern construction, agriculture, and tree

Table 22. Efficacy of the methods employed to determine ancient use of Ebey's Prairie.

Method Used	***Potential Results***	***Observations and Inferences***	***Limitations***
Ethnographic review	Types of prairie activities	Ebey's Prairie heavily utilized for a variety of activities	Timescale limited to early historic period and may not be applicable to prehistory
Review of known archaeological record	Recognition of prairie use through features and artifacts in other prairies. Comparison to known archaeological sites in the vicinity.	Analysis of feature content is necessary to make interpretations. Artifacts associated with prairie use are uncharacteristic (i.e., can also be used in other ecosystems)	Many activities are not measurable. Previous study in coastal prairies, nearby sites, and of archaeobotanical remains has been limited
Ground-penetrating radar	Spatial distribution of prehistoric features	Relied on highly reflective material (rocks) which were not present in quantity	Minimally useful for indicating features
Exploratory and standard excavation units and trenches	Spatial distribution of prehistoric features and artifact recovery	Feature discovery, recovery of artifacts and archaeobotanical remains	Exploratory tests/under-house trenches useful as preliminary techniques but offered imprecise context data. Standard excavations useful for context but were more time consuming. Exploratory trenches revealed stratigraphy and feature presence but information was potentially lost in unscreened sediments

Method Used	*Potential Results*	*Observations and Inferences*	*Limitations*
Feature Sampling	Determining stratigraphic contexts, recovering datable material and feature content for analysis	A variety of features. Datable material recovered from profiles. Context of features recorded and content collected for further analysis	Level of documentation was inconsistent between expedient versus slower, more precise techniques
Analysis of artifacts from excavation	Spatial distribution of artifacts, types and ages of activities, tool technology	Plant processing and expedient tool manufacture are represented. Diagnostic projectiles help establish longevity of hunting at the Ferry House Site	Limited sampling produced a limited artifact assemblage
Analysis of private artifact collections	Types and ages of activities, tool technology and spatial distribution	Hunting widespread throughout the Holocene. Plant processing, wood working and trade represented	No stratigraphic context. Collection locations imprecise. Sample bias toward projectiles

Table 23. Multiple methods used to study Ebey's Prairie and the results and interpretations gained from each.

Method Used	***Results and Interpretations***
Ethnographic Review	Plant cultivation and processing, hunting, camping, winter settlement, worship, feasting and council were practiced on Ebey's Prairie by a variety of Indigenous groups. Many of these activities are linked to ecological abundance of the prairie and were likely to have been practiced in the past.
Archaeological Review	Cultivation practices were suspected for Ebey's Prairie in prehistory but no prior archaeological study had been conducted to demonstrate it. Other prairie studies indicate that cultivation is difficult to demonstrate but can be inferred through indirect evidence of mass plant processing features. Plant processing has been demonstrated in other archaeological sites by features in context with cobble tool assemblages and plant remains.
Ground-penetrating radar	Minimally useful for indicating prehistoric features in this study.
Exploratory and Standard Excavation Units and Trenches	13 Features were discovered and artifacts and archaeobotanical remains were collected from 11 of them, indicating edible plant processing.
Feature Sampling	Plant processing, shellfish processing, generalized cooking, and flintknapping were represented. Multiple episodes of hearth use and refuse dumping in fixed locations, indicate some consistency in spatial relationships among use areas.
Analysis of Artifacts from Excavation	Multifunction cobble tools are common, and may relate to pit construction and firewood procurement and plant processing. Flintknapping is also represented and reflects expedient tool manufacture. Hunting represented by three stone projectiles dating from 10,500 to 500 BP.
Analysis of Artifacts from Private Collections	Hunting with stone projectiles was widespread from 10,800 to 150 BP and reflects multiple technologies such as spear, dart, and arrow points. Woodworking, plant processing, flintknapping and trade are also represented.

encroachment. I created a map approximating Northwest Coast prairie distribution (Figure 1) in my introduction by focusing on two plant species which I knew to be common on anthropogenic prairies — camas and Garry oak — but I recognize the limitations of this approach. These genera respond well to periodic, low intensity burning, they do not survive in closed-canopy forested ecosystems, and are therefore good indicators of anthropogenic prairies (Beckwith 2004; Lea et al. 2003; Norton 1979b). However, their presence on the landscape is not solely linked to past human activity. Nor can isolated communities of these plants fully define the previous and likely greater extent of now extinct prairies. Further, these native plants continue to become more popular as horticultural and restoration specimens. They may be placed in previously forested areas to create new "prairies" and be falsely recognized as part of ancient prairie communities. This is particularly true of *Camassia* which is desirable for its showy flower, hardiness, and ability to spread easily in optimal conditions. Though this phenomenon is not currently widespread enough to complicate landscape-level studies, it could be in the foreseeable future.

In order to address ancient prairie distribution on a regional scope and throughout time, a combination of methods and disciplines is needed (Table 24). It is necessary to combine evidence from modern plant communities and prairie soils to create a regional prairie map which approximates past prairie distribution. Historic maps and documents, and archaeological and paleoethnobotanical records are additional lines of evidence which are needed to verify that these prairies were anthropogenic. Currently, most of the palynological studies in the region have been acquired from forested locales and therefore

Table 24. Potential research questions and strategies for answering them on Northwest Coast prairies.

Research Question	***Research Strategies***	***Suggested Methods***	***Potential Outcomes***
How "endangered" are Northwest Coast prairies today?	Determine current distribution of prairies	Map prairie communities regionally, through botanical survey information	Create baseline data and generate interest in preserving remaining prairies
What was the distribution of Northwest Coast prairies throughout the Holocene?	Combine evidence from paleobotany, soils, and historical records	Compile historical accounts of prairie distribution, prairie soils data, and sample open or previously open sites for pollen, phytoliths and macroremains. Radiocarbon date pollen, phytoliths and associated charcoal.	Discovery of spatial and temporal patterns in local and regional ecology specific to prairies.
How was prairie distribution influenced by people in the past?	Look for dramatic shifts in ecology and burn intervals	Paleobotanical study to recognize rapid increases in prairie plants with no apparent natural cause. Fire ecology study to determine where burn intervals appear much more frequent than natural fire sequence (e.g., on prairie edges where old growth trees and wood charcoal exist). Compilation of historic references to indigenous burning in the historic period.	Discovery of areas where prairies were recovered by or extended by frequent burning in the historic and prehistoric past.
How were prairies used by people in the past?	Find features and artifacts in prairies	Landscape-level surveys with surface and subsurface examination and unobtrusive techniques like magnetometry to identify areas for further study.	Discovery of features and artifacts across current or previous prairie ecosystems
	Analyze features and artifacts recovered from prairies	Macro and microanalysis of feature deposits and artifacts. Determine age estimates from radiocarbon dated deposits and seriation of diagnostic artifact types	Create a chronology of activities in prairies and compare to regional trends in human prehistory.

offer scant evidence regarding prairie history. More pollen studies are needed which specifically target the ecological history of prairies. A region-wide map showing prairie distribution in each major phase of the Holocene would be a tremendous asset to future study of human use of these ecosystems.

Maintaining the Harvest through Management

Researchers from many disciplines would like to determine the antiquity of cultivation practices on Northwest Coast prairies. Historic and ethnographic records provide indirect evidence for indigenous methods of cultivation, and can inform a discussion of these practices in prehistory (Deur and Turner 2005). Historic records also demonstrate that anthropogenic prairies were abundant during the early historic period even though climatic conditions favored tree encroachment through most of the Middle to Late Holocene (Boyd 1999; Whitlock and Knox 2002). The premise that, without burning, forests would close in on Northwest Coast prairies is reasonably solid for the region based on modern ecological studies (Lertzman et al. 1996; Lertzman et al. 2002). Therefore, it is reasonable to conclude that indigenous people may have been intentionally burning certain resource areas for thousands of years in this region.

However, it has proven difficult to find direct prehistoric evidence of intentional burning in prairies (Lepofsky et al. 2003). Evidence of fire through wood charcoal abundance alone is not an adequate measure of anthropogenic burning. Not only do prairies produce scant wood charcoal evidence due to the lack of trees (Lepofsky et al. 2003; Lepofsky et al. 2005b) but surrounding forests may produce a false signature for human-set fires during the Fraser Valley fire period ~2,400 to 1,200 BP (Hallett et al.

2003; Lepofsky et al. 2005b) which appears to have been fire-prone even without human agency due to a hot, dry climatic interval within the overall cooling trend of the Late Holocene.

Paleobotanical, sedimentological and archaeological studies can illustrate fluctuations in prairie distribution and indicate human activity in prairies throughout the past and thereby inform a discussion about cultivation in the past. Of these, landscape-level archaeological investigation with an emphasis on paleoethnobotany offers perhaps the most promising line of evidence for inferring ancient cultivation (Lepofsky 2004). If cultivation was necessary to maintain prairie openings on the Northwest Coast and archaeological evidence reflects mass processing of prairie plants (e.g., hundreds of camas roasting features) then it is reasonable to conclude that cultivation was practiced in the ancient past. On the Northwest Coast, mass processing of prairie plants has only been clearly demonstrated archaeologically in the Willamette Valley of Oregon (Cheatham 1989; O'Neill et al. 2004), though limited studies on Vancouver Island (Eldridge 2000; Baptiste and Wollstonecroft 1997; Capes 1964) and elsewhere (Morgan 1999; Schalk et al. 2005) have identified earth ovens and a few isolated camas bulb fragments. These data suggest that research focused on high potential areas for plant processing, using larger excavation blocks, could demonstrate mass plant processing in other areas.

The Future of Archaeological Study of Prairies

The inherent challenges of studying human history in prairies are greatly outweighed by the potential benefits of gaining a broader understanding of Northwest Coast prehistory. As demonstrated in Ebey's Prairie, the archaeological evidence of prairie use may appear subtle when compared to shoreline sites, yet it represents important activities in a hunter-gatherer economy. Research in prairies can help to balance the often repeated sampling bias toward shoreline sites and marine resources in Northwest Coast archaeology. Further, study in prairie ecosystems can help to fill a gap in our knowledge about prehistoric plant use that shoreline sites may not be able to fully address. Ethnographic and ethnohistoric accounts clearly show overlapping use of shoreline, prairie, and forest resource areas by Northwest Coast people. Prairies should be investigated as unique ecological units but the evidence from them, in the long term, is only one strand in the overlapping social and economic web of ancient human history. Regional chronologies of human activity should combine evidence from all ecosystems and site types. The results generated from this study of one prairie landscape illustrate the great potential for further archaeological and paleoethnobotanical investigations in Northwest Coast prairies to contribute to broader discussions of regional prehistory.

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APPENDICES

Appendix A: Northwest Coast Prairie Plants Targeted by People

Scientific Name (Common Name)[1]	***Indigenous Uses***[2]	***Places and Ecosystems where Plant Occurs in the NW***[3]
Apiaceae Family		
Conium maculatum Linn (Poison hemlock)	M, Ch (root)	Abundant on all wet grounds; originally introduced from Europe, wet ditches, moist disturbed sites
Conioselinum pacificum (fisheri) Wiem & Grab. (Pacific hemlock- parsley)	Fd (root)	Moist sandy prairies; Steilacoom; grassy bluffs and headlands, along or near coastline
Daucus pusillus Mich. (American wild carrot)	?Rx (seeds)	Steilacoom; Strait of Georgia-Puget Sound interior and coastal prairies
Heracleum lanatum Michx. (Cow parsnip)	Fd (young tops and stems), M (pedicels), Rx (leaves)	Abundant on coastal prairies; widespread, moist slopes and clearings, meadows
Lomatium nudicaule (Pursh) (Bare stem desert parsley)	Fd (young stems and leaves, seeds), Rx (seeds)	Prairies and sandy sea shores; Southwest British Columbia, Olympic Peninsula, south to Oregon
Lomatium utriculatum Nutt. (Fine-leaved desert parsley)	Fd (young stems, roots)	Puget Sound and South Vancouver Island prairies; dry open grassy bluffs, vernal meadows at low elevation
Oenanthe sarmentosa Presl. ex DC (Pacific water parsley)	Fd (young stems), Rx (roots), M (old stalks)	Common in wet grounds and clearings, rarer at Steilacoom; low wet meadows and clearings, at forest edges in temp. standing water
Osmorhiza occidentalis Nutt. ex Torr. & Gray (Western sweet cicely)	?Ch	Common in rich prairies, in shade; forest openings, clearings

Scientific Name (Common Name)[1]	***Indigenous Uses***[2]	***Places and Ecosystems where Plant Occurs in the NW***[3]
Apiaceae Family (continued)		
Perideridia gairdneri Hook. & Arn. (Gairdner's yampah)	Fd (root)	Common on Puget Sound prairies, Steilacoom; dry to vernally moist open forest, meadows and mossy to grassy slopes
Sanicula bipinnatifida Dougl. ex Hook. (Purple sanicle)	?Rx	Prairie at Penn's Cove, Whidbey Island; dry open forest, meadows, rocky slopes
Sanicula crassicaulis Poepp. ex DC (Pacific sanicle)	?Rx	Common on prairies; moist to dry, open forest
Sanicula graveolens Poepp. ex DC (Sierra sanicle)	?Rx	Prairie near Steilacoom; dry open forest, glades
Asteraceae Family		
Achillea millefolium L. (Yarrow)	Rx (leaves, flowers and roots)	Abundant everywhere in dry soil, Steilacoom; Quilayute Prairie; open sites, meadows, clearings, sometimes in open forest
Anaphalis margaritacea (L.) Benth & Hook. (Pearly everlasting)	Rx (whole plant)	Along coast, not rare; Quilayute Prairie; open forest clearings, meadows, fields, pastures
Argoseris grandiflora (Nutt.) Greene or *A.glauca* DC Eaton (Large flowered or Pale argoseris)	Fd (root, leaves chewed for pleasure)	Common on dry prairies of Puget Sound; dry to moist openings at mid to high elevation
Balsamorhiza deltoidea Nutt. (Deltoid balsamroot)	Fd (root, stems, seeds)	Moist prairies near Puget Sound; dry prairies in Strait of Georgia-Puget Sound south to California
Cirsium edule Nutt. (Edible thistle)	Fd (root), Rx (roots and tips)	Open dry grounds; common moist meadows, clearings, forest openings
Crocidium multicaule Hook. (Gold star)	?Ch	Grassy hill sides, Straits of De Fuca, common at Steilacoom; dry open sites at low elevations Strait of Georgia-Puget Sound scattered to valleys of California

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Asteraceae Family (continued)		
Eriophyllum lanatum (Pursh) (Woolly Sunflower)	Ch	Common on dry plains east of Coast Range, Steilacoom; Quilayute Prairie; Vancouver Island south to California
Gnaphalium chilense Spreng. and Lowland cudweed *Gnaphalium palustre* Nutt. *(*Cotton-batting cudweed)	?M	Prairie edges. Wet sandy soils along sea-shore; dry open sandy or rocky soils or recently burned forest at low to mid elevations
Gnaphalium purpureum L. (Purple cudweed)	?M	Dry prairie near Puget Sound and with *G. palustre* along coast; dry open sandy or rocky soils or recently burned forest at low to mid elevations
Grindelia integrifolia DC. *(*Entire-leaved gumweed)	?M	Common on wet meadows near the sea, Steilacoom; moist non-maritime habitats in Strait of Georgia-Puget Sound area through the Willamette Valley
Lactuca biennis (Moench) Fern (WNPS) (Tall blue lettuce)	?Fd	Prairie edges. Common in dry open woods; forest glades and edges, clearings
Madia racemosa Torr. & Gray. (JGC) (Tarweed)	?Fd	Steilacoom; dry, open and disturbed sites (for *Madia* spp.)
Solidago canadensis (Piper) M.E. Jones (Canada goldenro*d)*	?M	In open spots, not abundant, not seen near Steilacoom; Quilayute Prairie; grassy slopes, meadows, sometimes in dry open forest
Solidago spathulata DC. (Spikelike goldenrod)	?M	Abundant on sandy sea-shore prairies in dry soil, Steilacoom; coastal terraces, sand dunes, meadows and open dry forest and tundra
Sonchus asper (L.) Hill (Sow thistle)	?Fd	Common about cultivated ground, introduced? Common in settled areas, gardens, fields, pastures, clearings, meadows

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Asteraceae Family (continued)		
Tanacetum binpinnatum ssp *huronense* Nutt. (Dune tansy)	?Ch	Sandy soil along sea-shore and interior prairies; coastal and sand dunes, often associated with large-headed sedge and seashore bluegrass
Brassicaceae Family		
Barbarea vulgaris R. Br. (Bitter winter cress)	?Fd	Abundant in damp meadows everywhere to coast; wet disturbed places in Strait of Georgia-Puget Sound
Erysimum asperum DC (JGC) WNPS argues for E.capitatum (Prairie rocket)	Rx	Dry prairies near Steilacoom, not common; Cascade foothills, moist disturbed sites
Rorippa curvisiliqua (Hook.) Bess. (Western yellow cress)	Fd	Steilacoom, common in wet grounds on prairie; wet open areas (meadows)
Campanulaceae Family		
Campanula rotundifolia L. (Common hairbell)	S	Prairies east of Coast Range, common; grassy slopes, open ground
Caprifoliaceae Family		
Lonicera ciliosa, (Pursh) DC. (Orange HoneySuckle)	Fd, Rx, M, S	Prairie edges. Not uncommon about Puget Sound or borders of prairies; dry open forests Vancouver Island and Gulf Islands to California
Sambucus cerulea Raf. Var. cerulea (WNPS: 25,66) (Blue elderberry)	Fd, M, Rx	Plains an prairies both sides of the Cascade mountains, Steilacoom, not west of the Coast range; vicinity of Sumas; dry to moist, fairly open low elevation S. Vancouver Island and adjacent mainland to California
Clusiaceae Family		
Hypericum formosum H.B.*K. ssp scouleri* (Western St John's wort)	?Rx	Common in prairies everywhere; moist open sites, meadows

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Cucubitaceae Family		
Marah oreganus (Torr. & Gray) T.J. Howell (Manroot)	Rx	Common on dry prairies about Puget Sound. Where soil is richer and in shade, it climbs 30 or 40 ft over trees; moist fields, clearings
Cyperaceae Family		
?Carex deweyana Schwein var. *deweyana* (WNPS) closest match to *Carex bromoides* (JGC)	?M	On dry hills along coast, not common; clearings at low to mid elevation. Abundant on Vancouver Island and Queen Charlottes, common Washington and Oregon
Carex macrocephala Willd. var. (Large headed sedge)	?M	Sandy prairies of sea shore, common; sandy seashores, coastal dunes
Ericaceae Family		
Arctostaphylos uva ursi (L.) (Kinnikinnick)	Fd, Rx	Abundant on sandy prairie from sea-shore eastward; sandy and well drained exposed sites, dry forests and clearings, common throughout region
Vaccinium caespitosum Michx. (Dwarf blueberry)	Fd	Prairies of interior, abundant; low elevation bogs
Fabaceae Family		
Lathyrus japonicus Willd. (Beach pea)	Fd	Abundant on sandy prairies along sea-shore; sandy beaches and dunes
Lathyrus palustris L. (Marsh pea vine)	?Fd	Common everywhere in wet ground; usually in marshes and mudflats
Lupinus nootkatensis Dougl. (Nootka lupine)	Fd	Sandy prairie along coast north of the Columbia River; open habitats S. Vancouver Island to California
Psoralea physodes Dougl. ex Hook. (Bread-root)	Rx, Bev	Common on prairie near Steilacoom

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Fabaceae Family (continued)		
Trifolium microcephalum Pursh. (Small-headed clover)	?Fd	Common on inland prairies, Steilacoom ; dry to moist open grassy spots at low elevation
Trifolium wormskjoldii Lehm. (Springbank clover)	Fd	Prairies of interior, and dry parts of marshes near coast; moist to wet open places, low to mid elevation
Vicia gigantea Hook. (Giant vetch)	Fd, Rx,Ch, M	Prairie edges. Common along coast and at Steilacoom in sand; disturbed sites openings and edges of forest and streams at low elevation
Quercus garryana Dougl. ex Hook. (Garry oak)	Fd, Rx, M	Abundant and sole species of oak, in prairies; dry rocky slopes or bluffs, or in deep, rich, well drained soil at low elevation
Hydrangeaceae Family		
Philadelphus lewisii Pursh. var. *gordonianus* L. (Mock orange)	T, Rx, M	Very common in dry open prairies about Vancouver, rare about Puget Sound; open forests and forest edges to open brushy areas on dry soil
Juncaceae Family		
Luzula parviflora (Ehrh. Desv.) (Small-flowered wood rush)	?M	Dry hills common; Quilayute Prairie; moist sites in open forest, meadows, widespread and common
Lamiaceae Family		
Mentha arvensis L. var. *villosa* (Benth.) S.R. Stewart (Field mint)	Rx	Common on wet prairies; wet meadows, clearings
Prunella vulgaris ssp. *lanceolata* (Barton) (Self heal)	Rx	Common on prairies, Steilacoom; Quilayute Prairie; clearings, fields, lawns, this sub species is native
Stachys ciliata Dougl. (Mexican hedge-nettle)	Rx, Fd, M	Wet grounds; Quilayute Prairie; moist clearings, forest edges

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Liliaceae Family		
Brodiae coronaria (Salisb.) Engl. ssp. *coronaria* (Harvest brodia)	Fd	Rare, on prairie near Puget Sound; grassy meadows, slopes, rocky areas
Brodiae congesta Smith (Compact harvest lily)	Fd	Common on prairies with *Brodia hyacinthina*; open grassy areas in drier climates, common in Willamette Valley of Oregon
Brodiae hyacinthina Lindl. Baker (Fool's onion)	Fd	Common on prairies (with *B. congesta*), at Steilacoom; open, grassy areas at low elevation to mountain meadows
Camassia quamash (Pursh) Greene reported as *C. esculenta* (JGC) (Common camas)	Fd	Common on prairies everywhere; Quilayute Prairie; Vancouver Island; Ebey's Prairie; Nisqually Plains; Quilayute and Forks, Baker's, Cook, O'Toole Prairies, & Mia, Barnes, Spieden, and Clark Islands; grassy slopes and meadows Haines, Alaska, SE Vancouver Island & bog on Brooks Peninsula, south to California
Disporum hookeri (Torr.) Nichols. var. *oraganum* (S. Wats.) Q. Jones (Hooker's fairybells)	Fd, Ch	Prairie, Whidbey Island, in shade, rare; mixed forest at low elevation
Erythronium grandiflorum Pursh., WNPS argues for *E. oregonum* (Yellow glacier lily)	Fd	Prairies of interior, common (with *Fritillaria lanceolata* on Whidbey Island; around Skokomish; moist open areas mid to high elevation
Fritillaria lanceolata Pursh. (Chocolate lily)	Fd	Prairies of interior, common (with *Erythronium grandiflorum* on Whidbey Island; grassy meadows, bluffs and open woods sea level to subalpine
Lillium columbianum Hanson ex Baker (Tiger lily)	Fd	Prairies of interior; Quilayute, Forks, Birdsview, German Prairie, near Coupeville on Whidbey Island; meadows, open forest and clearings low to subalpine elevation

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Liliaceae Family (continued)		
Zigadenus venenosis S. Wats. var venenosis (Death camas)	Rx	Prairie at Steilacoom, rare, prairie at Whidbey Island, rare; open forests and edges, meadows damp in spring, grassy slopes low to mid elevation, grows with edible camas varieties
Onagraceae Family		
Epilobium angustifolium L. (Fireweed)	Fd, M, Rx	Exceedingly abundant, especially in the dead forests where its bright flowers color the surface for miles together in July, Steilacoom; moist to fairly dry disturbed areas, including clearings, meadows, especially recently burned sites
Oenothera villosa Thunb. ssp. *strigosa* (Rydb.) D. Dietr. & Raven (Evening primrose)	Fd	Very common on every prairie throughout the country, a very large flowered variety grows in meadows at the mouth of the Columbia
Orchidaceae Family		
Platanthera dilata (Pursh) Lindl.ex Beck var. *leucostachys* (White bog orchid)	?Poison	Common in moist prairie near Steilacoom
Pinaceae Family		
Pinus ponderosa Dougl. ex P. & C. Lawson var. *ponderosa* (Ponderosa pine)	Fd	Prairies near Steilacoom, not common, stunted; dry open sites west of the Cascades in the Puget Trough and Oregon
Plantaginaceae Family		
Plantago aristata Michx. (Indian wheat)	?Rx	Prairie, head of Chehalis, rare

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Plantaginaceae Family (continued)		
Plantago major L. var. *pachyphylla* Pilger. (Common plantain)	?Rx	A very large variety in an opening of the forest, Chehalis river, apparently indigenous
Poaceae Family		
Agrostis oregonensis (Oregon bentgrass)	Fg	Quilayute Prairie; wet meadows Vancouver Island south
Bromus carinatus Hook. & Arn. (California brome grass)	?Fg	Dry prairie at Steilacoom, and salt meadows common; open habitats in the southern half of our region
Calamagrostis neglecta (Ehrh.)Gaertn., Mey., & Scherb. var *neglecta* (Slimstem reedgrass)	?Fg	Sandy sea-shore prairies Steilacoom with *Elymus mollis*; wetlands, wet meadows, dune slacks, shores
Deschampsia cespitosa (L.) Beauv. (WNPS) JGC reported as *Aira latifolia* Hook. (a high elev. grass) (?Tufted hairgrass)	?Fg	Damp prairies and salt meadows with *D. elongata*; Tidal marshes, beaches, meadows from sea level to alpine
Deschampsia elongata (Hook.) Munro ex Benth. (Slender hairgrass)	?Fg	The common grass on damp prairies and salt meadows with ?*D. cesitosa*; Clearings, meadows often disturbed sites near habitation
Elymus mollis Trin. ssp. *Mollis* (Dunegrass)	M, ?Fg	Sandy sea-shore prairies Steilacoom with *Calamagrostis neglecta*; wetlands, wet meadows, dune slacks, shores
?*Hordeum pratense* Kunth., introduced?	?Fg	Prairies with *Poa annua*
Koeleria cristata (L.) Pers.	?Fg	Dry prairies

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Poaceae Family (continued)		
Poa annua L. var. unknown, adventive (WNPS) (Annual bluegrass)	?Fg	Prairies, Introduced? Found with *Hordeum pratense*; very common in disturbed areas, fields, gardens, waste places
Polemoniaceae Family		
Collomia grandiflora Dougl. ex Lindl. (Large flowered collomia)	?M	Common on prairies of interior (W. of Cascades); dry, open or lightly forested areas
Collomia heterophylla Dougl. ex Hook. (Vari-leaved collomia)	?M	Prairie near Puget Sound, rare, Steilacoom; common in dry to moist forest openings, meadows at low elevation
?Lianthus bicolor (Nutt.) Greene ssp. bicolor (WNPS) JGC reported *Gilia micrantha*, Steud. (Bicolored flaxflower)	?M	Common in prairies of the interior with *Gilia capitata*, and *Microsteris gracilis*; open, dry to vernally moist sites at low elevation
Polygonaceae Family		
Polygonum paronychia Cham. & Schlecht (Black knotweed)	?Rx	Common on dry sandy prairies along sea-coast; coastal dunes and sandy beaches at low elevation
Rumex acetosella L. ssp. *angiocarpus* (Murb.) Murb. and/or *Rumex tenufolius* (Wallr.) A. Love. (Sheep sorrel)	Fd	Common in cultivated prairies, introduced about 1835 at Nisqually farms and now (1855) crowding out everything else in poor soil; disturbed open areas low to mid. elevation
Rumex occidentalis S. Wats. var. *labradoricus* (Reech.f.) Lepage	Fd	Not common, Steilacoom, introduced? Moist to wet meadows low to mid elevation

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Polypodiaceae Family		
Pteridium aquilinum L. Kuhn (Bracken or Brake Fern)	Fd, M	Abundant on prairies everywhere; Quilayute Prairie; meadows, clearings, burns, open and disturbed sites
Portulacaceae Family		
Claytonia sibirica L. var. unknown (Siberian miner's lettuce)	Rx	Prairie edges--common in shady wet grounds; common on moist, often shady sites, clearings, meadows low to mid elevation
Primulaceae Family		
Trientalis latifolia (Western star flower)	Rx, Fd	Quilayute Prairie; open forests, meadows low to mid elevation
Ranunculaceae Family		
Aquilegia formosa Fisch. var. *formosa* (red columbine)	Fd, Rx	Common on dry prairies up to 4,000 ft, Steilacoom & Quilayute Prairies; moist, open to partly shaded sites, meadows, clearings
Delphinium menziesii DC (Menzies' larkspur)	Rx	Whidbey Island prairies; grassy bluffs, vernal grassland, meadows
Ranunculus aquatilis L. var. *hispidulus* E. Drew (White water buttercup)	for unspecified Rannunculus species: Fd, Rx	Steilacoom mud prairie; sloughs, water filled ditches
Ranunculus occidentalis Nutt. ex Torr. & Gray (western buttercup)	for unspecified Rannunculus species. Fd, Rx	Dry prairies of Puget Sound and the Coast; Quilayute Prairie; moist meadows, grassy slopes, clearings
Rosaceae Family		
Fragaria chiloensis (L.) Duchesne ssp. *pacifica* (Staudt strawberry)	Fd, Rx	On sandy prairies along coast; sand dunes and sea bluffs

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Rosaceae Family (continued)		
Fragaria vesca L. ssp. *bracteata* (Woodland strawberry)	Fd	Certainly grows on prairies of the interior (JGC); Quilayute Prairie; openings and open forests
Fragaria virginiana Duchesne ssp. *platypetala* (Rydb.) Staudt (Wild strawberry)	Fd	Various parts of the territory near the coast, interior prairies; S. Vancouver Island, south in openings
Malus fusca (Raf.) Schneid. Gunther reports as *Pyrus diversifolia* (Pacific crabapple)	Fd, Rx, M, Fg	Wet grounds everywhere west of Cascades on edges of openings; Quilayute Prairie; moist woods and edges
Potentilla gracilis Dougl. Ex Hook. Var. *gracilis* (Graceful cinquefoil)	?Fd, Ch	Abundant on dry prairies of the interior, Steilacoom; meadows and clearings low to mid elevation in S. half of the region
Rosa sp. (Lots. et al) likely *R. gymnocarpa* or *R. nutkana* (JGC) (Wild rose)	Fd, Rx: *(R. nutkana*), M, Ce (*R.gymnocarpa*)	On borders of woods in dry soil for *R.gymnocarpa*. *R. nutkana* common in wet ground everywhere, Quilayute Prairie; variety of open habitats, meadows, clearings
Rubus leucodermis Dougl. Ex Torr. & Gray var. *leucodermis* (Blackcap raspberry)	Fd (berries), M (berries for stain)	Common in dry open grounds, burnt woods etc.; open forests, disturbed (burned) clearings
Rubus parviflorus Nutt. var. *parviflorus* (Thimbleberry*)*	Fd (berries, shoots), M (bark and leaves), Rx (leaves)	Prairie edges. Abundant in dry hilly woods, everywhere; open sites, clearings, edges or open forest
Rubus ursinus Cham. & Schlecht ssp. *macropetalus* (Blackberry)	Fd (berries), Rx (leaves and roots), Ce (stems)	Prairie edges. Common on dry hills; common in dry open disturbed sites, open forest
Galium boreale (Northern bedstraw)	T (flowers), B (stems)	Quilayute Prairie; moist to dry meadows & grassy openings, common Vancouver Island south

Scientific Name (Common Name)[1]	*Indigenous Uses*[2]	*Places and Ecosystems where Plant Occurs in the NW*[3]
Saxifragaceae Family		
Lithophragma parvoflorum (Hook.) Nutt. ex Torr. & Gray (Small flowered woodland star)	Rx	Abundant on prairies of Whidbey Island, etc.; dry open grassy slopes, in Garry oak woodland
Scrophulariaceae Family		
Castillleja pallida Kunth. and perhaps *C. levisecta, C. hispida, C. miniata, C. angustifolia* (Indian paintbrush) (unalaska)	Fd (nectar) Rx(whole plant)	Several varieties and perhaps another species abound on the prairies; grassy meadows, open woods
Violaceae Family		
Viola adunca Smith (Early blue violet)	Rx (roots, leaves, flowers)	Dry sandy prairies. Whidbey Island and coast, Steilacoom; dry to moist meadows, open woods, grasslands

B=bedding; Ce=ceremony; Ch=charm; Fd=food; Fg=Forage; M=Materials; Rx=medicine; S=Superstition; T=toiletry. Any symbol preceded by ? Indicates possible use based on associations in the literature.

Contents of this table are based upon:

1= Cooper (1860a); Pojar and MacKinnon (1994); Washington Native Plant Society (1994)

2= Collins (1974); Ebey (1855); Farrar (1916, 1917); Gibbs (1877); Gunther (1973), Norton (1979); Suttles (1974, 1990); Turner (1975, 1998)

3= Cooper (1860a:55-71); Ebey (1855); Farrar (1916, 1917); Gunther (1973); Lotspeich et al. (1961); Norton (1979); Washington Native Plant Society (1994)

This list of plants includes only those which J. G. Cooper (1860a) and Lotspeich et al. (1961) identified specifically for western Washington prairies. Many species not listed here are common to prairies as well but were not specified in the literature cited (e.g., *Allium* spp.)

Appendix B: Animals Targeted by People in Northwest Coast Prairies

Animal ***Scientific Name* (Common Name)**	**Preferred Prairie Diet**	**Human Uses**[1]	**Procurement**[2]
Foraging Mammals			
Aplodontia rufa (mountain beaver)	Ferns, nettle, grasses, roots, salmonberry	Ce, Cl, Fd, Tl	T
Castor Canadensis leucondontus (gray beaver)	Bracken fern and shrubs, herbs, grasses	Cl, Fd, Tl	B
Cervus Canadensis roosevelti (elk or wapiti)	Blue grass, brome, June grass, sedge, aster, dandelion, strawberry, pussytoes, clover	Cl, Dec, Fd, Tl	P, B
Lepus americanus washingtoni (red hare)	Blue grass, brome, aster, dandelion, strawberry, jewelweed, pussytoes, clover, vetch	Cl, Fd	S
Odocoileus hemiunus columbianus (black-tailed deer)	Forbs and grasses, deciduous saplings, blackberry, huckleberry, salal	CE, Cl, Dec, Fd, Tl	B, P, S
Ondatra zibethica Linnaeus (muskrat)	Cattails, grasses	Cl	
Procyon lotor Linnaeus (racoon)	Roots and fruits, waterfowl	Cl, Ce, Fd	
Foraging Birds			
Branta sp. (goose)	Grasses, berries, seeds	Dec, Fd, T	?N, ?Sp
Lophodytes sp, *Anas* sp, etc. (duck)	Seeds, berries	Ce, Fd, T	N, Sp
Predatory Mammals			
Canis latrans (coyote)	Small rodents and birds, insects,	Cl	

Animal ***Scientific Name* (Common Name)**	**Preferred Prairie Diet**	**Human Uses[1]**	**Procurement[2]**
	fruits		
Canis lupus Linnaeus (wolf)	Ungulates, small mammals, birds	Cl, Dec	
Felis concolor (cougar)	Ungulates	Cl	
Lynx rufus Schreber (lynx)	Small mammals and birds		
Martes pennanti Erxleben (fisher)	Small mammals, insects, berries	Cl	
Predatory Birds			
Asio flammeus (short-eared owl)	Small mammals, rodents	?Ce	
Haliaeetus sp., Aquila sp. (eagle)	Small mammals	Ce	
Tyto alba (barn owl)	Small mammals, prey birds	?Ce	

Contents of this table based upon Banfield (1974), Barnett (1955), Cooper (1860b), Cowan et al. (1978), Dahlquest (1948), Drucker (1965), Gunther (1972), Jenness (1977), Mathews (1955), Maud (1978), and Suttles (1974). Many procurement techniques and human uses were previously summarized by Trost (2005).

[1] Ce=ceremonial; Cl=clothing; Dec=decoration; Fd=Food; Tl=tool/utilitarian

[2] B=bow/arrow; N=net; P=pitfall; S=snare; Sp=spear; T=specialized tool

Appendix C: Northwest Coast Plants with Edible Underground Parts

Edible Parts ***Scientific Name* (Common Name)**	***Description of Edible Part***	***Preparation Methods***
Bulbs		
Allium acuminatum (Hooker's onion)	Spherical bulb	Fresh or pit-steamed with penstemon, grasses, lichens, and alder boughs. Sometimes dried or made into cakes
Allium amplectens (wild onion)	Ovoid, usually clustered	Eaten raw or steamed in pits
Allium cernuum (nodding onion)	Spherical elongated bulb, clustered, often stipulate	Fresh or pit-steamed with penstemon, grasses, lichens, and alder boughs. Sometimes dried or made into cakes
Camassia quamash and *Camassia leichtlinii*. (camas)	Pear-shaped with flat modified leaf scales like onion	Pit cooked
Erythronium revolutum (pink fawn lily)	Elongated bulb (attached to small corms)	Eaten raw or steamed in cedar boxes with grease, dried in the sun and boiled or baked in hot ashes
Fritillaria lanceolata (chocolate lily)	Bell-shaped with rice-like bulblets	Steamed in pits
Fritillaria camchatcensis (rice root)	Bulb with rice-like bulblets	Steamed 30 minutes in basket inside cedar box
Fritillaria pudica (yellow bell)	Small, ovoid bulb	Eaten raw, boiled, or quickly steamed. Sometimes dried on mats and stored through winter

Edible Parts ***Scientific Name*** **(Common Name)**	***Description of Edible Part***	***Preparation Methods***
Lilium columbianum (tiger lily)	Bell-shaped with fleshy modified leaf scales like garlic	Steam cooked
Zigadenus venonesus (death camas)	Pear-shaped with flat modified leaf scales like onion	Not eaten; poisonous, but can be confused with *Camassia* sp. or *Allium* sp.
Tubers		
Sagittaria latifolia (wapato)	Oval and fleshy like an Irish potato	Baked in hot ashes
Roots		
Conioselinum pacificum (Pacific hemlock parsley)	Long and slender, carrot-like	Basket steamed in a pit lined with eelgrass and ferns
Perideridia gairdneri (wild caraway)	Bifurcated, spindle-shaped	Eaten; no prep info.
Sium suave (water parsnip)	Long fleshy root	Eaten raw or cooked
Lysichiton americanus (skunk cabbage)	Thick fleshy rootstocks	Roasted
Circium brevistylum (Indian thistle)	Thick carrot-like taproot	Peeled and eaten raw or steamed
Potentilla pacifica (Pacific silverweed)	Curly surface roots and long fleshy taproot	Steam-cooked (sometimes in cedar boxes)
Rhizomes		
Aralia nudicaulis (sarsaparilla)	Long, branching rhizomes	Boiled in wooden boxes

Edible Parts ***Scientific Name* (Common Name)**	***Description of Edible Part***	***Preparation Methods***
Dryopteris sp. (spiny wood fern)	Round fleshy, light colored	Steamed in pits overnight, or covered with ochre and roasted on a stick over open fire
Polypodium glycyrrhiza (licorice fern)	Long (>15 cm), roundish (>5mm thick), branching	Chewed raw for flavor or medicine
Polystichum munitum (sword fern)	Stout, fleshy, scaled rhizome	Cooked over open fire or in steaming pits, peeled
Pteridium aquilinum (bracken fern)	Long, branching, ca. 1.5 cm thick, white and glutinous with fibers in center	Roasted in ashes or pit steamed and eaten or pounded into flour cakes
Lupinus sp (lupine)	Long (up to 1 m) and fleshy	Roasted in embers of a fire or steamed in cedar box with dried grass.
Trifolium wormskjoldii (springbank clover)	Long (up to 80 cm) and thin	Dried then wrapped in skunk cabbage and cooked in fire ashes, or steamed in boxes or baskets, or platform steamed with hot rocks and layers of seaweed & mats
Corms		
Claytonia lanceolata(spring beauty)	Spherical corm	Steamed in underground pits or boiled. Sometimes cooked with *Fritillaria pudica* or dried on mats and stored for winter.
Calypso bulbosa (calypso orchid)	Small rounded corm	Eaten raw or boiled

Summarized from Turner (1975, 1998).

Appendix D: Bulbs and Tubers of the Northwest Coast Used for Comparative Analysis

Claytonia lanceolata (Spring beauty)

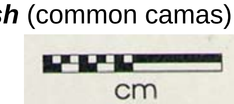
Sagittaria latifolia (wapato)

Fritillaria camschatencis
(rice root)

Fritillaria lanceolata
(chocolate lily)

Camassia leichtlinii (great camas)

Camassia quamash (common camas)



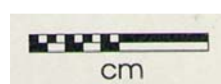
Scale

Zygadenus venenosis (death camas)

Allium acuminatum (Hooker's onion)

Allium cernuum (nodding onion)

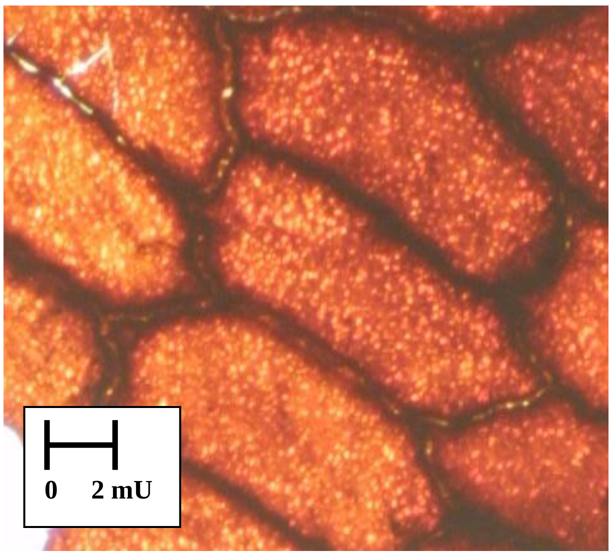
Allim geyeri (Geyer's onion)



Scale

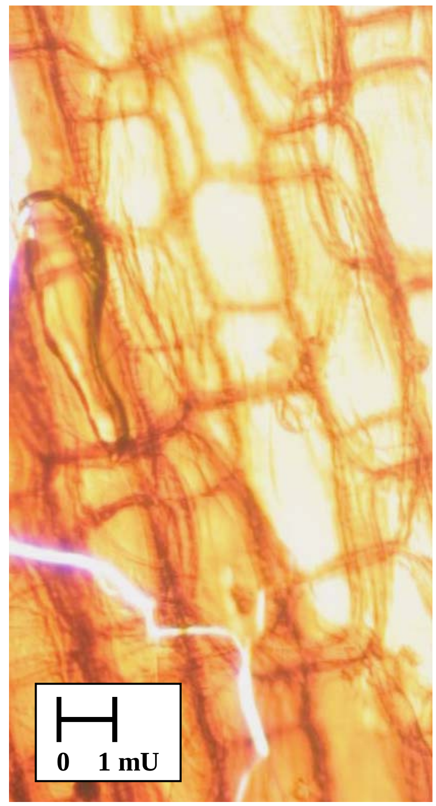
Appendix E: Photomicrographs of Epidermal Tissue from Bulb Midsections

Reference Specimen



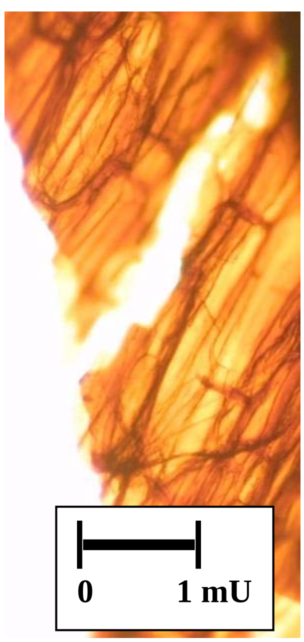
Allium acuminatum (nodding onion) 40x – charred

Reference Specimen



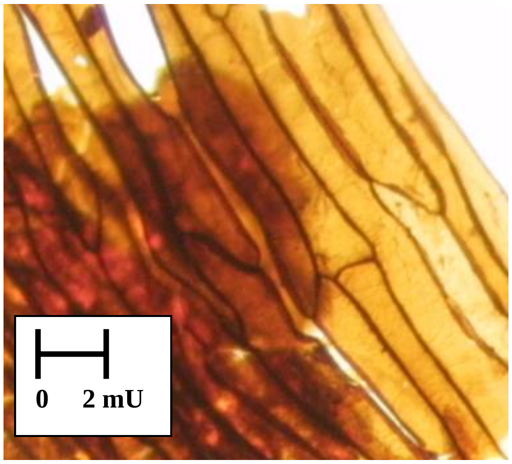
Allium cernuum (nodding onion) 100x –charred

Archaeological Specimen



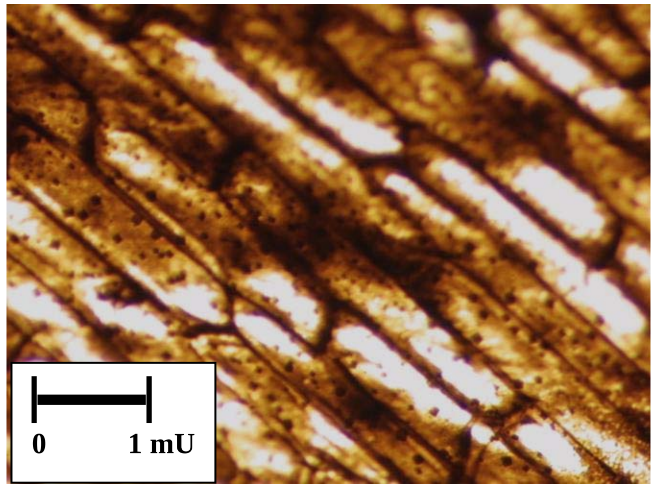
Allium *cf.* ***cernuum*** (nodding onion) 100x (EBLA Trench 26 Sample 2) –charred

Reference Specimen



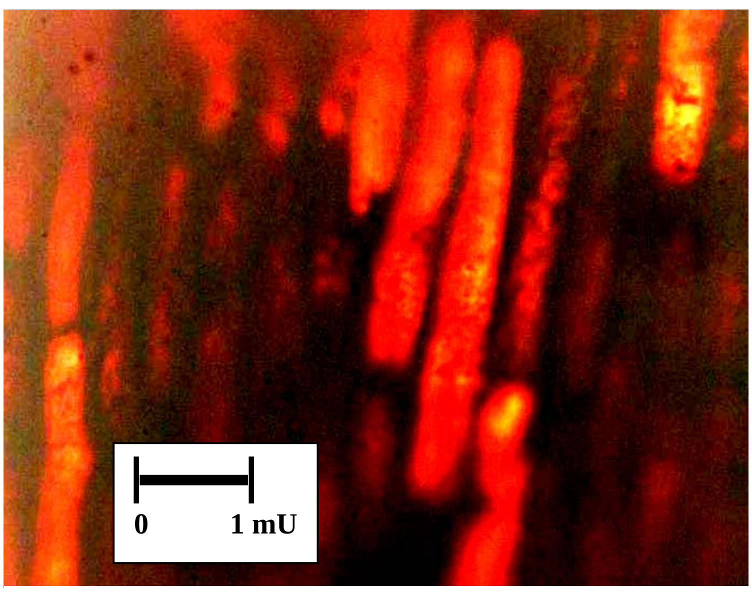
Allium geyeri (Geyer's onion) 40x – charred

Reference specimen



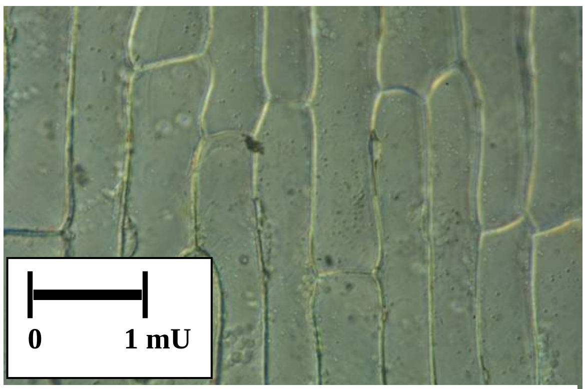
Camassia leichtlinii (great camas) 200x –fresh, treated with 10% Chloral hydrate

Archaeological specimen



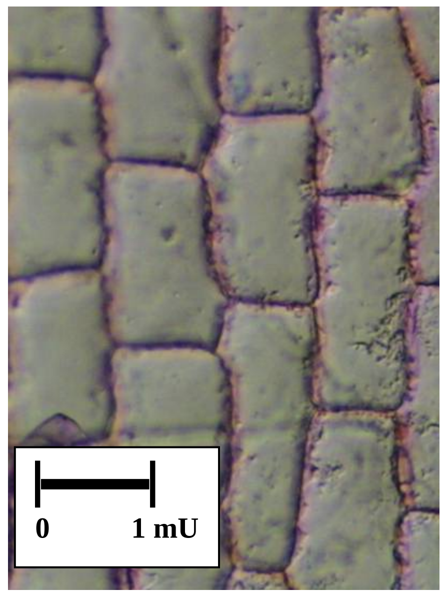
Camassia** cf. **leichtlinii (great camas) 100x (EBLA Trench 9 Bag 9 Sample 2) –charred

Reference Specimen



Camassia quamash (common camas) 400x –fresh, viewed with polarizing optics

Reference Specimen



Zygadenus venenosus (death camas) 100x –fresh, treated with 0.05% w/v toluidine blue

Appendix F: Archaeobotanical Content of Bulk Samples from Features 1-3

Feature Number	1					2A			2B			3
Bulk Sample No.	20-1	20-2	21-1	21-2	69-1	36-1	61-1	513-1	44-1	48-1	514-1	62-2
	Archaeobotanical Remains											
Seeds (N)												
cf. Amelanchier	1	-	-	-	-	-	-	-	-	-	-	-
Asteraceae	-	-	-	1	-	-	-	-	-	-	-	-
Brassica	-	-	-	-	-	-	-	-	-	-	-	-
cf. Brassica	1	-	1	2	-	-	-	-	-	-	-	-
?Caprifoliaceae	-	-	-	-	-	-	-	-	-	-	-	-
Chenopodium	6	3	-	13	5	-	-	-	-	-	1	-
cf. Chenopodium	-	3	-	-	1	-	-	-	-	-	-	-
Claytonia	4	-	-	-	-	-	-	-	-	-	-	-
? *Cornus*	-	1	-	-	-	-	-	-	-	-	-	-
Cyperaceae	-	-	-	-	-	-	-	-	-	-	-	-
cf. Cyperaceae	-	3	-	3	2	-	-	-	-	-	-	-
Ericaceae	1	-	-	-	-	-	-	-	-	-	-	-
Euphorbia	-	-	-	-	1	-	-	-	-	-	-	-

Feature Number	1					2A			2B			3
Bulk Sample No.	**20-1**	**20-2**	**21-1**	**21-2**	**69-1**	**36-1**	**61-1**	**513-1**	**44-1**	**48-1**	**514-1**	**62-2**
	Archaeobotanical Remains											
cf. Fragaria	1	-	-	-	-	-	-	-	-	-	-	-
Galium	-	-	1	1	-	-	-	-	-	-	-	-
cf. Labiateae	-	-	-	-	-	-	-	-	-	-	-	-
Plantago	7	1	-	-	6	-	-	-	-	-	-	-
Seeds (N)												
Poaceae	-	-	-	-	-	-	-	-	-	-	-	-
Polygonum	-	-	-	-	-	-	-	-	-	-	-	-
Portulaca	-	-	-	-	-	-	-	-	-	-	-	-
cf. Portulaca	1	-	-	-	-	-	-	-	-	-	-	-
cf. Potamogeton	3	-	-	-	2	-	-	-	-	-	-	-
Ranunculus	2	-	-	-	-	-	-	-	-	-	-	-
cf. Ranunculaceae	-	-	-	-	-	-	-	-	-	-	-	-
Roseaceae	-	-	-	-	-	-	-	-	-	-	1	-
cf. *Rosa*	-	-	-	-	-	1	-	-	-	-	-	-
Rubus	1	-	-	-	1	-	-	-	-	-	-	-
cf. Rubus	-	1	-	-	-	-	-	-	-	-	-	-
cf. Ruppia	1	-	-	-	-	-	-	-	-	-	-	-
Sambucus	-	1	-	-	-	-	-	-	-	-	-	-

Feature Number	1					2A			2B			3
Bulk Sample No.	**20-1**	**20-2**	**21-1**	**21-2**	**69-1**	**36-1**	**61-1**	**513-1**	**44-1**	**48-1**	**514-1**	**62-2**
	Archaeobotanical Remains											
cf. Sambucus	-	-	-	-	-	-	-	-	-	-	-	-
Scirpus	-	-	-	-	1	-	-	-	-	-	-	-
Silene	-	-	-	-	-	-	-	-	-	-	-	-
cf. Sparganium	-	-	-	-	2	-	-	-	-	-	-	-
Trifolium	-	-	-	-	-	-	-	-	-	-	-	-
cf. Viola	2	-	-	-	-	-	-	-	-	-	-	-
Seeds (N)												
unknown seeds	1	-	2	-	2	7	-	-	2	-	6	-
unidentifiable seeds	25	3	7	-	5	1	-	-	-	-	-	3
Conifer needles (N)												
Abies	-	-	1	-	-	-	-	-	-	-	-	-
Picea	2	1	1	1	4	1	4	-	-	-	4	2
Pinus	-	-	-	-	2	6	5	-	-	-	1	-
Pseudotsuga menziesii	-	-	-	-	-	2	3	-	-	-	-	2
Tsuga	1	-	-	-	-	-	1	-	-	-	-	-
unidentifiable needles	-	-	9	1	7	18	14	3	-	-	15	5

Feature Number	1					2A			2B			3
Bulk Sample No.	**20-1**	**20-2**	**21-1**	**21-2**	**69-1**	**36-1**	**61-1**	**513-1**	**44-1**	**48-1**	**514-1**	**62-2**
	Archaeobotanical Remains											
Other parts												
bulb fragments (g)	0.37	-	-	0.02	-	-	-	-	-	-	-	-
cf. bulb fragments (g)	0.02	0.07	-		-	-	-	-	-	-	-	-
?cotyledon (N)		1	-	1	1	-	-	-	-	-	1	-
conifer cone parts (N)	-	2	2	-	-	271	30	23	16	1	74	-
conifer bud (N)	-	-	-		2	-	-	-	-	-	-	-
Other parts												
whole fruit (berry) (N)	-	-	-	1	-	-	-	-	-	-	-	-
glume (N)	-	-	-	-	-	1	-	-	-	-	-	-
?nutshell (N)	-	-	-	-	1	-	-	-	-	-	-	-
?pericarp (N)	-	-	-	-	1	-	-	-	-	-	-	-
Totals												
Total whole seeds (N)	57	16	11	20	28	9	0	0	2	0	6	3
Total needles (N)	3	1	11	2	13	27	27	3	0	0	20	9
wood charcoal (g)	1.9	2.4	0.47	4.8	-	0.72	0.67	0.35	0.79	0.07	5.8	0.68

Feature Number	1					2A			2B			3
Bulk Sample No.	**20-1**	**20-2**	**21-1**	**21-2**	**69-1**	**36-1**	**61-1**	**513-1**	**44-1**	**48-1**	**514-1**	**62-2**
	Archaeobotanical Remains											
Total other (N)	3	3	2	3	5	272	30	23	16	1	75	0

Note: Wood charcoal fragments >1mm in size from light and heavy fractions were weighed but not identified. Decimal places rounded to the nearest hundredth. Seed fragments are not included in this table and were not identifiable. Unknown=specimen has diagnostic characteristics but could not be identified; *cf.*=probable identification; ?=possible identification; unidentifiable=specimen lacking diagnostic characteristics.

Appendix F: Archaeobotanical Content of Bulk Samples from Features 5-11

Feature No.	5	6	8A	8B	10	11
Bulk Sample No.	**556-1**	**558-1**	**579-1**	**577-1**	**575-1**	**580-1**
			Archaeobotanical Remains			
Seeds (N)						
cf. Amelanchier	-	-	-	-	-	-
Asteraceae	-	-	-	-	-	-
Brassica	2	-	2	-	-	-
cf. Brassica	-	-	-	-	-	-
?Caprifoliaceae	1	-	-	-	-	-
Chenopodium	4	-	-	-	-	-
cf. Chenopodium	3	-	-	-	-	-
Claytonia	-	-	-	-	-	-
? *Cornus*	-	-	-	-	-	-
Cyperaceae	-	1	-	-	-	-
cf. Cyperaceae	-	-	-	-	-	-
Ericaceae	-	-	-	-	-	-

Feature No.	5	6	8A	8B	10	11
Bulk Sample No.	**556-1**	**558-1**	**579-1**	**577-1**	**575-1**	**580-1**
			Archaeobotanical Remains			
Euphorbia	-	-	-	-	-	-
cf. Fragaria	-	-	-	-	-	-
Galium	1	-	-	-	-	-
cf. Labiateae	2	-	-	-	-	-
Seeds (N)						
Plantago	1	-	-	-	-	-
Poaceae	1	-	-	-	-	-
Polygonum	-	-	1	-	-	-
Portulaca	1	-	-	-	-	-
cf. Portulaca	-	-	-	-	-	-
cf. Potamogeton	-	-	-	-	-	-
Ranunculus	-	-	-	-	-	-
cf. Ranunculaceae	1	-	-	-	-	-
Roseaceae	-	-	-	-	-	-
cf. Rosa	-	-	-	-	-	-
Rubus	2	-	-	-	-	-
cf. Rubus	-	-	-	-	-	-
cf. Ruppia	-	-	-	-	-	-

Feature No.	5	6	8A	8B	10	11
Bulk Sample No.	**556-1**	**558-1**	**579-1**	**577-1**	**575-1**	**580-1**
	Archaeobotanical Remains					
Sambucus	1	-	-	-	-	-
cf. Sambucus	1					
Scirpus	-	-	-	-	-	-
Silene	1	-	-	-	-	-
cf. Sparganium	-	-	-	-	-	-
Trifolium	-	-	1	-	-	-
Seeds (N)						
cf. Viola	-	-	-	-	-	-
unknown seeds	7	1	-	-	-	-
unidentifiable seeds	18	6	2	3	-	-
Conifer needles (N)						
Abies	-	-	-	-	-	-
Picea	-	-	-	-	-	-
Pinus	-	-	-	-	-	-
Pseudotsuga menziesii	-	1	-	-	-	-
Tsuga	-	-	-	-	-	-
unidentifiable needles	3	-	1	-	-	-

Feature No.	5	6	8A	8B	10	11
Bulk Sample No.	**556-1**	**558-1**	**579-1**	**577-1**	**575-1**	**580-1**
			Archaeobotanical Remains			
Other parts						
bulb fragments (g)	-	-	-	-	-	-
cf. bulb fragments (g)	-	-	-	-	-	-
?cotyledon (N)	-	-	-	-	-	-
conifer cone parts (N)	1	-	-	-	-	-
conifer bud (N)	-	-	-	-	-	-
Other parts						
whole fruit (berry) (N)	-	-	-	-	-	-
glume (N)	-	-	-	-	-	-
?nutshell (N)	-	-	-	-	-	-
?pericarp (N)	-	-	-	-	-	-
Totals						
Total whole seeds (N)	47	8	6	3	0	0
Total needles (N)	3	1	1	0	-	0
wood charcoal (g)	0.5	2.7	1.1	0.1	0.1	0.02

Feature No.	5	6	8A	8B	10	11
Bulk Sample No.	**556-1**	**558-1**	**579-1**	**577-1**	**575-1**	**580-1**
			Archaeobotanical Remains			
Total other (N)	1	0	-	-	-	-
Note: Wood charcoal fragments >1mm in size from light and heavy fractions were weighed but not identified. Decimal places rounded to the nearest hundredth. Seed fragments are not included in this table and were not identifiable. Unknown=specimen has diagnostic characteristics but could not be identified; *cf*.=probable identification; ?=possible identification; unidentifiable=specimen lacking diagnostic characteristics.						

Appendix G: Lithic Artifacts Excavated from the Ferry House Site on Ebey's Prairie in 2001 to 2004 Field Seasons

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
525	n/a	Surface	Indeterminate	Flaked cobble	1	
525	n/a	Surface	Dacite	Flake	1	Interior[1]
665	TU 1	2	Dacite	Flake	1	Interior
725	TU 4	2	Chert	Flake	1	Secondary[2]
n/a	TU 6	2	Granitic	Flaked cobble	1	Feature 1
n/a	TU 6	2	Granitic	Pecked, ground, and fire-modified cobble	1	Feature 1
n/a	TU 6	2	Granitic	Core	1	Feature 1 contents
n/a	TU 6	2	Granitic	FMR[3]	1	Feature 1 contents
n/a	TU 6	2	Indeterminate	FMR	3	Feature 1 contents
1254	TU 6	3	Metasediment	Shatter and FMR	1	With cortex
791	TU 6	4	Granitic	Flake	1	Primary[4]
792	TU 6	4	Metasediment	Flake	1	Interior

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
1259	TU 6	5	Metasediment	Flake	1	Secondary
1259	TU 6	5	Indeterminate	Flake	2	Secondary
1260	TU 6	5	Indeterminate	Shatter	2	With cortex
800	TU 6	6	Medium-grained volcanic	Flaked cobble	1	
802	TU 6	6	Granitic	Shatter	1	With cortex
807	TU 6	6	Granitic	Flaked cobble	1	
1207	TU 6	6	Granitic	Shatter	1	With cortex
1263	TU 6	6	Indeterminate	FMR	1	
1264	TU 6	6	Metasediment	Flake	1	Interior
1268	TU 6	7	Metasediment	Core	1	
1265	TU 6	7	Andesite	Core	1	
1266	TU 6	7	Indeterminate	FMR	1	
1267	TU 6	7	Indeterminate	Flake	1	Primary
1269	TU 6	7	Indeterminate	Pecked cobble	1	Hammerstone
1270	TU 6	8	Granite	Flake	1	Interior
907	TU 11	3	Dacite	Core	1	
1053	13A	3	Dacite	Flake	1	Interior
1060	TU 13A	6	Dacite	Flake	1	Interior
1093	TU 14	5	Dacite	Flake	2	1-interior, 1-

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
						secondary
1093	TU 14	5	Dacite	Shatter	1	With cortex
1126	TU 15	3	Indeterminate	FMR	1	
1130	TU 15	5	Dacite	Flake	1	Secondary
1130	TU 15	5	Indeterminate	FMR	1	
1168	TU 16	4	Dacite	Flake	1	Interior
1164	TU 16	5	Dacite	Flake	1	Interior
1164	TU 16	5	Indeterminate	Shatter	2	Without cortex
1166	TU 16	7	Volcanic	Shatter	1	Without cortex
1201	TU 17	5	Granitic	Ground cobble	1	
1207	TU 17	7	Probably dacite	Biface	1	
1223	TU 18A	2	Dacite	Flake	1	Secondary
1705	TU 18	1	Indeterminate	Flake	1	Secondary
1715	TU 18	1	Metasediment	Core & FMR	1	Bipolar
1735	TU 18	5A	Greenstone	Core	1	
1740	TU 18	6	Medium-grained crystalline	Flake	1	Interior
1219	TU 19	1	Dacite	Flake	1	Secondary
1245	TU 19	3	Dacite	Uniface	1	
1245	TU 19	3	Chert	Flake	1	Secondary

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
FB 548	SPE 5	B-horizon	Dacite	Uniface	1	
FB 549	SPE 5	n/a	Dacite	Uniface	1	
FB 551	SPE 5	n/a	Dacite	Flakes	3	1-secondary, 2-interior
FB 551	SPE 5	all	Dacite	Shatter	8	2 with cortex, 6 without cortex
1837	SPE 5	n/a	Dacite	Flaked cobble and core	1	
1810	SPE 5	n/a	Granite	Pecked cobble and FMR	1	
1810	SPE 5	n/a	Dacite	Core and FMR	1	
1801	SPE 5	n/a	Dacite	Flakes	10	2-primary, 7-secondary, 1-interior
1801	SPE 5	All	Dacite	Shatter	4	1-secondary, 3-interior
1801	SPE 5	All	Metasediment	FMR	1	
1805	SPE 5	n/a	Dacite	Flakes	7	1-primary, 4-secondary, 2-interior
1805	SPE 5	n/a	Dacite	Shatter	3	1-with cortex, 2-without cortex
1811	SPE 5	n/a	Dacite	Flakes	3	Secondary

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
1811	SPE 5	n/a	Indeterminate	Shatter	1	No cortex
1802	SPE 5	Surface	Dacite	Projectile point	1	Stemmed lanceolate
1802	SPE 5	Surface	Dacite	Biface	1	With cortex
1823	SPE 5	n/a	Dacite	Flake	1	Interior
1834	SPE 5	n/a	Dacite	Flakes	8	4-secondary, 4-interior
1834	SPE 5	n/a	Metasediment	Flake	1	Secondary
1834	SPE 5	n/a	Dacite	Shatter	1	With cortex
1837	SPE 5	n/a	Metasediment	Core	1	
1838	SPE 5	n/a	Dacite	Flakes	2	Secondary
1838	SPE 5	n/a	Dacite	Shatter	1	With cortex
1839	SPE 5	All	Indeterminate	FMR	7	
1846	SPE 5	All	Dacite	Flakes	21	9-secondary, 12-interior
1846	SPE 5	n/a	Metasediment	Flake	1	Secondary
1846	SPE 5	n/a	Chert	Flake	1	Secondary
1846	SPE 5	n/a	Dacite	Shatter	1	With cortex
1846	SPE 5	All	Unkonwn	Shatter	1	Without cortex
1809	SPE 7	All	Dacite	Flake	1	Secondary
1809	SPE 7	All	Metasediment	Shatter	1	Without cortex

NOCA Catalog No. or Field Bag No.	Unit	Level	Lithic Material	Artifact category	Total	Notes
1989	SPE 8	1	Dacite	Projectile point	1	Stemmed, triangular
17	TR A	n/a	Quartzite	Flaked cobble	1	
51	TR 1	n/a	Indeterminate	Flaked cobble and core	1	
51	TR 1	n/a	Indeterminate	Flake	1	Primary
92	TR 4	n/a	Granitic	Ground cobble	1	
114	TR 4	n/a	Indeterminate	Flake	1	Primary
114	TR 4	n/a	Dacite	Flake	1	Interior
115	TR 4	n/a	Chalcedony	Flake	1	Interior
116	TR 4	n/a	Dacite	Projectile point	1	
134	TR 5	n/a	Dacite	Flake	2	1-primary, 1-interior
174	TR 8	n/a	Indeterminate	Ground cobble	1	
542	TR 22	n/a	Indeterminate	Flaked and pecked cobble	1	
543	TR 22	n/a	Dacite	Flake	1	Secondary
437	TR 25	n/a	Metasediment	Flake	1	Secondary
437	TR 25	n/a	Indeterminate	Flaked and pecked cobble	1	
437	TR 25	n/a	Indeterminate	FMR	2	

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
470	TR 26	n/a	Dacite	Flake	3	1-primary, 1-secondary, 1-interior
470	TR 26	n/a	Indeterminate	Flake	2	Secondary
471	TR 26	n/a	Quartzite	Core	1	
473	TR 26	n/a	Medium-grained volcanic	Flaked cobble	1	
947	TR 26	n/a	Dacite	Flake	2	Secondary
948	TR 26	n/a	Indeterminate	Flaked cobble	2	
491	TR 27	n/a	Dacite	Flake	1	Interior
956	TR 28	n/a	Indeterminate	Flaked cobble	1	
600	TR 29	n/a	Dacite	Flake	1	Interior
618	TR 31	n/a	Indeterminate	Pecked cobble	1	
634	TR 32	n/a	Dacite	Flake	1	Interior
635	TR 32	n/a	Indeterminate	Pecked cobble	1	
646	TR 33	n/a	Quartzite	Core	1	
986	TR 35	n/a	Quartzite	Shatter	1	With cortex
995	TR 36	n/a	Dacite	Core	1	
278	FT 14	n/a	Indeterminate	Ground cobble	1	
1274	EU 1	1	Indeterminate	FMR	2	
1470	EU 1	1	Probably dacite	FMR	1	

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
1312	EU 1	2	Indeterminate	FMR	10	
1321	EU1	3	Indeterminate	FMR	12	
1338	EU 1	4	Indeterminate	Shatter	2	With cortex
1338	EU 1	4	Indeterminate	FMR	4	
1348	EU 1	5	Indeterminate	Shatter	1	With cortex
1348	EU 1	5	Indeterminate	FMR	1	
1351	EU 1	5	Indeterminate	Flake	1	Secondary
1351	EU 1	5	Indeterminate	Shatter	1	Without cortex
1360	EU 1	8	Jasper	Shatter	1	Without cortex
1378	EU 2	1	Indeterminate	FMR	46	
1380	EU 2	2	Indeterminate	FMR	6	
1420	EU 2	3	Indeterminate	FMR	12	
1430	EU 2	4	Chert	FMR	1	
1441	EU 2	4	Indeterminate	Groundstone and FMR	1	
1441	EU 2	4	Indeterminate	FMR	12	
1445	EU 2	5	Indeterminate	FMR	3	
1448	EU 2	6	Indeterminate	FMR	1	
1547	EU 3	2	Indeterminate	FMR	1	
1496	EU 3	3	Indeterminate	FMR	4	

NOCA Catalog No. or Field Bag No.	***Unit***	***Level***	***Lithic Material***	***Artifact category***	***Total***	***Notes***
1519	EU 3	4	Indeterminate	Flake	1	Secondary
1525	EU 3	4	Indeterminate	Flaked cobble and ground stone	1	
1538	EU 3	8	Indeterminate	Flaked cobble	1	
1589	EU 4	3	Indeterminate	FMR	18	
1614	EU 4	4	Indeterminate	FMR	7	
1637	EU 4	4	Indeterminate	FMR	1	
1642	EU 4	5	Indeterminate	FMR	1	
1673	EU 4	5	Indeterminate	FMR	1	

1=interior flakes exhibit no cortex ; 2=secondary flakes exhibit <50% cortex; 3=Fire-modified rock; 4=primary flakes exhibit >50% cortex on one face. Material types were determined using the comparative sample collection at North Cascades National Park, Marblemount, Washington. Rock types which could not be identified without destructive tests are designated as indeterminate.