Site 35JA42 represents the first protohistoric village complex excavated in Southwest Oregon. Analyses of animal bones recovered from the site offer the first significant insights into human subsistence behaviors in this region. Although the faunal assemblage is extremely fragmented, detailed zooarchaeological analysis indicates that deer were the primary meat resource while elk, bear, mountain lion, and gray fox were secondary. Animal carcasses were disarticulated by percussion and the bones subsequently processed for marrow and soup/grease. The faunal data also suggest that one house was used as a refuse dump by later occupants and that the site was re-occupied by the same family or families who returned to the site and constructed new houses over several consecutive winters.
Zooarchaeological and Taphonomic Investigations of Site 35JA42, Upper Applegate River, Southwestern Oregon

by

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ARCHAEOLOGICAL AND TAPHONOMIC INVESTIGATIONS OF
SITE 35JA42, UPPER APPLEGATE RIVER,
SOUTHWESTERN OREGON

I. INTRODUCTION

Archaeological investigations in southwest Oregon have provided a great deal of information regarding the aboriginal populations that inhabited this rugged domain. Although these numerous archaeological investigations have recovered many aspects of prehistoric material culture, few faunal remains have been found in the organic-poor deposits of most sites in this region (e.g., Brauner and Lebow 1983; Brauner and Nisbet 1983; Davis 1983; Griffin 1983; Lyman 1985a; Nicholls, et al. 1983; Tisdale 1986).

The detailed analysis of faunal remains representative of human intervention offers potential for reconstruction of human behavior (Lyman 1980), subsistence and dietary patterns (Daly 1969), season of site occupation (Monks 1981), and contributing to understanding the taphonomic history of a site (Binford 1981; Gifford 1981; Lyman 1982). The faunal assemblage recovered from 35JA42 is unique in that it possesses much of these data which are usually invisible in southwestern Oregon archaeological sites.
Physical Setting

Site 35JA42 is located in the NW of the NW of section 30, Township 40S, Range 3W. The site parallels the eastern bank of the Applegate River near the northern boundary of the Applegate Lake Project area (Figure 1) in the Klamath Mountain physiographic province (Baldwin 1981:81-83). The site is situated on the heavily forested upper terrace of the Applegate River which lies at an elevation of 1750 feet above sea level (Brauner 1983).

The upper terrace is composed of rounded to subangular (alluvial) cobbles in a sand and gravel matrix. Although no soil development is evident, cultural material is buried 10 to 30 centimeters by organic debris and sandy loam brought to the site by a previous land owner in an attempt to grow exotic plants on the "gravel bar" (Brauner 1983:5). Dominant overstory vegetation includes second growth ponderosa pine (*Pinus ponderosa*) and Douglas fir (*Pseudotsuga menziesi*). Oregon grape (*Berberis aquifolium*) and white-leaved manzanita (*Arctostaphylos vicidus*) are the dominate understory species (Shelley Smith, field notes; see also Franklin and Dyrness 1973).
Figure 1. Location of site 35JA42.
Site Discovery, Testing, and Temporal Placement

Site 35JA42 was recorded in 1976 by Jeff LaLande, cultural resources technician, Rogue River National Forest. While conducting a reevaluation of cultural resources within the Applegate Lake Project area in 1977, David Brauner, archaeologist with Oregon State University, placed the site on the State of Oregon inventory. The southern portion of the site was characterized by two mute depressions with a low frequency surface scatter of lithic tools and debitage extending approximately 80 meters north to five and possibly six circular pit-house depressions. Although late prehistoric cultural material was recovered from 1977 test excavations, the southern depressions turned out to be a recent trash pit and a natural surface depression (Brauner and Honey 1977:40).

Test excavation (of House 1) in the northern site area during the 1978 field season confirmed the presence of house pits in this portion of the site (Brauner 1978:69-70). Since the remaining house depressions appeared to be undisturbed, they were assumed to contain the wealth of economic, technological, and architectural data retrieved from test excavation of House 1 (Brauner 1978). For a more detailed description of the "history" of 35JA42 and field methods employed during the initial test excavations at the site, see Brauner (1978, 1983) and Brauner and Honey (1977).
Test excavations in 1978 and the 1982 excavation of 35JA42 produced a number of historic artifacts, including blue glass beads, a brass hinge, and glass projectile points (Brauner 1978, 1983). These artifacts indicate a protohistoric occupation. Although the recovered tool assemblages from late prehistoric components at 35JA47 and 35JA49 are similar to those found at 35JA42 (Brauner 1983; Brauner and MacDonald 1983), the latter site represents the first protohistoric site excavated in the Applegate River drainage. As suggested by Brauner (1983:89), "a general time frame ranging between 1750 AD and 1830 AD may be appropriate for site 35JA42."
II. METHODOLOGY

Data Recovery

The field methodology employed at 35JA42 was designed to recover cultural materials from all observable house depressions, and to sample associated exterior work areas. A large open surface excavation strategy was employed to expose the in situ structures and all associated cultural materials (Brauner 1983).

All excavated sediment was passed through a series of screens with final recovery of debris in screen mesh no larger than one-eighth inch. All screening was done with water (Brauner 1983). The use of water accompanied with the use of small screen mesh size aided in the recovery of microdebitage, beads, botanical remains, and small bone fragments which would otherwise have been lost (cf. Thomas 1969; Watson 1972). The basic recovery unit was a 1 X 1 meter excavation unit 10 cm deep (Brauner 1983).

At the completion of fieldwork in 1982, 198 square meters in level 1 (surface to 10 cm below surface; fill) and 106 square meters in level 2 (10 cm to 20 cm below surface; floor) had been excavated (Figures 2 and 3). To alleviate confusion in excavation and subsequent analysis, the dashed lines on these illustrations represent a generic breakdown of large excavation areas into their respective house or feature (after Brauner 1983:17).
Figure 2. Sampling units and houses at 35JA42, level 1.
Figure 3. Sampling units and houses at 35JA42, level 2.
Analytic Methods

Pertinent horizontal and vertical provenience data were recorded for each of the recovered faunal specimens. Prior to taxonomic identification, I compiled a list of extant mammalian taxa (see Appendix B) to familiarize myself with fauna in the site area (after Gilmore 1949:165). Faunal data were also extracted from reports documenting taxa which are not presently locally extant, but which were present in the area historically.

The faunal remains were identified by direct comparison with the Oregon State University, Department of Anthropology, comparative osteological collection. Identification was conducted in a very conservative fashion; the relatively few numbers of individuals representing each species in the comparative collection made it difficult to distinguish intrataxonomic variation such as sexual dimorphism. As pointed out by Grayson, "the smaller the comparative collection, the easier the identification seems though the more inaccurate it is likely to be" (1973a:53-54). The recovered specimens were identified to the most specific level possible (cf. Lyman 1979). Although the majority of the faunal remains are unidentifiable (i.e., small bone fragments), all specimens were tallied. Data on butchering marks, ontogenetic age, bone fragment size, burning, weathering, rodent gnawing, and carnivore attrition
were also recorded, and are described and discussed in the following chapters.
III. ETHNOGRAPHIC BACKGROUND

The aboriginal populations that inhabited southwest Oregon and northwest California include the Tolowa, Shasta, Galice Creek Athapaskans, Applegate Creek Athapaskans, Upland Takelma, and Lowland Takelma (e.g., Schaeffer 1959). Until 1981, the paucity of ethnographic data relevant to the aboriginal groups that once occupied the upper Applegate River drainage created difficulty in defining distinct cultural territories (cf. Brauner and Honey 1977). Since then, the publication of J.P. Harrington’s field notes in 1981 and Gray’s (1985) ethnographic synthesis have clarified our understanding of territorial boundaries in this region.

The upper Applegate River drainage was included within the territory of the Applegate Athapaskan or Dakubetede (Gray 1985; see also Brauner 1983). Although linguistically distinct from the Takelma (to the west, north, and east) and Hokan-speaking Shasta (to the south), these groups shared a number of cultural traits. As stated by Kroeber, the close relationship was "so much so, in fact, as to constitute a single (cultural) area" (1920:156). The following discussion of (animal) food acquisition and preparation incorporates ethnographic data from these cultural groups.

Deer, elk, and bear represent the primary large land mammals that were hunted. Deer hunting involved a variety of techniques. These included stalking (using head-type disguises) and manually driving deer into fenced "corrals"
or snares, often with the use of fire or dogs to facilitate driving (Dixon 1907; Holt 1946; Jacobs n.d.; Sapir 1907). Whether natural or constructed, corrals and snares were usually located near streams or salt licks (Dixon 1907; Sapir 1907). Harrington (1981:558) and Sapir (1907:260) document the use of deer shoulder blade (scapula) "rattles" utilized both in the deer drive and as an alarm system to alert other hunters when the deer were entrapped. Once trapped, deer were shot or clubbed to death (Dixon 1907; Sapir 1907). Although Jacobs (n.d.) states that stalking and snares were not utilized in hunting elk, I suspect that all or some of the techniques employed in hunting deer were used under certain circumstances.

Ethnographic documents describe numerous techniques for hunting grizzly bears and black bears. These included luring the animal out of its den and then dispatching it with bow and arrow or spear (e.g., Holt 1946), or by using dogs as decoys while hunters perched in nearby trees would shoot at it (Jacobs n.d.). Because the aboriginal people had a great deal of respect and reverence for the bear (especially the grizzly bear), there was a great deal of spiritual preparation before the hunt (Dixon 1907; Holt 1946).

Ethnographic records conflict in discussing utilization of the mountain lion and bobcat. Dixon (1907:424) states they were used as food while Holt (1946:311) maintains that these taxa were taken only for their fur.
Although deer, elk, and bear were the fundamental meat resource species, smaller mammals, such as rabbits and ground squirrels were also taken (Driver 1939; Harrington 1981; Holt 1946). No ethnographic data is available on the techniques employed to take small mammals.

The preparation of deer, elk, and bear meat included boiling (often with a small amount of salt), roasting, and drying (Harrington 1981; Holt 1946; Sapir 1907). Meat was also consumed fresh (Holt 1946:309). Although there are some slight discrepancies in the ethnographic literature as to variations in food preparation techniques, Holt's (1946:309) detailed description serves as a synthesis of the various techniques employed.

Bear feet were boiled and eaten fresh. Deer hoofs, the gristle stripped from the lower leg bone left on, were dried and boiled and eaten like pigs' feet. The marrow from the deer's upper leg bone was eaten, as were also the liver and lungs. A sort of blood pudding was made by filling the paunch or large intestine of the deer about half full of blood, adding to this, fat from the outside of the paunch. It was then tied and buried in the ashes and when done the paunch would be full. It was tested by piercing with a stick and when no blood oozed out it was done and was opened and eaten with a spoon. The small intestines were washed, turned inside out with a
stick, and roasted over coals. Deer heads were skinned and placed on flat rocks around the fire, as were any other bones to which a little meat adhered. These cooked there and were left for anyone to pick up and eat at any time he wished. During the big fall deer hunt on the mountains, when they had a number of deer heads at the same time, a pit was dug, lined with rocks, and a fire kept up in it all day. In the late afternoon the ashes were raked out, evergreen boughs placed on the hot rocks, and the deer heads (washed with the hair on) were put on these. More boughs were put on top, sprinkled with water, and the whole covered thickly with hot ashes, coals, and dirt. A fire was built on top and kept up for several hours and the heads were left thus all night. Ground squirrels were also roasted in the ashes, after singeing off the hair, and gray squirrels and rabbits were skinned and boiled or roasted in front of the fire. Deer bones and salmon bones were pounded up and stored for making soup in the winter.

No ethnographic data exists concerning activities performed at the kill site. The only ethnographic document regarding the disposal of bone refuse was recorded by Goddard (n.d.): The Galice threw bones of deer away back into the brush somewhere, where a woman would not step over
them. If a woman stepped over the deer bones, the deer in the woods would get wild!

Whether this represents culturally distinct (unique?) behavior or refers to only whole bones and/or those removed from the kill site and brought back to camp is unknown.

Fish, especially salmon, were a primary food source for many aboriginal populations in southwest Oregon (Gray 1985). No fish remains or fishing implements were recovered from archaeological excavations at 35JA42. Whether this is due to differential preservation (cf. Lyman 1984), food preparation techniques (Dixon 1907:425; Driver 1939:381), bone consumption (cf. Dansie 1984), or that fish were not part of the human inhabitants diet remains unknown.

Most ethnographies encompass observations made after Euro-american contact had changed the aboriginal way of life. This is not to say that ethnographic documents should not be used in conjunction with archaeological data, but that they should be used in a very general sense, especially when analyzing prehistoric and late prehistoric culture. On the other hand, their value might be underestimated when dealing with archaeological data representing protohistoric occupations.
IV. SYSTEMATIC PALEONTOLOGY

Twenty thousand twenty-three vertebrate specimens were recovered from the 1978 test and 1982 excavation of 35JA42. The highly fragmented nature of the assemblage resulted in the identification of only 78 specimens (less than 1%) to the family, genus, or species level. The following is a descriptive summary of the recovered faunal remains. This discussion includes the species represented and their abundances. See Appendix B for a complete list of mammals in the site area.

Class: Mammalia

Order: Rodentia - Rodents

Family: Sciuridae - Squirrels

Material: 2 radii (2 specimens).

Remarks: Six species of sciurid rodents are found in southwest Oregon (Hall 1981; Maser, et al. 1981). Although these specimens appear to represent the genus *Spermophilus*, they are too fragmentary to identify beyond the family level.

cf. *Spermophilus* sp.

Ground Squirrels

Material: 1 innominate (1 specimen).

Remarks: Two species of ground squirrel are currently found in southwest Oregon: the California ground squirrel (*Spermophilus beecheyi*) and the golden mantled ground
squirrel (*S. lateralis*) (Hall 1981). The recovered specimen is burned and fragmentary precluding more specific identification.

**Order:** Carnivora - Carnivores  
**Family:** Canidae - Wolves, Dogs, and Foxes  
**Canis familiaris**  
Domestic Dog  

**Material:** 1 complete individual  
**Remarks:** This individual was recovered from an excavation unit just northwest of House 1. Not yet fully decomposed (i.e., the bones were still covered with mold and large clusters of hair), this immature individual (less than 22 weeks old) represents a recent, intrusive burial in the site. The recovered skeleton is now part of the O.S.U. Department of Anthropology comparative osteological collection.

**cf. Urocyon cinereoargentius**  
**Material:** 1 canine (1 specimen).  
**Urocyon cinereoargentius**  
Gray Fox  

**Material:** 1 edentulate mandible (1 specimen).  
**Remarks:** Gray foxes are inhabitants of wooded areas throughout western Oregon (Hall 1981; Maser, et al. 1981).

**Family:** Felidae - Cats  
**cf. Lynx rufus**  
Bobcat
Material: 1 first phalanx (1 specimen).
Remarks: The bobcat is currently found throughout the entire state of Oregon (Hall 1981; Maser, et al. 1981).

*Felis concolor*

Mountain Lion

Material: 1 distal humerus (1 specimen).
Remarks: Mountain lions are common throughout the state of Oregon. Hall (1981) lists seven occurrence records in the southwestern portion of the state.

Family: Ursidae - Bears
cf. *Ursus americanus*

Material: 1 metatarsal, 1 metapodial diaphysis (2 specimens).

*Ursus americanus*

Black Bear

Material: 1 mandible with \( M_1 \), \( M_2 \), and \( M_3 \) (1 specimen).
Remarks: The black bear is found throughout western Oregon (Hall 1981; Maser, et al. 1981). Although they are not currently found in the area, ethnographic documentation (Harrington 1981) and historical records (Craighead and Mitchell 1982) indicate that the grizzly bear (*Ursus arctos*) was once present in southwest Oregon. Grizzly bears are much larger than black bears and are commonly differentiated from one another by their size differences (Gordon 1977). The maximum antero-posterior length and lingual-buccal width of the third molar were measured. Comparison of these measurements with those of known species (after Lyman 1985)
clearly indicates that the 35JA42 specimen represents *U. americanus* (Figure 4).

**Order:** Artiodactyla - Even-toed Ungulates  
**Family:** Cervidae - Elk, Caribou, Moose, and Deer  
**Material:** 4 antler tines (4 specimens).  
**cf. Cervus elaphus**  
**Material:** 1 thoracic vertebra, 1 metacarpal shaft fragment, 3 first phalanges (5 specimens).  
**Cervus elaphus**  
Elk (Wapiti)  
**Material:** 1 isolated tooth, 3 first phalanges, 1 third phalanx (5 specimens).  
**Remarks:** Two subspecies of elk, Roosevelt elk (*roosevelti*) and Rocky Mountain elk (*C. e. nelsoni*) occur in Oregon (Bryant and Maser 1982; Hall 1981; Maser, et al. 1981). Because the Rocky Mountain elk presently occurs east of the Cascade range (Bryant and Maser 1982), the specimens recovered from 35JA42 probably represent the subspecies *roosevelti*. The osteological similarities of the two subspecies prevents identification beyond the species level. Other archaeological occurrences of elk in Jackson County include 5 specimens from a prehistoric house pit in the Elk Creek drainage (Schmitt 1986a).  
**cf. Odocoileus sp.**  
**Material:** 3 skull fragments, 1 hyoid, 5 edentulate mandible fragments, 3 isolated tooth fragments, 1 axis, 1
Figure 4. Scatter plot of measurements of Ursus sp. M3. The circles represent U. americanus and the dots U. arctos. Connected circles and dots denote the left and right M3's of the same individual. (A) represents the archaeological specimen (after Lyman 1985b:254).
distal humerus, 2 proximal radii, 1 distal radius, 3 proximal ulnae, 1 trapezoid-magnum, 1 unciform, 2 innominate fragments, 1 femur shaft fragment, 1 proximal tibia, 1 distal tibia, 10 astragali, 3 calcaneae, 1 navicular cuboid, 1 proximal metacarpal, 5 metatarsal shaft fragments, 2 distal metapodials, 1 first phalanx (50 specimens).

**Odocoileus sp.**

**Deer**

**Material:** 2 skull fragments, 1 antler fragment, 10 mandibles, 16 isolated teeth, 2 scapulae, 1 proximal humerus, 2 distal humeri, 6 proximal radii, 1 distal radius, 2 proximal ulnae, 1 ulna, 4 distal tibiae, 1 astragalus, 1 proximal metatarsal, 7 metatarsal shafts, 1 third phalanx (58 specimens).

**Remarks:** Two subspecies of the species *Odocoileus hemionus* are currently found in southwest Oregon: mule deer (*O. h. hemionus*) and black-tailed deer (*O. h. columbianus*) (Hall 1981; Wallmo 1981). Although records for the occurrence of white-tailed deer (*O. virginianus*) are marginal in relation to the upper Applegate River (Baker 1984; Hall 1981; Smith 1985), the possibility that this species was more widespread in the past should be considered (cf. Grayson 1982; Lyman and Livingston 1983). Deer are clearly the most abundant taxon at 35JA42 and numerous deer remains were recovered from a prehistoric house pit in the Elk Creek drainage northeast of the Applegate Lake Project area (Schmitt 1986a).
Family: Bovidae - Bovids

*Ovis aries*

Domestic Sheep

**Materials:** 4 isolated teeth, 1 mandible with DP$_2$, DP$_3$, DP$_4$, and M$_1$ (5 specimens).

**Remarks:** All of these specimens were recovered from a 1 X 1 meter excavation unit in House 5. The presence of these specimens in the site will be elaborated on in the discussion of House 5.

"Elk-sized"

**Material:** 1 proximal humerus shaft fragment, 3 rib fragments, 1 proximal tibia shaft fragment, 1 distal femur shaft fragment, 1 scaphoid fragment, 1 navicular-cuboid fragment, 2 phalange fragments, 1 first phalanx fragment (11 specimens).

**Remarks:** These fragmented specimens probably represent elk, but might be representative of cow (*Bos* sp.).

"Deer-sized"

**Material:** 1 skull fragment, 7 edentulate mandible fragments, 5 scapula fragments, 1 axis fragment, 1 cervical vertebra fragment, 2 thoracic vertebra fragments, 1 lumbar vertebra fragment, 3 vertebra fragments, 2 rib fragments, 3 proximal humerus fragments, 1 humerus shaft fragment, 15 distal humerus fragments, 7 proximal radius fragments, 7 radius shaft fragments, 3 distal radius fragments, 3 proximal ulna fragments, 1 trapezoid-magnum fragment, 5 innominate fragments, 4 proximal femur fragments, 8 femur
shaft fragments, 8 distal femur fragments, 13 proximal tibia fragments, 10 tibia shaft fragments, 21 distal tibia fragments, 9 astragalus fragments, 2 calcaneus fragments, 2 proximal metacarpal fragments, 4 metacarpal shaft fragments, 4 proximal metatarsal fragments, 6 metatarsal shaft fragments, 6 metapodial shaft fragments, 6 distal metapodial fragments (171 specimens).

Remarks: Although these specimens probably represent deer, the recovery of domestic sheep (*Ovis aries*) remains obviated more specific identification of these specimens. There are many morphological characteristics which differentiate these two taxa (Hilbebrand 1955; Lawrence 1951), but the fragmented elements from 35JA42 lack diagnostic surfaces.
V. QUANTIFICATION AND TAPHONOMY

Quantification

The quantification of taxonomic abundances in vertebrate faunal assemblages has had a long and controversial history. Since the advent of White's recommendation for the use of "the number of individuals" to determine "the percentage which each species contributes to the diet of the people" (1953a:396-397), the topic of zooarchaeological quantification has received much attention (e.g., Grayson 1979, 1981, 1984; Klein and Cruz-Uribe 1984).

The two most frequently employed techniques in measuring taxonomic abundances are the number of identified specimens per taxon (NISP) and the minimum number of individuals (MNI) (Grayson 1979, 1984; Lyman 1982). There are many difficulties with both measures. The major problem with NISP is the unknown degree of specimen interdependence (Grayson 1984). While MNI controls for specimen interdependence, it is a derived measure (e.g., Casteel 1977) that is a function of sample size and different aggregation techniques can cause variations in relative taxonomic abundances across a site (Grayson 1984).

Because the scale of measurement can be empirically determined (Grayson 1979, 1984), various "medium-sized" faunal aggregates (after Lyman 1985b:261) were defined for analysis of the 35JA42 fauna. Grayson (1984) suggests that
a sample can be analyzed and interpreted at an ordinal scale of measurement if the rank order of taxa do not differ significantly when various aggregation techniques are compared. The quantitative data for vertebrate taxa presented in Table 1 clearly illustrate that the rank orders do not differ significantly between aggregation techniques. Therefore, the 35JA42 archaeofaunas can be validly analyzed at an ordinal scale. Deer represent the most abundant taxon at the site with all other taxa representing secondary resources. Due to the paucity of identified skeletal elements for each of these (secondary) species, it is uncertain as to their relative economic importance to the people who inhabited the site.

Grayson (1984) has elucidated our understanding of zooarchaeological quantification. "Although the current emphasis on taphonomy is extremely healthy" (Grayson 1984:179), there are still many ambiguities in the fossil record related to the unknown taphonomic (formational) history of a site (e.g., Lyman 1984a). As our understanding of taphonomic processes increases, so will our understanding of the assessment of relative taxonomic abundances (see also Lyman 1985c).

Taphonomic Considerations

Between its initial occupation and its archaeological excavation, an archaeological site is an extremely dynamic
Table 1. Quantitative data for vertebrate taxa at 35JA42.

<table>
<thead>
<tr>
<th>Sciuridae</th>
<th>NISP</th>
<th>MNI</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>House 1/Level 1</td>
<td>House 2/Level 1</td>
</tr>
<tr>
<td></td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Urocyon cinereoargenteus</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>cf. U. cinereoargenteus</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>cf. Lynx rufus</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Felis concolor</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ursus americanus</td>
<td>1</td>
<td>-</td>
</tr>
<tr>
<td>cf. U. americanus</td>
<td>-</td>
<td>1</td>
</tr>
<tr>
<td>Cervidae</td>
<td>-</td>
<td>2</td>
</tr>
<tr>
<td>Cervus elaphus</td>
<td>-</td>
<td>3</td>
</tr>
<tr>
<td>cf. C. elaphus</td>
<td>-</td>
<td>4</td>
</tr>
<tr>
<td>Odocoileus sp.</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>cf. Odocoileus sp.</td>
<td>9</td>
<td>10</td>
</tr>
<tr>
<td>Ovis aries</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
environment. It is therefore important to consider the many processes which may have played a significant role in the formation of a faunal assemblage, prior to elaborating on human subsistence and other zooarchaeological interpretations. Although the mammalian skeletal remains recovered from 35JA42 represent an "archaeofauna" (Lyman 1982:332-333) and probably represent bone refuse indicative of human intervention (cf. Daly 1969), there are many processes which could have incorporated and modified the bones in this archaeological deposit (e.g., Binford 1981; Brain 1981; Gifford 1981; Gifford and Behrensmeyer 1977; Hill 1979; Haynes 1980, 1983). Taphonomy or "the science of the laws of burial" (Efremov 1940:93) is the study of these processes.

In the past twenty years actualistic research has increased our taphonomic awareness. While we are far from recognizing the precise taphonomic history of most specimens (i.e., each bone has its own unique history; Gifford 1981), taphonomic studies have helped to redefine the kinds of research and analysis which can validly be performed. Empirical analysis indicates a wide range of primary and post-depositional modification of numerous bones recovered from 35JA42. My discussion will focus on four agencies which appear to have contributed to the taphonomic and formational history of the site: small mammals, carnivores, humans, and bone weathering.
Small Mammals

During their growth, many small mammals (i.e., rodents) gnaw on bone. Rodent gnawed bone is characterized by parallel striations that are typically broad, shallow and flat-bottomed (e.g., Johnson 1985; Shipman 1981; Shipman and Rose 1983). Twenty-two bones recovered from 35JA42 display these distinctive marks. Because many rodents, particularly woodrats (e.g., Neotoma sp.; Bonaccorso and Brown 1972; Wells 1976), transport bones, these specimens could represent bones transported by rodents to the site. Figure 5a illustrates an example of rodent gnaw marks on a specimen recovered from House 1.

The mixing of soils by burrowing animals (faunalturbation) can have profound effects on archaeological and paleontological deposits (Erlandson 1984; Wood and Johnson 1978). The soft, sandy deposits at 35JA42 precluded the identification of krotovinas during excavation of the site. The abundance of burrowing species in the area and numerous krotovinas encountered in the excavation of other sites in the Applegate River drainage suggest the possibility of mixing of cultural deposits at 35JA42 due to faunalturbation (David Brauner, personal communication, 1986).

Aside from their taphonomic input during their life cycle, the occurrence of small mammal skeletal remains in archaeological deposits can be the result of many taphonomic
processes. Stahl (1982) has pointed out the potential importance of small mammals in prehistoric human subsistence due to their availability and high ratio of edible meat to total weight. Ethnographic records on most western prehistoric cultures discuss small mammals as part of the aboriginal diet (e.g., Holt 1946; Steward 1941; Stewart 1941). Because rodents were roasted and consumed whole or pounded up for soup (e.g., Holt 1946), the best evidence for their utilization as a food resource by humans would be the analysis of human coprolites (see Bryant 1974; Dansie 1984) or the recovery of small charred bone fragments resulting from carcass consumption. Four charred rodent bone fragments were recovered from 35JA42, but whether these are indicators of human food refuse or non-cultural inclusion is unknown.

Small mammal remains can also be incorporated into deposits by many non-human agencies. They may be deposited in carnivore scatological remains (Dansie 1984; Juell and Schmitt 1985; Mellet 1974) or raptor pellets (Brain 1981; Dodson and Wexlar 1979; Mayhew 1977), or they may simply die in their burrows. Research directed toward distinguishing the characteristics of human and non-human modification of small mammal remains is increasing (Dansie 1984; Juell and Schmitt 1985), but much more work must be done before "signature criteria" that "discriminate one modifying agent or set of agents from another" (Binford 1981:26) are defined.
Carnivores

Research has shown that carnivores, especially canids, can destroy bone (Binford and Bertram 1977; Lyon 1970), fragment bone (Haynes 1980, 1983), and/or disperse it throughout a site (Kent 1981). The distinctive punctures and pitting characteristic of carnivore gnawing (e.g., Haynes 1980) can help in interpreting the extent of bone modification due to carnivore activities in a site.

Only one specimen recovered from 35JA42 possesses marks indicative of carnivore gnawing. The specimen, a deer (Odocoileus sp.) distal right tibia (B-403), displays pitting on the anterior surface and a large (10.8 mm) puncture on its posterior surface (Figure 5b). The oval shape of the puncture, and the fact that the tooth contact area "for most carnivores will be relatively small, no more than a few millimeters" (Morlan 1983:256), indicates that this perforation represents a series of contiguous tooth punctures. Whether the marks on this bone represent carnivore gnawing contemporary with human occupation of the site (e.g., a domestic dog co-existing with the human inhabitants) or carnivore scavenging after site abandonment is unknown. Because tooth marks are not always produced
from carnivore gnawing and transport of bone (Haynes 1980; Kent 1981), there is equal difficulty in ascertaining the
degree of taphonomic input that carnivores contributed at
35JA42.

As discussed above, carnivores can deposit bones as
scatological remains in deposits. Although I have
identified scat bones in other archaeofaunal assemblages
(Schmitt 1986b), none were identified in the 35JA42
assemblage.

Humans

Human activities directed toward extracting resources
from an animal's carcass are also taphonomic processes.
Skinning and butchering a carcass, breaking a bone for
marrow, bone meal, and/or soup manufacture, and modifying
bone for its use as a tool are examples of these processes
(e.g., Bonnichsen 1982; Lyman n.d.; Noe-Hygaard 1977). Once
bone has passed through this "cultural filter" (Daly
1969:146) it is susceptible to further human modification
such as trampling and redisposal.

Bones can be discarded at their locus of use ("primary
refuse"; Schiffer 1972:161), discarded away from their locus
of use ("secondary refuse"; Schiffer 1972:161), or they can
be transported from either of these locales by house
construction and pit digging activities ("tertiary
deposition"; Meadow 1981:68). The site population and the
Figure 5. Miscellaneous modified bone. a. Deer-sized metatarsal with rodent gnawing; b. deer distal tibia with carnivore tooth punctures; c. weathered deer ulna.
duration and intensity of occupation can create a decreasing correspondence between use and discard locations (Gifford 1980; Murray 1980; Schiffer 1972, 1983). This "smearing" of debris during daily activities (Ascher 1968) and the possibility of cultural scavenging of materials creates difficulty in defining activity areas within a site.

The shallow deposits, close proximity of the house depressions, intensity of occupation, and backdirt piles from aboriginal house construction and recent looting at 35JA42 indicate multiple episodes of human refuse deposition. Figure 6 represents a model of known and speculative formational processes attributed to human activities at the site.

Human modification of bone indicative of butchering, marrow extraction, and soup/grease manufacture is discussed in Chapter 7. Bone artifacts are discussed and described in Chapter 10.

Bone Weathering

Numerous unburned bones displaying various degrees of weathering were recovered from the site (see weathering stages 0-3 in Behrensmeyer 1978:151). These specimens indicate mixing of the cultural deposits at 35JA42 because they are horizontally and vertically dispersed throughout the site. I would expect a uniform distribution of
Figure 6. Chronological sequence (earliest [top] to latest [bottom]) of known and speculative human formational processes at 35JA42.

A. The construction of House 3. Backdirt from construction tossed to the northeast of the house.

B. House 3 occupied.

C. The construction of House 2. Backdirt from construction tossed to the northeast of the house.

*D. Outside of house task area(s) from the House 3 occupation redeposited by the construction of House 2.

E. House 2 occupied.

F. The construction of House 1. Backdirt from house construction tossed to the northeast of the house.

*G. Outside of house task areas from the House 2 and House 3 occupations redeposited by the construction of House 1.

H. House 1 occupied.

I. Hearth stones from House 3 scavenged by a later (more recent) occupation.

J. Cultural scavenging of materials.

K. Recent looting of House 5. Backdirt tossed to the south of the house.

L. Recent construction of a waterline ditch (*possible redeposition of outside of house(s) task areas).

*?. The construction and occupation of House 5. Backdirt probably tossed to the northeast of the house.

M. Site excavation.

* Denotes speculative occurrence.
Figure 6.
weathering stages if no mixing occurred. There is a great deal of difficulty in distinguishing between dessication cracks due to weathering and shrinkage cracks due to heating (cf. Shipman, et al. 1984). This degree of uncertainty precluded any detailed spatial analysis of "weathered" bone fragments in the site. Figure 5c shows weathering cracks on a deer (cf. *Odocoileus* sp.) proximal ulna found just under the ground surface and above the floor of House 5.

I have presented here an outline of "visible" processes that have influenced the formation of the faunal assemblage at 35JA42. Other processes which might have affected the assemblage are unknown due to our taphonomic naivete (cf. Behrensmeyer and Kidwell 1985).
VI. DESCRIPTIVE ZOOARCHAEOLOGY

The following is a discussion of individual faunal assemblages within the houses and features at 35JA42. Although faunal remains from the house fill (level 1) are graphically presented, emphasis is placed on faunal specimens recovered from the house floors (level 2).

House 1

House 1 was the southernmost depression in the village complex at 35JA42, located 1.5 meters south of House 2 (Figure 2). The only visible disturbance of the cultural deposits was the planting of a few small exotic trees above the depression by a previous land owner (Brauner 1983). Backdirt from the construction of House 1 was thrown into the House 2 depression indicating House 1 was constructed and occupied subsequent to the construction of House 2. With backdirt from the construction of House 2 located in the southeast portion of House 3, House 1 represents the most recent occupation of the site (cf. Brauner 1983).

Two thousand nine hundred nineteen bones were recovered from House 1: 938 (73% burned) from level 1 and 1981 (80% burned) from level 2 (Figures 7 and 8, respectively). Sixty-six unidentifiable bone fragments were recovered from a 2 X 2 meter excavation unit 2 meters east of the house (Figure 2).
Figure 7. Bone frequencies by excavation unit in House 1, level 1. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 8. Bone frequencies by excavation unit in House 1, level 2. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
On the floor (level 2) of House 1, bones were concentrated in the northern and northwestern portion of the house (Figure 8). Based on the distribution of bone, fire-cracked rock, grinding stones, and lithic debitage, the northwest quadrant of House 1 appears to be the primary task area within the house (after Brauner 1983:34).

Deer are the most abundant taxon in House 1 (NISP = 7; cf. *Odocoileus* sp., NISP = 9) while ground squirrel (cf. *Spermophilus* sp., NISP = 1) and black bear (from level 1, NISP = 1) are rare. Figures 10, 11 and 12 illustrate the skeletal portions recovered from House 1 (see Table 2 and Figure 9 for the definition of symbols). The skeletal portions of deer recovered from House 1 indicate that a wide variety of butchering units and/or whole carcasses were used by this household; both axial and appendicular skeletal elements were recovered.

**House 2**

House 2 was located between House 1 and House 3 approximately 3 meters from the alluvial terrace (Figure 2). The only visible damage to the house was exotic plants placed in the depression by a previous land owner. Previous land owners had also burned trash and limbs in the house depression, as indicated by a 5 cm layer of ash and burned wood near the center of the depression (Brauner
Table 2. Abbreviations of anatomical parts (after Binford 1978).

<table>
<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>ANT</td>
<td>Antler</td>
</tr>
<tr>
<td>SK</td>
<td>Skull</td>
</tr>
<tr>
<td>HY</td>
<td>Hyoid</td>
</tr>
<tr>
<td>MAND</td>
<td>Mandible</td>
</tr>
<tr>
<td>TO</td>
<td>Tooth</td>
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<tr>
<td>AT</td>
<td>Atlas</td>
</tr>
<tr>
<td>AX</td>
<td>Axis</td>
</tr>
<tr>
<td>CERV</td>
<td>Cervical vertebrae</td>
</tr>
<tr>
<td>THOR</td>
<td>Thoracic vertebrae</td>
</tr>
<tr>
<td>LUM</td>
<td>Lumbar vertebrae</td>
</tr>
<tr>
<td>VER</td>
<td>Vertebrae (unidentifiable)</td>
</tr>
<tr>
<td>PELV</td>
<td>Pelvis</td>
</tr>
<tr>
<td>SAC</td>
<td>Sacrum</td>
</tr>
<tr>
<td>R</td>
<td>Ribs</td>
</tr>
<tr>
<td>ST</td>
<td>Sternum</td>
</tr>
<tr>
<td>SC</td>
<td>Scapula</td>
</tr>
<tr>
<td>H</td>
<td>Humerus</td>
</tr>
<tr>
<td>PH</td>
<td>Proximal humerus</td>
</tr>
<tr>
<td>DH</td>
<td>Distal humerus</td>
</tr>
<tr>
<td>RD</td>
<td>Radius</td>
</tr>
<tr>
<td>PRD</td>
<td>Proximal radius</td>
</tr>
<tr>
<td>DND</td>
<td>Distal radius</td>
</tr>
<tr>
<td>UL</td>
<td>Ulna</td>
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</tr>
<tr>
<td>CARP</td>
<td>Carpals</td>
</tr>
<tr>
<td>MC</td>
<td>Metacarpal</td>
</tr>
<tr>
<td>PMC</td>
<td>Proximal metacarpal</td>
</tr>
<tr>
<td>DMC</td>
<td>Distal metacarpal</td>
</tr>
<tr>
<td>F</td>
<td>Femur</td>
</tr>
<tr>
<td>PF</td>
<td>Proximal femur</td>
</tr>
<tr>
<td>DF</td>
<td>Distal femur</td>
</tr>
<tr>
<td>T</td>
<td>Tibia</td>
</tr>
<tr>
<td>PT</td>
<td>Proximal tibia</td>
</tr>
<tr>
<td>DT</td>
<td>Distal tibia</td>
</tr>
<tr>
<td>LBN</td>
<td>Long bone (unidentifiable)</td>
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<tr>
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<td>Tarsals</td>
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<td>Calcaneus</td>
</tr>
<tr>
<td>MT</td>
<td>Metatarsal</td>
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<tr>
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</tr>
<tr>
<td>DMT</td>
<td>Distal metatarsal</td>
</tr>
<tr>
<td>MPL</td>
<td>Metapodial</td>
</tr>
<tr>
<td>DMPL</td>
<td>Distal metapodial</td>
</tr>
<tr>
<td>PHA 1</td>
<td>First phalange</td>
</tr>
<tr>
<td>PHA 2</td>
<td>Second phalange</td>
</tr>
<tr>
<td>PHA 3</td>
<td>Third phalange</td>
</tr>
<tr>
<td>PHAL</td>
<td>Phalange (unidentifiable)</td>
</tr>
</tbody>
</table>
HOUSES 1, 2, 3, 5, 6 and FEATURE 4

Cervidae

Odocoileus sp.  ○

Odocoileus sp.  ●

deer-sized  X

Q. elaphus  □

cf. Q. elaphus  ■

elk-sized  ▲

O. aries  ○

U. americanus  △

cf. U. americanus  ▲

HOUSE 1

cf. Spermophilus sp.  ♡

HOUSE 2

cf. L. rufus  ♡

HOUSE 3

U. cinereoargenteus  ♡

FEATURE 4

F. concolor  ♡

FEATURE 4 and HOUSE 5

Sciuridae  ♡

HOUSE 5

cf. U. cinereoargenteus  ♡

Figure 9. Species key to symbols used in Figures 10-12, 15-18, 21-24, 26, and 28.
Figure 10. Distribution of identified specimens in House 1, level 1. See Table 2 and Figure 9 for keys to symbols.
Figure 11. Distribution of in situ identified specimens in House 1, level 2. See Table 2 and Figure 9 for keys to symbols.
Figure 12. Distribution of identified specimens in House 1, level 2. See Table 2 and Figure 9 for keys to symbols.
1983:35). Overall, damage to the cultural deposits was minimal.

Four thousand three hundred seventy-seven bones were recovered from House 2: 1646 (82% burned) from level 1 and 2731 (70% burned) from level 2 (see Figures 13 and 14, respectively). Many of the burned bones in level 1 could be attributed to recent trash burning. The highest frequency of bones recovered from the floor of House 2 was located in the northern and northwestern portions of the house. A smaller concentration was located along the southeast rim (Figure 14). The distribution of relative frequencies of lithic tools in the house is similar to that of bone suggesting that the northern floor was the primary work area (Brauner 1983:52).

Deer are more abundant (NISP = 15; cf. *Odocoileus* sp., NISP = 5) while elk (NISP = 2) are rare. Of the deer and deer-sized identified skeletal elements in level 2 (Figures 16, 17 and 18), the appendages (humerus, radio-cubitus, carpal-metacarpals [anterior] and tibia, tarsal-metatarsals [posterior]) constitute over half (54%) of the house assemblage. The frequency of these high marrow yielding units (Binford 1978:26-28) suggests the in-house processing of these elements. Five of these specimens display mid-shaft flake scars indicative of marrow extraction. The anterior appendages were concentrated in the northern portion of the house and the posterior appendages were in the northwest floor area. Whether these small
Figure 13. Bone frequencies by excavation unit in House 2, level 1. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 14. Bone frequencies by excavation unit in House 2, level 2. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 15. Distribution of identified specimens in House 2, level 1. See Table 2 and Figure 9 for keys to symbols.
Figure 16. Distribution of in situ identified specimens in House 2, level 2. See Table 2 and Figure 9 for keys to symbols.
Figure 17. Distribution of in situ deer-sized specimens in House 2, level 2. See Table 2 for the key to anatomical part abbreviations.
Figure 18. Distribution of identified specimens in House 2, level 2. See Table 2 and Figure 9 for keys to symbols.
concentrations are due to food redistribution (cf. Lyman 1980), a shift in food processing locales, or random deposition is unknown because the sample is so small. The recovery of long bones, vertebrae, cranial fragments, and teeth indicate the "head to toe" marrow and soup/grease processing of carcasses in and around House 2.

House 3

House 3 was located 2 meters northwest of House 2. The recovery of charred wall planks and other architectural material indicate that most of the structure had burned (see Brauner 1983:56-59 for a discussion of data relating to the superstructure). Backdirt in the House 3 depression is attributed to the construction of House 2 and indicates that the former was occupied before Houses 1 and 2.

House 3 possessed the highest frequency of bone and the most taxonomically rich faunal aggregate at the site. Ten thousand two hundred eighty bones were recovered from House 3: 6551 (68% burned) from level 1 (including 133 from the ground surface) and 3729 (70% burned) from level 2 (Figures 19 and 20, respectively). Deer are most abundant in level 2 (NISP = 8; cf. Odocoileus sp., NISP = 7) while elk (NISP = 3), bear (cf. U. americanus, NISP = 2), and gray fox (cf. U. cinereargenteus, NISP = 1) are rare. Faunal remains are most abundant in the southeast portion of the house floor (Figures 20-24). The variety of anatomical parts in this
Figure 19. Bone frequencies by excavation unit in House 3, level 1. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 20. Bone frequencies by excavation unit in House 3, level 2. Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 21. Distribution of identified specimens in House 3, level 1. See Table 2 and Figure 9 for keys to symbols.
Figure 22. Distribution of in situ identified specimens in House 3, level 2. See Table 2 and Figure 9 for keys to symbols.
Figure 23. Distribution of in situ deer-sized and elk-sized specimens in House 3, level 2. See Table 2 and Figure 9 for keys to symbols.
Figure 24. Distribution of identified specimens in House 3, level 2. See Table 2 and Figure 9 for keys to symbols.
cluster and throughout the entire house suggests that whole carcasses were processed in and around House 3.

**Feature 4**

Feature 4 was the designation given to a surface depression just northeast of House 3 (Figure 2). First thought to be a house depression, it is now thought that the area was heavily disturbed by construction of a water line ditch, and deposition of backdirt from the recent looting of House 5 and from the construction of House 3 (Brauner 1983:70).

One thousand one hundred seventy faunal specimens were recovered from Feature 4: 755 (81% burned) from level 1 (including 59 bone fragments from the ground surface) and 415 (77% burned) from level 2 (Figure 25). Deer are most abundant in disturbed level 1 and in level 2 (NISP = 12, cf. *Odocoileus* sp., NISP = 1) while mountain lion is represented by only one specimen.

Two relatively complete deer left scapulae were found next to each other in Feature 4 on the 120N grid line (see Figure 26, level 2). Oriented the same (both distal ends are facing south), these two specimens might represent a "shoulder blade rattle" which was utilized in hunting deer.
Figure 25. Bone frequencies by excavation unit in Feature 4, level 1 (top) and level 2 (bottom). Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 26. Distribution of identified specimens in Feature 4, level 1 (top) and level 2 (bottom). See Table 2 and Figure 9 for keys to symbols.
House 5

House 5 was located 6 meters to the northeast of House 3 (Figure 2). First thought to be different from the other houses due to steeply sloping side-walls, excavation of House 5 indicated that the depression had been looted (Brauner 1983). Backdirt from the looting of House 5 had been tossed back into the depression and onto the surface of Feature 4. Due to extensive looting of the house, its relationship to the other structures at the site is unknown.

Seven hundred eighteen bones were recovered from House 5: 673 (69% burned) from level 1 (including 9 bones recovered from the ground surface) and 45 (33% burned) from level 2 (Figure 27). Deer are most abundant (NISP = 3; cf. Odocoileus sp., NISP = 3) while domestic sheep (NISP = 5) and gray fox (NISP = 1) are secondary (Figure 28).

The recovery of domestic sheep remains from the site warrants discussion. The occurrence of a complete domestic sheep mandible in the cultural deposits at 35JA42 could be attributed to a number of processes. This specimen could represent food refuse from the aboriginal site occupants, more recent occupants, natural inclusion through the on-site mortality of an animal, or, transportation of the specimen to the site by a carnivore. I believe that this specimen is representative of food refuse deposited by one of the aboriginal occupations at 35JA42. Although it possesses no evidence of butchery (i.e., flake scars or
Figure 27. Bone Frequencies by excavation unit in House 5, level 1 (top) and level 2 (bottom). Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
Figure 28. Distribution of identified specimens in House 5, level 1 (top) and level 2 (bottom). See Table 2 and Figure 9 for keys to symbols.
striae), it is heavily stained from the organic-rich midden and its location (in backdirt from the looting of House 5) suggests that it was redeposited. Although conjectural, this specimen could have been associated with the floor of House 5 prior to its looting.

No historical data (pre 1900) was recorded for the introduction of domestic sheep to southwest Oregon. Because historical records document the import of sheep to Oregon from California (Gibson 1985; Lomax 1941, 1928), a brief history of the domestic sheep in California is presented here.

Domestic sheep were brought to California by the Spaniards in the early part of the 16th century (Lomax 1941). In reference to the breed of sheep brought to the New World by the Spanish, Lomax (1941:24-25) notes that they were;

largely Merino, degenerated by this time into a scrub type. Nevertheless, they were woolbearers and by selective breeding, could be improved in quality in spite of their lack of pedigrees.

By the mid 1700's, sheep were a primary component of California mission livestock. Exceeded in importance only by cattle, they were a valuable source of meat and wool (Archibald 1978:177). Between 1785 and 1795, the number of sheep in California missions increased 497%. By 1810, there were 150,000 sheep in California missions alone (Archibald 1978:180-181).
The recovery of glass beads and other historic artifacts from 35JA42 indicates aboriginal trade with Euro-Americans (or at least with other aboriginals for these items). Although speculative, it is possible that a domestic sheep (or portion thereof) was exchanged during one of these interludes, and was subsequently deposited at 35JA42.

House 6

House 6 was located 12 meters northwest of House 5 (Figure 2). A small relic collectors pit near the center of the depression was the only sign of disturbance (Brauner 1983:76). Unlike other houses in the village complex, the depression was small (approximately 2 X 3 meters) and oval shaped (Figure 2). A total of 493 bones were recovered from House 6: 349 (97% burned) from level 1 and 144 (88% burned) from level 2 (Figure 29). None of the recovered bone fragments were identifiable.

The assemblage of bone and other cultural debris from House 6 indicates that the structure was used for a more limited range of activities than the larger houses (Brauner 1983:82). This structure may have been a menstrual hut. Activities and tools associated with a male presence in the structure were absent. The total cultural assemblage from House 6 indicates short-term usage of the structure by women. The
Figure 29. Bone frequencies by excavation unit in House 6, level 1 (top) and level 2 (bottom). Bold numbers (top) are total number of bones and small numbers (bottom) are percentage of total which are burned.
context, size, and isolated position of the structure leads this researcher to propose that House 6 functioned as a menstrual hut (Brauner 1983:82).

Menstrual huts are commonly reported in ethnographic literature throughout most of western North America (see Brauner 1976 and references therein). Because they are rarely (if ever) reported archaeologically, there is difficulty in recognizing the recovered material culture as indicative of activities associated with such structures.

**Summary**

As discussed in the previous chapter, there is often a great deal of difficulty in identifying areas indicative of specific human activities. What I have presented here is a general characterization of the distribution and frequency of bones associated with various occupational features at 35JA42.

The distribution of bones in Houses 1 and 2 suggest that in-house food preparation and (possibly) consumption occurred in the northern portion of the houses while similar tasks performed in House 3 occurred in the southeast floor area. Deer are most abundant across the site and are represented by almost every skeletal element. The recovery of this wide range of skeletal parts indicates that (at
least in some instances) whole carcasses were brought back to camp for processing.

The site may have been occupied by the same family or families returning to the site and constructing new houses over consecutive years (Brauner 1983). Although House 3 is different than houses 1 and 2 in many respects, the tool kits recovered from all of the structures are stylistically and functionally similar. The divergence of House 3 from the other houses indicated by the distribution, frequency, and condition of the recovered faunal remains is examined in detain in Chapter 8.
VII. BUTCHERING

Theodore White was one of the first zooarchaeologist to study prehistoric butchering techniques in North America (e.g., 1952, 1953a, 1953b, 1954). His discussions on differential transport of bones and cultural temporal differences in butchery techniques, and his insights into prehistoric behavior and social organization as indicated by horizontal and vertical distribution of skeletal elements in a site served as a standard for many subsequent researchers (see discussions in Lyman 1985c, n.d.). While "he realized ... that taphonomy had to be considered when making intra-site comparisons" (Lyman n.d.), the contemporary affluence of actualistic and ethnoarchaeological research has helped elucidate many taphonomic considerations White was unaware of. As an example, we now know that bone distributions and frequencies are often dictated by distributional factors (e.g., Hill 1979a, 1979b), differential presentation (e.g., Binford and Bertram 1977; Lyman 1984), or both. Nonetheless, White's work in the 1950's helped stimulate contemporary analytic endeavors in this important and rapidly expanding aspect of zooarchaeological analysis.

The butchering of an animal involves a series of processes directed towards extracting consumable resources from the carcass (Lyman n.d.). Evidence of butchering consists of striae and flake scars on bones (e.g., Binford 1981; Bonnichsen and Will 1980; Potts and Shipman 1981).
Other taphonomic agencies (e.g., rodents, carnivores, and treadage) can produce marks on bone similar to those produced by humans during the butchering process (e.g., Behrensmeyer, et al. 1986; Shipman 1981). These latter marks superficially resemble butcher marks, and problems persist in identifying the particular agent that made a mark on a bone (Lyman n.d.). The following discussion of animal butchery and associated taphonomic implications of the 35JA42 assemblage follows recommendations outlined by Lyman (n.d.).

**The Site**

All but one of the butchering marks are flake scars (Table 3). The remaining specimen (a deer calcaneum) has two striations on its dorsal surface. These striae closely match filleting marks (type TC-3) illustrated by Binford (1981:120). Prior to interpreting the flake scar data, it is important to note that carnivores not only fragment bone (Haynes 1980, 1983), but can also leave marks on bone similar to those produced by a hammerstone wielded by a human impacting bone (Bunn 1982). Although some of the flake scars might have been produced by carnivores, the paucity of bones in the collection displaying carnivore damage suggests that the majority of the flake scars were hammerstone ("dynamic loading"; Lyman n.d.) produced.
Table 3. Butchering marks on artiodactyl bones.

<table>
<thead>
<tr>
<th>Catalog #</th>
<th>House/Feature</th>
<th>Level</th>
<th>Element</th>
<th>Type</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-120</td>
<td>1</td>
<td>1</td>
<td>Distal anterior radius</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-159</td>
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<td>2</td>
<td>Proximal posterior radius</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-166</td>
<td>1</td>
<td>2</td>
<td>Distal posterior metatarsal</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-167</td>
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<td>2</td>
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<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-173</td>
<td>1</td>
<td>2</td>
<td>Metatarsal - posterior shaft</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-174</td>
<td>1</td>
<td>2</td>
<td>Metacarpal - anterior shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-185</td>
<td>1</td>
<td>2</td>
<td>Mandible - horizontal ramus</td>
<td>FS</td>
<td>Lingual</td>
</tr>
<tr>
<td>B-196</td>
<td>2</td>
<td>2</td>
<td>Proximal posterior metatarsal</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-203</td>
<td>2</td>
<td>2</td>
<td>Proximal anterior tibia</td>
<td>FS</td>
<td>Medio-anterior</td>
</tr>
<tr>
<td>B-220</td>
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<td>Radius - lateral shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-226</td>
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<td>2</td>
<td>Distal tibia</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-244</td>
<td>2</td>
<td>2</td>
<td>Tibia - medial shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-252</td>
<td>2</td>
<td>2</td>
<td>Proximal posterior tibia</td>
<td>FS</td>
<td>Medio-posterior</td>
</tr>
<tr>
<td>B-266</td>
<td>2</td>
<td>2</td>
<td>Distal anterior radius</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-303</td>
<td>2</td>
<td>2</td>
<td>Humerus - lateral shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-502</td>
<td>3</td>
<td>1</td>
<td>Distal posterior tibia</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-512</td>
<td>3</td>
<td>1</td>
<td>Dorsal calcaneum</td>
<td>S</td>
<td>Dorsal</td>
</tr>
<tr>
<td>B-537</td>
<td>3</td>
<td>1</td>
<td>Distal medio-posterior radius</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-538</td>
<td>3</td>
<td>1</td>
<td>Distal latero-posterior humerus</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-551</td>
<td>3</td>
<td>1</td>
<td>Proximal anterior radius</td>
<td>FS</td>
<td>Latego-posterior</td>
</tr>
<tr>
<td>B-564</td>
<td>3</td>
<td>1</td>
<td>Proximal latero-anterior tibia</td>
<td>FS</td>
<td>Medio-posterior</td>
</tr>
<tr>
<td>B-580</td>
<td>3</td>
<td>1</td>
<td>Distal posterior radius</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-616</td>
<td>3</td>
<td>1</td>
<td>Proximal posterior humerus</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-617</td>
<td>3</td>
<td>1</td>
<td>Metatarsal - posterior shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-618</td>
<td>3</td>
<td>1</td>
<td>Posterior first phalanx</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-645</td>
<td>3</td>
<td>1</td>
<td>Proximal posterior femur</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-323</td>
<td>3</td>
<td>2</td>
<td>Proximal posterior tibia</td>
<td>FS</td>
<td>Medio-posterior</td>
</tr>
<tr>
<td>B-339</td>
<td>3</td>
<td>2</td>
<td>Proximal anterior humerus</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>Catalog #</td>
<td>House/Feature</td>
<td>Level</td>
<td>Element</td>
<td>Type</td>
<td>Location</td>
</tr>
<tr>
<td>-----------</td>
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<td>--------------------------------</td>
<td>------</td>
<td>----------------</td>
</tr>
<tr>
<td>B-369</td>
<td>3</td>
<td>2</td>
<td>Distal posterior tibia</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-400</td>
<td>3</td>
<td>2</td>
<td>Anterior first phalanx</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-403</td>
<td>3</td>
<td>2</td>
<td>Distal tibia</td>
<td>FS</td>
<td>Medial</td>
</tr>
<tr>
<td>B-417</td>
<td>3</td>
<td>2</td>
<td>Distal anterior tibia</td>
<td>FS</td>
<td>Latero-anterior</td>
</tr>
<tr>
<td>B-424</td>
<td>4</td>
<td>2</td>
<td>Radius - posterior shaft</td>
<td>FS</td>
<td>Medio-posterior</td>
</tr>
<tr>
<td>B-427</td>
<td>4</td>
<td>2</td>
<td>Distal posterior tibia</td>
<td>FS</td>
<td>Lateral</td>
</tr>
<tr>
<td>B-430</td>
<td>4</td>
<td>2</td>
<td>Femur - anterior shaft</td>
<td>FS</td>
<td>Lateral</td>
</tr>
</tbody>
</table>

FS  Flake scar

S  Striae
Further, the morphology of the flake scar at 35JA42 is not similar to flake scars produced by North American carnivores (Haynes 1983).

While the 35JA42 flake scars represent human induced bone breakage, problems persist in interpreting the function (purpose) of this breakage. Traditional interpretations suggest that flake scars are indicative of marrow extraction and/or grease production (Binford 1978, 1981). Plotting the frequency of flake scars per anatomical part and comparing it to Binford's "marrow index" (1978:21) indicates that many of the flake scars might be attributed to the extraction of marrow by humans (Figure 30) because most of the flake scars occur on bones with high marrow content. But some of these flake scars could be related to animal disarticulation. As an example, the proximal tibiae are represented almost entirely by anterior crests. While only two of these skeletal portions display flake scars, they are an abundant element in this and other collections (cf. Lyman 1978). Because many muscles and ligaments are attached to this element (e.g., the deep fascia and ligamentum patellae), "breaking off the crest allows easy separation of the knee joint from the tibia" (Lyman 1978:16). Further, because tibiae are relatively high marrow yielding elements (Figure 30), the breakage pattern resulting in the high frequency of anterior crests could be two-fold: disarticulation by percussion and the resultant opening of the medullary
Figure 30. Comparison of the marrow utility index (Binford 1978) and number of specimens from 35JA42 with flake scars.
cavity for marrow extraction. Disarticulation by percussion might represent the most "optimum" butchering strategy in that it separates articulated joints while simultaneously exposing the medullary cavity for marrow extraction (Figure 31, far right).

The paucity of cut marks, high frequency of flake scars, and the recovery of a number of articulated joints seems to indicate a butchering pattern similar to that documented on the prehistoric Columbia Plateau. Specifically, dismemberment and disarticulation by breaking bone just proximal and distal to major joints (Lyman 1978, 1985b). There are, however, many methodological weaknesses in how this interpretation is derived (after Lyman 1985b). First, "it is quite possible to butcher an animal of any size without leaving a single (cut) mark on any bone" (Guilday, et al. 1962:64; see also Shipman and Rose 1983). Second, the intensive processing of bone for soup/grease as displayed by the highly fragmented 35JA42 assemblage could have "erased" many cut marks. Finally, regardless of butchering techniques, less dense articular ends that possessed cut marks could be absent due to preservational factors (Lyman 1984a).

While these inherent weaknesses might render the traditional interpretation too simplistic (after Lyman 1985b:279), the 35JA42 butchering data indicates that in many instances ungulates were skinned and subsequently disarticulated by percussion and filleted. Although no
Figure 31. Flow chart depicting the various methods and stages in animal butchery at 35JA42.

1. After the animal is skinned, the carcass is disarticulated by cutting through the joints.

2. After the animal is skinned, the carcass is disarticulated by breaking bones just proximal and distal to joints.

3. Meat is extracted from separated butcher units.

4. Meat and marrow are extracted from the separated butcher units.

5. After meat and marrow are extracted, the bones are discarded.

6. After meat is removed, the bones are discarded. The paucity of nearly complete elements indicates that this rarely occurred.

7. After meat is removed, the bones are broken for marrow.

8. Although bones are broken during disarticulation, further bone processing is required to expose more of the medullary cavity for marrow extraction.

9. After marrow is extracted, the bones are discarded.

10. Bone fragments resulting from disarticulation and marrow extraction are broken further for the manufacture of soup/grease.

11. After soup/grease is manufactured, the bone fragments are discarded.
Figure 31.
disarticulation (cut) marks were observed, it is suspected that carcasses were occasionally disarticulated by cutting through the joints. Because "every butchering situation is unique" (Frison 1978:305), one can assume variation in butchering techniques due to the many contingencies affecting each butchering episode. These contingencies might include (among other things) the number of animals killed, the natural setting in which animal butchery occurred (Binford 1978), and the anatomy of the animal(s) (Gifford 1977). For a complete list of variables affecting butchering techniques, see Lyman (n.d., Table 3).

In Houses 1 and 2, skeletal elements displaying flake scars are most abundant on the house floors. Conversely, the highest frequency of butchered bone in House 3 is from level 1 (Table 3). Because it represents the chronologically first occupational surface at the site, the abundance of butchered bone in the fill of House 3 suggests that this open depression served as a refuse dump for later occupants of the site.

Bone fragments from a "typical" excavation unit at 35JA42 are shown in Figure 32. The abundance of small bone fragments implies that the activities of bone soup/grease manufacturing were commonly undertaken at the site (cf. Leechman 1951; Vehik 1977). Because bone grease is a high caloric food resource (due to its high fat content) and because it preserves well (see Vehik 1977), bone grease appears to have served as a multifunctional food resource:
Figure 32. Faunal remains from a "typical" excavation unit at 35JA42 (112-113N/100-101E, level 2).
"opportunistic" exploitation of an available resource (cf. Lyman 1985b:285), a concentrated energy source (Vehik 1977), an additive to other foods, and as a stored food reserve for consumption under conditions of short supply. Minimally, the crushing of bone and its suspected subsequent boiling for grease extraction indicate the maximum utilization of animal resources at the site.

In order to assess the human behavioral meaning of the site fauna, deer and deer-sized skeletal elements were collapsed into one sample (after Lyman 1985b). The minimum number of elements (MNE) and minimum animal units (MAU) were then derived from this sample (see Binford 1984:50-51). These data were then compared to Binford's (1978:74) modified general utility index (MGUI) for sheep. The curve resulting from plotting the MAU against the MGUI per anatomical part (Table 4, Figure 33), corresponds closely with that of a reverse utility strategy (Thomas and Mayer 1983:368), or, the inverse of the bulk utility strategy (Binford 1978:81; see also Lyman 1985b, 1985c). The model for this strategy predicts the recovery of a higher proportion of low utility elements (e.g., mandibles) than higher utility elements (e.g., femurs). Although the paucity of high utility skeletal portions suggests transport of these elements to another location, many (e.g., vertebrae and ribs) are low density elements and their low frequency in the site could be attributed to differential destruction. As stated by Lyman (1985c:234),
Table 4. Absolute and proportional frequencies (Binford 1984:50-51) of deer and deer-sized bones compared to the MGUI for sheep (from Binford 1978:74).

<table>
<thead>
<tr>
<th>Skeletal Part</th>
<th>NISP</th>
<th>MNE</th>
<th>MAU</th>
<th>MGUI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Antler</td>
<td>4</td>
<td>2</td>
<td>29</td>
<td>1</td>
</tr>
<tr>
<td>Skull</td>
<td>6</td>
<td>4</td>
<td>57</td>
<td>26(13)</td>
</tr>
<tr>
<td>Mandible</td>
<td>22</td>
<td>5</td>
<td>71</td>
<td>12a</td>
</tr>
<tr>
<td>Hyoid</td>
<td>1</td>
<td>1</td>
<td>14</td>
<td>44b</td>
</tr>
<tr>
<td>Atlas</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>19</td>
</tr>
<tr>
<td>Axis</td>
<td>2</td>
<td>1</td>
<td>14</td>
<td>19</td>
</tr>
<tr>
<td>Vertebrae (unident.)</td>
<td>3</td>
<td>.04</td>
<td>.5</td>
<td>47c</td>
</tr>
<tr>
<td>Cervical</td>
<td>1</td>
<td>.14</td>
<td>2</td>
<td>55</td>
</tr>
<tr>
<td>Thoracic</td>
<td>2</td>
<td>.15</td>
<td>2</td>
<td>46</td>
</tr>
<tr>
<td>Lumbar</td>
<td>1</td>
<td>.16</td>
<td>2</td>
<td>39</td>
</tr>
<tr>
<td>Pelvis</td>
<td>7</td>
<td>1.5</td>
<td>21</td>
<td>82</td>
</tr>
<tr>
<td>Rib</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>100</td>
</tr>
<tr>
<td>Sternum</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>91</td>
</tr>
<tr>
<td>Scapula</td>
<td>7</td>
<td>2</td>
<td>29</td>
<td>45</td>
</tr>
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<td>14</td>
<td>37</td>
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<td>3</td>
<td>43</td>
<td>33</td>
</tr>
<tr>
<td>Proximal radius</td>
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<td>4</td>
<td>57</td>
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<td>Distal radius</td>
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<td>14</td>
<td>20</td>
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<td>8</td>
<td>3.5</td>
<td>50</td>
<td>28d</td>
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<td>Carpals</td>
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<td>7</td>
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<td>Proximal metacarpal</td>
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<td>1.5</td>
<td>21</td>
<td>10</td>
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<td>1</td>
<td>14</td>
<td>81</td>
</tr>
<tr>
<td>Distal Femur</td>
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<td>1.5</td>
<td>21</td>
<td>81</td>
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<td>Proximal tibia</td>
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<td>Distal tibia</td>
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<td>5.5</td>
<td>79</td>
<td>38</td>
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<tr>
<td>Tarsals</td>
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<td>.25</td>
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<td>23</td>
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<tr>
<td>Astragalus</td>
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<td>7</td>
<td>100</td>
<td>23</td>
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<td>Calcaneum</td>
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<td>1.5</td>
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<td>23</td>
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<td>Proximal metatarsal</td>
<td>5</td>
<td>1.5</td>
<td>21</td>
<td>16</td>
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<tr>
<td>Distal metapodial</td>
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<td>29</td>
<td>10e</td>
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<tr>
<td>First phalanx</td>
<td>1</td>
<td>.13</td>
<td>2</td>
<td>8</td>
</tr>
<tr>
<td>Second phalanx</td>
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<td>0</td>
<td>0</td>
<td>8</td>
</tr>
<tr>
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<td>1</td>
<td>.13</td>
<td>2</td>
<td>8</td>
</tr>
</tbody>
</table>

a MGUI is for mandible without tongue.
b MGUI is for mandible with tongue.
c Average of MGUI for cervical, thoracic, and lumbar.
d Average of MGUI for proximal radius and distal humerus.
e Average of MGUI for distal metacarpal and distal metatarsal.
Figure 33. Deer-sized artiodactyl utility strategy at 35JA42. MAU and MGUI values from Table 4. Stippled area is arbitrary ±10% variance (after Thomas and Mayer 1983:370). See Table 2 for abbreviations.
"the frequencies of bone parts should be correlated with the bulk density of those bone parts to assess the possibility that the [reverse utility] curve may be the result of differential destruction and not differential transport."

In order to test this possibility, ratio values of the (less dense) proximal humeri/distal radii were plotted against the (dense) distal humeri/proximal radii as illustrated by Binford (1981: Figures 5.07-5.10; see Lyman 1984a for bulk density values). The results (Figure 34) indicate that the reverse utility curve (Figure 33) could be the product of differential destruction of high utility-low density skeletal elements. The paucity of vertebrae and ribs could be attributed to food preparation techniques and not differential transport. To illustrate this further, jack rabbit (*Lepus* sp.) skeletal portion frequencies in western Great Basin archaeological sites can serve as an interpretive analog.

Much like the processing of larger mammal bone for grease, jack rabbits were pounded up for bone meal and soup (e.g., Steward 1941). Due to their small size, whole carcasses were brought to habitation sites for processing; differential transport of selected butcher units rarely, if ever, occurred. Although low density elements, such as scapulae and cranial fragments, are relatively abundant in these sites, vertebrae and ribs are rare due to intensive food processing of these elements (Dansie and Ringkob 1979; Schmitt 1986b). The paucity of these elements indicates
Figure 34. Relationship between frequencies of proximal humerus/distal radius and distal humerus/proximal radius at 35JA42 (after Binford 1981:221).
human behavior related to subsistence practices rather than differential transport. Perhaps the low frequency of axial skeletal portions at 35JA42 reflects a similar food processing technique.

To summarize, it appears that in many instances whole carcasses were brought to the site where a variety of food resources were extracted. The butchering data indicate that ungulates were disarticulated primarily by percussion. Once meat was removed, marrow was extracted for consumption. While many equate the recovery of broken mandibles and phalanges with marrow extraction due to nutritional stress (e.g., a depleted food supply; Binford 1978), the recovery of these broken elements at 35JA42 probably represents the use of a readily available and useable food resource (after Lyman 1985b), or perhaps even gustatory preference.

The condition of the faunal assemblage indicates maximizing of acquired animal resources by the human inhabitants of 35JA42. Although carnivores and other non-human agencies can break bone, ethnographic and archaeological data indicate that the processing of bone for soup/grease was the major factor resulting in the highly fragmented condition of the assemblage. With this evidence of intensive processing of skeletal elements, one must suspect intensive utilization of the internal and external soft tissue (the hide and viscera) as well.
VIII. INTRA-SITE ANALYSIS

The frequency, context, and content of activity areas in an archaeological site are determined by the function of a site and the duration and intensity of occupation (Binford 1980; Schiffer 1972). The inverse relationship between the duration and intensity of occupation, and the archaeological resolution of activity areas in cultural deposits (due primarily to blending and smearing of materials) increases the difficulty in defining such areas (see Chapter 6). The structure of 35JA42 (e.g., house depressions and hearths) and the large and diverse artifact assemblage (Brauner 1983) indicate multi-functional and intensive occupation of the site.

As previously discussed, the recovered faunal remains are represented primarily by small, burned fragments (see Figure 32). While this alone serves as an indicator of the extent of animal resource processing at the site, it tells us little about areas where food processing occurred and where exhausted resources (i.e., bone refuse) were deposited. In order to extract behavioral inferences related to activity areas and study variation in within-place and between-place site patterning (Binford 1982), various statistical analyses were performed on the samples of small bone fragments recovered from the house floors, fill, and surrounding areas.
Burnt Bone

Osteological material can become burned by many natural and cultural processes including brush fires, house fires, cooking, and refuse disposal in a hearth. When bone is heated by an open flame, it passes through a continuum of morphological stages directly related to the duration and intensity of heating (Shipman, et al. 1984). Although the burnt bone assemblage from 35JA42 possesses specimens in all stages of this continuum, most are gray to white, small, calcined bone fragments. Due to the dark, organic-rich deposits at the site, burnt and unburnt bone were easily differentiated: burnt bones were typically white and "chalky" while unburnt were orange to dark brown.

Spearman's rank order correlation coefficient ($r_s$) was employed to examine the relationship of burnt and unburnt bone at the site (two-tailed tests are used throughout). The results (Table 5) indicate significant variation between the proportions of burnt and unburnt bone in various locales at the site.

The proportions of burnt and unburnt bone in the disturbed areas of level 1 horizontal excavation units (Feature 4 and House 5) and the menstrual hut (House 6) are similar while these proportions in the fill of houses 1, 2 and 3 are significantly different (Table 5, level 1). Similarities in the proportions of burnt and unburnt bone in the former might be attributed to greater preservation of
Table 5. Statistical comparison of proportions of burnt and unburnt bone for various faunal aggregates.

<table>
<thead>
<tr>
<th>Level</th>
<th>House 1</th>
<th>House 2</th>
<th>House 3</th>
<th>Feature 4</th>
<th>House 5</th>
<th>House 6</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Area</td>
<td>Area</td>
<td>Area</td>
<td>Area</td>
<td>Area</td>
<td>Area</td>
</tr>
<tr>
<td>Number of Units</td>
<td>25</td>
<td>39</td>
<td>56</td>
<td>19</td>
<td>8</td>
<td>18</td>
</tr>
<tr>
<td>Total # of Bones</td>
<td>938</td>
<td>1646</td>
<td>6551</td>
<td>755</td>
<td>673</td>
<td>349</td>
</tr>
<tr>
<td>% of Total Burned</td>
<td>73</td>
<td>82</td>
<td>68</td>
<td>81</td>
<td>69</td>
<td>97</td>
</tr>
<tr>
<td>Burned vs. Unburned per 1 x 1m unit (rS)</td>
<td>.690</td>
<td>.381</td>
<td>.611</td>
<td>.438</td>
<td>.024</td>
<td>.274</td>
</tr>
<tr>
<td>p</td>
<td>&lt;.002</td>
<td>&lt;.02</td>
<td>&lt;.002</td>
<td>&gt;.05</td>
<td>&gt;.2</td>
<td>&gt;.2</td>
</tr>
</tbody>
</table>

| Level 2 |
|---------|---------|---------|---------|---------|---------|
| Number of Units | 18 | 23 | 24 | 8 | - | 12 |
| Total # of Bones | 1961 | 2731 | 3729 | 415 | - | 144 |
| % of Total Burned | 80 | 70 | 70 | 77 | - | 88 |
| Burned vs. Unburned per 1 x 1m unit (rS) | .751 | .460 | .660 | .777 | - | .663 |
| p | <.002 | <.01 | <.002 | <.002 | - | <.01 |

| House Floors Only |
|--------------------|---------|---------|---------|
| Number of Units | 8 | 13 | 14 | - | - | 7 |
| Total # of Bones | 1168 | 1266 | 2144 | - | - | 105 |
| % of Total Burned | 79 | 70 | 70 | - | - | 88 |
| Burned vs. Unburned per 1 x 1m unit (rS) | .545 | .379 | .780 | - | - | .446 |
| p | >.2 | >.2 | <.002 | - | - | >.2 |
burnt bone due to increased bone resilience via carbonization. Because almost all of the bones in level 1 of House 6 are burned (97%), similarities between this house and the disturbed areas indicate that the destruction (e.g., weathering) of unburnt bone through redeposition of faunal remains (see Figure 6) may have contributed to variation in proportions of burnt and unburnt bones in these areas.

The level 2 units show that the proportions of burnt and unburnt bone per unit are significantly different across the site. Faunal remains from the house floor units display a pattern different than that shown across the general house areas (Table 5). Specifically, the proportions of burnt and unburnt bones in House 3 are correlated while the other occupational surfaces (i.e., Houses 1, 2 and 6) show no correlation. Although the divergence of House 3 from the other houses might be attributed to the fact that House 3 had burned, percentages of burned bone (see Table 5) in the houses (and across the site) suggest that the burning of House 3 did not effect the relationship of burnt and unburnt bone. I believe the variation between House 3 and (especially) houses 1 and 2 is a result of refuse being deposited in the House 3 depression after its abandonment. The percentage of burnt bone remains constant across all sample sizes in houses 1 and 2, but varies across different sample sizes in House 3 suggesting bone accumulation processes different from those operating in houses 1 and 2 operated in House 3; House 3 served as a refuse dump while
houses 1 and 2 did not. This inference is examined further at the end of this chapter.

**Fragmentation Analysis**

As discussed in Chapters 5 and 7, bones can be broken by many cultural and natural processes. Bones are broken by people during various stages of animal butchery to extract meat (Lyman 1978), marrow (Binford 1978) and grease (Vehik 1977). In most instances, the location where these activities are performed will be dictated by site function. Tasks associated with marrow processing and bone grease manufacture are commonly carried out around exterior (outside of house) hearths (Binford 1978, 1983). Because the resultant small bone fragments are commonly "concentrated in the location where the actual cracking of bones was carried out" (Binford 1978:155), one might expect these activity areas to be easily identified in the archaeological record as a "drop zone", consisting of small items concentrated around the hearth (Binford 1983; see also Stevenson 1985). Further, a "toss-zone" (Binford 1983:153) might be archaeologically discerned as an area radiating outward from a hearth and characterized by large items which were removed to keep the task area devoid of large debris. Again, depending on the intensity and duration of site occupation, these areas can be subject to blending and smearing and secondary (and/or tertiary) refuse disposal
which can leave the behavioral meaning of observed archaeological patterns obscure.

In a general sense, the function of a house interior is different than exterior work areas. Houses consist of enclosed spaces in which activities are spatially concentrated. For this reason, and because they generally contain sleeping and storage areas, cleaning of houses is common to keep the floor free of refuse (see Murray 1980 for a list of ethnographic examples). House cleaning, multi-purpose locations, and blending and smearing create difficulty in defining areas indicative of specific human activities within houses.

In order to make inferences concerning refuse disposal practices and variation in activity patterning at 35JA42, fragmentation analysis was employed. The procedure involved measuring each bone fragment from selected units in levels 1 and 2 (see Figures 35 and 36, respectively) on a five millimeter increment scale. In order to make reliable measurements, small fragments exhibiting fresh breaks were not included in the analysis (after Watson 1972). In many instances, however, bones that broke during excavation and transport were easily recognized and were re-articulated and measured. Histograms depicting the size of bone fragments and their respective abundances (by excavation unit) are presented in Appendix A.

Elsewhere I (Schmitt 1986b) employed fragmentation analysis of faunal remains to compare bone fragments in the
Figure 35. Relationship of units selected for fragmentation analysis and houses at 35JA42, level 1.
Figure 36. Relationship of units selected for fragmentation analysis and houses at 35JA42, level 2.
fill of houses with fragments from house floors. Because house floors represent distinct living surfaces, my purpose was to determine if bones on house floors are smaller than bones in house fill and exterior areas due to in-house food processing and human treadage (cf. Deetz 1977; Yellen 1977). Although house cleaning would remove some of this evidence, ethnoarchaeological research has shown that smaller items tend to be displaced downward and thus remain in fair numbers while larger, more visible items are swept-up and discarded outside of the house (Binford 1978; Gifford, et al. 1985; Yellen 1977). While analysis of bone fragment size in the earlier sample supported the hypothesis (Schmitt 1986b), fragmentation analysis of the 35JA42 faunal remains displays a different yet equally enlightening pattern.

The Kolmogorov-Smirnov test was employed to examine differences between paired samples (Table 6). Statistical analyses show similarities between in-house and out-house units in both levels 1 and 2, thus precluding the definition of house floors at 35JA42 as containing a higher frequency of smaller bone fragments. Fragmentation analysis does, however, show House 3 to be an anomaly when compared to other occupational surfaces at the site. There is a much higher frequency of larger bones on the floor of House 3 than on the floors of houses 1, 2, and 6.
Table 6. Statistical comparison of fragmentation data in various faunal aggregates (see Appendix A for data).

<table>
<thead>
<tr>
<th>Comparison</th>
<th>D</th>
<th>p-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>House 1/Level 1 vs. House 2/Level 1</td>
<td>0.353</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 1/Level 1 vs. House 3/Level 1</td>
<td>0.156</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>House 1/Level 1 vs. House 1/Level 2</td>
<td>0.179</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>House 2/Level 1 vs. House 3/Level 1</td>
<td>0.509</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 2/Level 1 vs. House 2/Level 2</td>
<td>0.197</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 3/Level 1 vs. House 3/Level 2</td>
<td>0.138</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Out-house/Level 1 vs. House 1/Level 1</td>
<td>0.036</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Out-house/Level 1 vs. House 2/Level 1</td>
<td>0.327</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Out-house/Level 1 vs. House 3/Level 1</td>
<td>0.182</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Out-house/Level 1 vs. Out-house/Level 2</td>
<td>0.155</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Out-house/Level 1 vs. House 3/Level 2</td>
<td>0.223</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 1/Level 2 vs. House 2/Level 2</td>
<td>0.066</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>House 1/Level 2 vs. House 3/Level 2</td>
<td>0.259</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 2/Level 2 vs. House 3/Level 2</td>
<td>0.334</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>House 1/Level 2 vs. House 6/Level 2</td>
<td>0.147</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>House 2/Level 2 vs. House 6/Level 2</td>
<td>0.170</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>House 3/Level 2 vs. House 6/Level 2</td>
<td>0.504</td>
<td>&lt; .001</td>
</tr>
<tr>
<td>Out-house/Level 2 vs. House 2/Level 2</td>
<td>0.040</td>
<td>&gt; 0.05</td>
</tr>
<tr>
<td>Out-house/Level 2 vs. House 3/Level 2</td>
<td>0.359</td>
<td>&lt; .001</td>
</tr>
</tbody>
</table>

* Out-house sample units in levels 1 and 2 are combined, see Figures 35 and 36.
Discussion

The use of fragmentation analysis has proven to be a valuable analytic tool in zooarchaeological investigations. Its application to faunal remains has the potential to define food processing areas, refuse disposal locations, and occupational surfaces. Employing fragmentation analysis also gives the analyst a more accurate tally of bone fragments in a site because bones that have broken during excavation and transport are easily recognized during this extensive "hands-on" analytic procedure. As a cautionary note, fragmentation analysis should only be employed on assemblages of bones represented by animals within the same size class (see Thomas 1969:393). Faunal remains recovered from 35JA42 (represented almost entirely by large mammals) thus constitute an excellent assemblage for such analysis.

The frequency and distribution of bones, the proportions of burnt and unburnt bone per unit, bone fragment sizes, and the distribution of bone artifacts (Chapter 10) indicate that House 3 is significantly different than other occupational surfaces at the site. The variation displayed by House 3 could be attributed to a number of factors.

In relation to houses 1 and 2, House 3 represents the first occupation at the site. Although the precise time of occupation is unknown, recovered architectural materials indicate that House 3 had burned. If this house burned
while it was occupied, perhaps houses 1 and 2 are anomalies and material from House 3 is actually more representative of a typical Applegate Athapaskan occupational surface. If the house burned subsequent to its occupation, this man-made depression could have served as a refuse disposal area for the more recent site occupants. This might account for the abundance of bone and the high frequency of larger fragments; house cleaning refuse was added to the floor of House 3 by House 1 and House 2 occupants. House 3 might also have been occupied during a different season than houses 1 and 2, or perhaps during a different climatic interval during which human behavior related to resource acquisition and processing was modified. Finally, House 3 might have been occupied by a different family (or families) than those who occupied houses 1 and 2, and familial variation in behavior patterns might, therefore, account for the variation.

I believe that the variation displayed by House 3 is a product of refuse being deposited in the depression after its abandonment. The use of abandoned house depressions for waste disposal activities is a relatively common phenomenon (see, for example, Brauner 1976:278). The abundance of butchered bone in the house fill (Chapter 7) tends to support this belief.
Determination of the season of site occupation is a common aspect of zooarchaeological analysis (see Monks 1981 and references therein). Techniques employed in extracting the season of site occupation utilize ontogenetic data such as tooth eruption and wear (e.g., Chaplin and White 1969), and epiphyseal fusion, and the presence or absence of seasonally available species (Bokonyi 1972). The literature, however, indicates that the accuracy of "measuring individual age and season of death may not be as great as once thought" (Lyman 1982:367), and that there are many difficulties in using biological measures to determine the season of human occupation (Grayson and Thomas 1983; Lyman 1982; Monks 1981; Morris 1972).

In using vertebrate remains to extract seasonal data, one must realize that the season of animal death is being measured (Monks 1981). Due to differential transport of bone by non-humans (e.g., Kent 1981) and/or the storage and transport of dried foods (cf. Binford 1978), the seasonal data extracted from archaeofaunal remains may not correlate with the actual season of site occupation (Lyman 1982; Monks 1981). As well, even if the derived seasonal data is representative of cultural bone refuse, there is difficulty in obtaining measurement precision (i.e., the month of
Further, a uniformitarian assumption that modern and prehistoric animal populations are ontogenetically similar is required, but may be inaccurate. While the peak birthing season for modern deer is in early June, differences in historic and prehistoric environments may have affected the seasonally dictated reproduction cycle (Lyman 1985b). Biologically documented individual dietary variation and genetic variation between geographic populations of the same taxon (Harris 1978) weigh against the uniformitarian assumption. Finally, some ontogenetic criteria, such as tooth eruption and wear, are at best ordinal scale measures of age due to variation in the growth and wear of teeth as these are influenced by the health, diet, and genotype of a given individual (Kay 1974; Monks 1981; see also Ransom 1966).

Incremental Lines

One technique used in assessing the age of an animal and the season of its death is the analysis of incremental lines (e.g., Gustafson 1968; Kay 1974; Lockard 1972; Saxon and Higman 1969). Universal in the mammalian species examined (Grue and Jensen 1979); Spinage 1973), incremental lines (incorrectly referred to by some as annuli) are alternating opaque and translucent lines within tooth cementum (incremental lines are also formed in dentine but will not be discussed here). Similar to tree rings in
appearance, these bands can be microscopically discerned with the aid of chemical staining or polarized light (e.g., Gordon 1984).

Cementum deposition is appositional, acting to uplift the tooth into the occlusal plane (Grue and Jensen 1979) and anchor the tooth in the alveolus (Morris 1972). Studies have shown that the opaque lines (or restlines) are formed during the winter months and the transparent bands are formed in the spring and summer. Although Gordon (1984) suggests that the denser restlines are concentrations of bone apatite within a protein lattice due to restricted winter protein intake, the true cause of incremental line formation is unknown (Grue and Jensen 1979).

The use of incremental lines (or "dontochronology"; Schmitt 1984) to estimate the season of animal death is subject to the same biological and analytical problems encountered in the use of other techniques. The uniformitarian assumption is required, but must be expanded to include reference to sexually dimorphic characteristics (Grue and Jensen 1979). Studies have shown that false incremental lines can occur; such lines have been suggested to represent rut lines in males and lactation lines in females (cf. Gordon 1984; Grue and Jensen 1979). Further, split lines can occur in cementum, creating an incorrect number of lines at a given location on the tooth root (Kay 1974; Lockard 1972) and cementum can be resorbed into the
tooth socket (Spinage 1973), possibly removing the outermost band(s).

The literature is vague concerning interpretation of the first "line" formed. Refered to by most as the dentino-cemental interface, some interpret this dark band as a "birthline", in which the first (overlying) translucent band represents the first summer of life (e.g., Ransom 1966). Others, however, maintain that the dentino-cemental interface represents the first year of life (i.e., in examining a deer M₁, this tooth is fully erupted at approximately 12 months) and thus the first transparent band represents the second summer of life (e.g., Low and Cowan 1963). Although interpretation of the first line deposited will not affect seasonal estimates, it will effect the derivation of individual age (Schmitt 1984).

I have presented only a few of the many problems in assessing the season of site occupation. Although the analysis of incremental lines appears to deliver more precise seasonal data than other techniques, the growth increment technique possesses many unknown variables which can impede reliable interpretations. The cause and outcome of incremental line formation must be exhaustively studied before we place complete faith in our interpretations of these date. In order to achieve the greatest precision, analyses of causational factors, geographic variation, sexually dimorphic variables, and (large) taxonomically
diverse samples are needed, but are beyond the scope of my study.

Seasonality at 35JA42

Two deer lower first molars from 35JA42 were thin sectioned and analyzed at the Center for Materials Research in Archaeology and Ethnology (CMRAE) at the Massachusetts Institute of Technology in June of 1983. Although I performed most of the procedures, Chris Craig (CMRAE) assisted with the mounting of the specimens and photography, and Bryan Gordon (National Museum of Man) helped with incremental line interpretation. A general description of the thin section procedure employed on the 35JA42 specimens follows:

1. Specimens were measured, photographed, and occlusal wear patterns were recorded (see Figure 37).
2. Teeth were extracted from the alveolus by gently cutting away the dentary.
3. Teeth were dried in an alcohol bath, baked, and dessicated.
4. Teeth were vacuum impregnated with CIBA-GEIGY 509 to consolidate.
Catalog no. B-228; left mandible (dentary)

Location: House 2, level 2; 110-111N / 101-102E

Tooth row length: 71.5mm

P2  P3  P4  M1  M2  M3
W  W  B

length 11.8mm
breath 7.5mm
crown height 11.0mm

Catalog no. B-274; left mandible (dentary)

Location: House 2, level 2; 112.26N / 99.13E

Tooth row length: 20.6mm

P4  M1
W

length 12.7mm
breath 7.4mm
crown height 11.4mm

W worn
B broken

Figure 37. Specimens selected for incremental line analysis. Wear stages are after Payne (1985:142).
5. Teeth were mounted on a Ward's 1 X 2 inch petrographic slide with resin.

6. Teeth were cut in half (dorsal-basal) with a slow speed diamond cut-off saw.

7. One cut surface was ground smooth (by hand) with various carborundum grit; final hand grinding with 600 grit.

8. The cut (smooth) sides were mounted on a Ward's 1 X 2 inch petrographic slide with epoxy resin Araldite 509.

9. The teeth were cut again (to thin) with a slow speed diamond cut-off saw.

10. The cut surface of the teeth were ground with an automatic thin section grinder (parallel to the slide) to approximately 75-100 microns.

11. The cut surfaces were hand ground to 35q microns using 600 carborundum grit.

12. The ground surfaces were then covered with Corning 22 X 50 millimeter cover slides.

The thin section was placed under a polarized light microscope and was rotated on the stage to examine incremental lines in the tooth cementum. After careful examination of cementum along all edges of the tooth root, the area just below the enamel was chosen for line counts. Although incremental lines were visible along most of the root, they were most distinct just below the enamel on both
teeth examined (see Figure 38). The cementum was then photographed through a polarized light microscope with a 35 mm camera. The area was exposed for one minute using Kodak 200 Daylight slide film. Figures 39 and 40 illustrate photographs and graphic depictions of the results. The age in months of these specimens is after Low and Cowan (1963).

There was difficulty in interpreting the incremental line count due to staining of the cementum by the organic-rich soil deposits. Both specimens, however, display relatively full development of the outermost restline (Figures 39 and 40) suggesting mid to late winter mortality of these individuals. This in turn suggests winter human occupation of the site, at least during the occupation at House 2 from which the two specimens were recovered.

Analysis of other seasonal indicators at 35JA42 tend to support winter occupation of the site. Age data for deer were derived by examining the stage of mandibular tooth eruption and wear (Robinette, et al. 1957). The five specimens examined indicate the deer died between the months of September and March. The recovery of black bear and mountain lion also suggest winter occupation of the site. Black bears enter their dens for hibernation between late October and early January and remain there until April unless disturbed by people or other animals (Pelton 1982). Ethnographic documentation of techniques utilized in hunting bear (Chapter 3) indicate luring the animal out of its winter den was commonly employed. The occurrence of
Figure 38. Section of an artiodactyl lower molar (after Gordon 1982). Arrow locates area photographed on the 35JA42 specimens for incremental line analysis (see Figures 39 and 40).
Figure 39. Photograph (top) and graphic depiction (bottom) of incremental lines in tooth cementum, specimen B-224. Scale is in microns.
Figure 40. Photograph (top) and graphic depiction (bottom) of incremental lines in tooth cementum, specimen B-274. Scale is in microns.
mountain lion in the site could be representative of an individual taken during a (winter) deer hunt; because mountain lions feed almost exclusively on deer, they follow deer herds down to lower elevations during the winter months (Dixon 1982).

While these additional seasonality data suggest a winter occupation, they also tend to be broader than the estimate from tooth growth increments (Figure 41). Clearly, larger samples and multiple indicators generally produce more valid estimates of seasonality (cf. Monks 1981). In the case of 35JA42, however, the use of multiple indicators has decreased the resolution of the estimate. The reason for this is that tooth eruption and wear are less precise measures of ontogenetic age, and thus provide broader estimates than growth increments.

Although ethnographic documents corroborate the seasonal data extracted from incremental line analysis (see Brauner and Honey 1977:6-11), the possibility of stored food resources, small sample size, and the many biological and analytical unknowns render the assessment of season of 35JA42 occupation an estimate. The fact that no indicators of summer occupation were recovered does not necessarily indicate that the site was not occupied during the summer months but, rather, could be due to small sample size.
Figure 41. Season of site occupation as indicated by faunal data.
BONE ARTIFACTS

Seventeen bone artifacts were recovered from 35JA42. These specimens are discussed within five analytic categories: pointed bone (N=7), antler tine flakers (N=2), cut bone (N=4), pendants (N=1), and miscellaneous bone artifacts (N=3).

Because bone artifacts are rare in southwest Oregon archaeological sites, bone artifacts from central California and the Great Basin serve as the nearest analogs. Inferences derived for manufacture and functional interpretations are based on microscopic (10X) examination and comparisons with Great Basin archaeological collections.

Pointed Bone

Relatively dispersed throughout the site, seven bones sharpened to points were recovered (Table 7, Figure 41a-g). All of the specimens except one (BA-8) display extensive manufacture and use wear striations perpendicular to the long axis of the bone. Specimen BA-8 (Figure 41d) is charred (fire hardened?) and possesses numerous, small flake scars indicating manufacture by flaking rather than transverse abrasion. The tip of this artifact is extensively polished. Specimens BA-6, BA-11, and BA-13 have multi-faceted points which terminate approximately 10 mm down from the tips. Specimen BA-1 has a series of parallel,
transverse striations from the tip to its (broken) end. Although these incisions could be the product of use-wear, they are deep and evenly spaced and appear to represent decorative motifs.

Due to the fragmented condition of all of the specimens (i.e., only the tips are represented) and the fact that many burned, I cannot ascertain with any confidence the specific function(s) of these items. They may represent bone awls used in the manufacture of basketry (Ambro 1970) and/or perforating tools. Similar pointed bone objects are common in Great Basin archaeological sites (e.g., Elston 1979; Jennings 1957; Pendleton 1985; Thomas 1983).

**Antler Tine Flakers**

Two antler tine flakers were recovered (Table 7, Figure 42h,i). Both specimens (BA-2 and BA-7) are charred and display blunt, rounded, and slightly polished tips suggesting their utilization as flaking tools. Specimen BA-2 possesses transverse incisions around its tip indicative of resharpening. Aikens (1970:Figure 47b) illustrates an antler tine flaker very similar to those recovered from 35JA42.
Cut Bone

Four small cut bone artifacts were recovered from the floor of House 2 (Table 7, Figure 42j-m). All of the specimens possess incisions (perpendicular to the long axis) on one end of the bone. All of the incised ends are truncated, indicating that these incisions were to thin and weaken the bone before breaking it (Schmitt n.d.). Lack of further modification or use-wear leads me to believe that these specimens are refuse from the manufacture of bone tools.

Pendants

One biconically drilled, tear-trop shaped bone pendant was recovered from the floor of House 2 (Table 7, Figure 42n). Surface and edge modification which created its uniform shape indicate that the primary stage in manufacture was in achieving the desired shape. Breakage and lack of use-wear polish in the perforation suggests that this artifact broke during the latter portion of this manufacturing stage. Bone and horn perforated ornaments are common in Great Basin archaeological sites (e.g., Lucius 1980; Pendleton 1985; Schmitt n.d.).
Table 7. Bone and antler artifacts. All measurements are in millimeters.

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<tr>
<td>BA-1</td>
<td>104,49N/100,58E</td>
<td>1</td>
<td>1</td>
<td>Antler tine(?)</td>
<td>Cervidae</td>
<td></td>
<td>13.8</td>
<td>4.9</td>
<td>Burned</td>
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<tr>
<td>BA-5</td>
<td>110-111N/100-101E</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
<td>28.4</td>
<td>4.1</td>
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<td>BA-6</td>
<td>110-111N/100-111E</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
<td>26.3</td>
<td>4.8</td>
<td>Burned</td>
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<td>BA-8</td>
<td>115.52N/96.81E</td>
<td>3</td>
<td>2</td>
<td>Long bone</td>
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<td></td>
<td>26.0</td>
<td>8.3</td>
<td>Burned/fire hardened(?)</td>
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<td>BA-10</td>
<td>115.51N/98.49E</td>
<td>3</td>
<td>2</td>
<td>Long bone</td>
<td>-</td>
<td></td>
<td>27.8</td>
<td>9.5</td>
<td>Burned</td>
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<tr>
<td>BA-11</td>
<td>117-118N/96-97E</td>
<td>3</td>
<td>2</td>
<td>Long bone</td>
<td>-</td>
<td></td>
<td>47.1</td>
<td>5.7</td>
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<td>BA-13</td>
<td>117-118N/96-97E</td>
<td>3</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td></td>
<td>24.4</td>
<td>5.5</td>
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<td>BA-2</td>
<td>104-105N/97,98E</td>
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<td>2</td>
<td>Antler tine</td>
<td>Cervidae</td>
<td></td>
<td>10.0</td>
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<tr>
<td>BA-7</td>
<td>123-124W/101-102E</td>
<td>4</td>
<td>1</td>
<td>Antler tine</td>
<td>Cervidae</td>
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<td>14.5</td>
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<td>BA-3</td>
<td>110-111N/100-101E</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>24.5</td>
<td>4.3</td>
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<td>110-111N/100-101E</td>
<td>2</td>
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<td>+</td>
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<td>110-111N/101-102E</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>27.1</td>
<td>5.9</td>
<td>Unburned</td>
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<tr>
<td>BA-17</td>
<td>110-111N/101-102E</td>
<td>2</td>
<td>2</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>14.9</td>
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Table 7. (Continued)

PENDANTS

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<td>BA-6</td>
<td>108-109N/99-100</td>
<td>3</td>
<td>2</td>
<td>Long bone</td>
<td>Deer-sized</td>
<td>-</td>
<td>35.5</td>
<td>13.9</td>
<td>Unburned/perforation dia. = 2.7</td>
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MISCELLANEOUS BONE ARTIFACTS

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<td>BA-9</td>
<td>108.65N/100.45E</td>
<td>2</td>
<td>2</td>
<td>Long bone</td>
<td>Deer-sized</td>
<td>?</td>
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<td>16.6</td>
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<tr>
<td>BA-14</td>
<td>116.87N/96.65E</td>
<td>3</td>
<td>2</td>
<td>Tibia - posterior</td>
<td>Deer-sized</td>
<td>+</td>
<td>95.2</td>
<td>22.0</td>
<td>Unburned</td>
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<td>BA-15</td>
<td>117-118N/98-99E</td>
<td>3</td>
<td>2</td>
<td>Radius - anterior</td>
<td>Deer-sized</td>
<td>-</td>
<td>75.9</td>
<td>20.0</td>
<td>Unburned</td>
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Figure 42. Bone and antler artifacts from 35JA42. a-q. pointed bone; h-i. antler tine flakers; j-m. cut bone; n. pendant; o-q. miscellaneous bone artifacts.
Miscellaneous Bone Artifacts

Three deer-sized long bone fragments with various degrees of use-wear and manufacture modification were recovered (Table 7, Figure 42o-q). Specimen BA-14 does not display any evidence of manufacture, but is highly polished along one edge and at its (distal) end. This specimen appears to represent an expedient bone tool (Johnson 1980:83-84).

By definition, expedient bone tools are difficult to recognize because they lack evidence of manufacture (Frison 1982). Problems persist in recognizing whether the bone was "purposefully" broken with the intent of utilizing it as a tool or whether it broke "fortuitously" during a butchering episode (Lyman 1984:316-317). Even the terminology is ambiguous in that a bone may be "purposefully" broken during animal butchery without the intent of utilizing it as a tool (Lyman 1984:317). Further, many non-human agents can create modifications on bone that resemble alterations attributed to human activities (Brain 1967; Hill 1976; Lyman 1984). When compared to other bones recovered from 35JA42, the extent of polish on this specimen strongly suggests cultural utilization. Although the function of this artifact is unknown, it is likely that it represents a scraper/flesher (after Dalley 1973).

The two remaining specimens (BA-9 and BA-15) are deer-sized long bone fragments possessing numerous, contiguous
flake scars along their edges (Figures 42p,g). These flake scars terminate within the medullary cavities indicating latero-medial percussion was employed on both specimens. Specimen BA-9 has slight polish along its flaked edges while the only indication of use-wear on specimen BA-15 is a rounded, polished tip (see the top of Figure 42p). These artifacts may represent scraper/fleshers (Dalley 1973; see especially Dalley 1976, Figure 25m) or cutting tools.

Discussion

The distribution of bones and statistical analysis employed on faunal remains form House 2 and House 3 indicate a significant amount of variation (see Chapters 6 and 8). The distribution of bone artifacts in the site tends to support the discrepancies displayed between these two houses. Seven (41%) of the bone artifacts recovered from the site were located on the floor of House 2. All of these specimens were recovered from the southern and eastern portions of the house. Five of these were clustered just east of the hearth (110-111N/100-102E) suggesting manufacture and/or use of these specimens in this portion of the house. Conversely, bone artifacts from the floor of House 3 (N=5) were all located in the northern and western portions of the house.

When compared to other aspects of the material culture recovered from 35JA42 (Brauner 1983), it is interesting that
so few bone artifacts are represented in the collection. Of those recovered, at least 12 (71%) are fragmented. Although some bone artifacts may have been lost during the test excavation of House 1 due to the use of larger screen mesh size (cf. Payne 1975; Watson 1972), only one small antler tine flaker was recovered from the northern portion of the house rim. The paucity of bone artifacts in this house (which represents the most recent occupational surface) and across the site as a whole, indicates that bone tools and ornaments were a small part of the material culture of the site occupants and/or that bone tools were highly curated.
XI. SUMMARY AND CONCLUSIONS

The archaeofauna recovered from 35JA42 provides many insights to protohistoric subsistence strategies in southwest Oregon and the formational history of the site. Deer represent the most abundant taxon (i.e., the primary meat source) while elk are secondary. Identified skeletal elements indicate that whole carcasses were brought to the site where they were dismembered and a variety of food resources were extracted. Lack of striae but presence of flake scars on the bones indicates that disarticulation by percussion was a commonly employed butchering technique. Once meat was removed, marrow was extracted and the bones were processed (broken) further for the manufacture of soup/grease. This is evident by the abundance of flake scars and the highly fragmented condition of the assemblage.

The remainder of the taxa are primarily represented by carnivores (black bear, mountain lion, gray fox, and possibly a bobcat). Much like the deer and elk assemblage, the carnivore remains are highly fragmented. Although some ethnographies state that carnivores were taken only for their fur, the highly fragmented carnivore remains in the site suggest maximum utilization of these animals as food resources.

The zooarchaeological data closely match the ethnographic record. The species represented and their abundances, food preparation techniques, and the possible
deer "shoulder blade rattle" are all well documented in ethnographies on southwest Oregon aboriginal cultures. The value of ethnographic documents as sources of interpretive analogs is often said to be limited (e.g., Wobst 1978). This apparently is not the case with the archaeological materials recovered from 35JA42.

Contrary to other zooarchaeological analyses which examine only taxonomically identified specimens, analysis of the unidentified, fragmented faunal remains from 35JA42 produced an abundance of human subsistence and taphonomic data. The high frequency of small, fragmented specimens illustrates the extensive processing of carcasses for marrow and soup/grease. Statistical analyses of the proportions of burnt and unburnt bone, and bone fragment sizes illustrate intra-site variation between various occupational features. In particular, all of the data indicate that House 3 served as a refuse dump for later occupants.

Zooarchaeological analysis of 35JA42 has also produced two "firsts" in southwest Oregon prehistory. Analysis of faunal remains accompanied with other aspects of material culture suggest that House 6 was a menstrual hut, the first archaeologically defined menstrual hut in the region. Also, although conjectural because it was recovered from disturbed deposits, the recovery of a domestic sheep mandible could represent the first occurrence of domestic sheep in southwest Oregon.
Analysis of faunal seasonal indicators suggests that the site was occupied during the winter months. Stylistic and functional analysis of the recovered artifacts indicates that the site may have been occupied by a single nuclear family abandoning and then returning to the site over four winter seasons.

Each occupation resulted in the construction of a new house. The site was certainly not occupied for more than four winter seasons since there was no evidence that any of the structures had been reoccupied after abandonment. Although difficult to prove, the probability that the same family or families returned to the site during the few short years it was utilized is logically high (Brauner 1983:86).

Zooarchaeological analysis of 35JA42 has proven valuable to our understanding of southwest Oregon protohistoric subsistence strategies. Further archaeological investigations in this region and the testing and refinement of zooarchaeological analytic methods can only enrich our insights into prehistoric and protohistoric cultures.
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APPENDICES
APPENDIX A

Bone Frequencies by Fragment Size in Selected Units.
Shaded Area Represents Unburnt Bone and Unshaded Area Represents Burnt Bone.
House 1, level 1
House 1, level 2
House 2, level 1
House 2, level 1 (Continued)
House 2, level 2
House 2, level 2 (Continued)
House 2, level 2 (Continued)
House 3, level 1
House 3, level 1 (Continued)
House 3, level 2
House 3, level 2 (Continued)
House 3, level 2 (Continued)
House 6, level 2
Out-house, level 1
Out-house, level 2
APPENDIX B

Mammals of Southwest Oregon
MARSUPIALIA

Didelphidae - Opossums

*Didelphis virginiana* Virginia Opossum

INSECTIVORA

Soricidae - Shrews

*Sorex vagrans* Vagrant Shrew
*Sorex palustris* Water Shrew
*Sorex bendirii* Pacific Water Shrew
*Sorex trowbridgii* Trowbridge's Shrew

Talpidae - Moles

*Neurotrichus gibbsii* Shrew-mole
*Scapanus townsendii* Townsend's Mole

CHIROPTERA

Vespertilionidae - Vespertilionid Bats

*Myotis californicus* California Myotis
*Myotis yumanensis* Yuma Myotis
*Myotis lucifugus* Little Brown Myotis
*Myotis volans* Long-legged Myotis
*Myotis thysanodes* Fringed Myotis
*Myotis evotis* Long-eared Myotis
*Lasionycteris noctivagans* Silver-haired Bat
*Nycticeius fuscus* Big Brown Bat
*Nycticeius borealis* Red Bat
*Nycticeius cinereus* Hoary Bat
*Nycticeius townsendii* Townsend's Big-eared Bat
*Antrozous pallidus* Pallid Bat

Molossidae - Free-tailed Bats

*Tadarida brasiliensis* Brazilian Free-tailed Bat

LAGOMORPHA

Leporidae - Rabbits and Hares

*Sylvilagus bachmani* Brush Rabbit
*Lepus americanus* Snowshoe Rabbit
*Lepus californicus* Black-tailed Jack Rabbit
## RODENTIA

### Aplodontidae - Mountain Beaver

**Aplodontia rufa**  
Mountain Beaver

### Sciuridae - Squirrels and Relatives

- *Eutamias amoenus*  
  Yellow-pine Chipmunk
- *Eutamias siskiyou*  
  Siskiyou Chipmunk
- *Spermophilus beecheyi*  
  California Ground Squirrel
- *Spermophilus lateralis*  
  Golden-mantled Ground Squirrel
- *Sciurus griseus*  
  Western Gray Squirrel
- *Taniasciurus douglasii*  
  Douglas' Squirrel
- *Glaucomys sabrinus*  
  Northern Flying Squirrel

### Geomyidae - Gophers

- *Thomomys mazama*  
  Mazama Pocket Gopher
- *Thomomys umbrinus*  
  Southern Pocket Gopher

### Castoridae - Beavers

- *Castor canadensis*  
  Beaver

### Muridae - Murids

- *Reithrodontomys megalotis*  
  Western Harvest Mouse
- *Peromyscus maniculatus*  
  Deer Mouse
- *Peromyscus boylii*  
  Brush Mouse
- *Peromyscus truei*  
  Pinon Mouse
- *Neotoma fusipes*  
  Dusky-footed Wood Rat
- *Neotoma cinerea*  
  Bushy-tailed Wood Rat
- *Clethrionomys californicus*  
  California Red-backed Vole
- *Arborimus longicaudus*  
  Red Tree Vole
- *Microtus californicus*  
  California Vole
- *Microtus longicaudus*  
  Long-tailed Vole
- *Microtus townsendii*  
  Townsend's Vole
- *Microtus Oregoni*  
  Oregon Vole
- *Ondatra zibethicus*  
  Muskrat

### Zapodidae - Jumping Mice

- *Zapus princeps*  
  Western Jumping Mouse

### Erethizontidae - New World Porcupines

- *Erethizon dorsatum*  
  Porcupine
**CARNIVORA**

**Canidae - Coyote, Wolves, Foxes, and Dogs**

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<td><em>Canis latrans</em></td>
<td>Coyote</td>
</tr>
<tr>
<td><em>Canis familiaris</em></td>
<td>Domestic Dog</td>
</tr>
<tr>
<td><em>Canis lupus</em></td>
<td>Gray Wolf</td>
</tr>
<tr>
<td><em>Vulpes vulpes</em></td>
<td>Red Fox</td>
</tr>
<tr>
<td><em>Urocyon cinereoargenteus</em></td>
<td>Gray Fox</td>
</tr>
</tbody>
</table>

**Ursidae - Bears**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Ursus americanus</em></td>
<td>Black Bear</td>
</tr>
<tr>
<td><em>Ursus arctos</em></td>
<td>Grizzly Bear</td>
</tr>
</tbody>
</table>

**Procyonidae - Raccoons and Allies**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Bassariscus astutus</em></td>
<td>Ringtail</td>
</tr>
<tr>
<td><em>Procyon lotor</em></td>
<td>Raccoon</td>
</tr>
</tbody>
</table>

**Mustelidae - Mustelids**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Martes americana</em></td>
<td>Marten</td>
</tr>
<tr>
<td><em>Martes pennanti</em></td>
<td>Fisher</td>
</tr>
<tr>
<td><em>Mustela erminea</em></td>
<td>Ermine</td>
</tr>
<tr>
<td><em>Mustela frenata</em></td>
<td>Long-tailed Weasel</td>
</tr>
<tr>
<td><em>Mustela vison</em></td>
<td>Mink</td>
</tr>
<tr>
<td><em>Gulo luscus</em></td>
<td>Wolverine</td>
</tr>
<tr>
<td><em>Taxidea taxus</em></td>
<td>Badger</td>
</tr>
<tr>
<td><em>Spilogale putorius</em></td>
<td>Spotted Skunk</td>
</tr>
<tr>
<td><em>Mustela vison</em></td>
<td>Striped Skunk</td>
</tr>
<tr>
<td><em>Lutra canadensis</em></td>
<td>River Otter</td>
</tr>
</tbody>
</table>

**Felidae - Cats and Allies**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Felis concolor</em></td>
<td>Mountain Lion</td>
</tr>
<tr>
<td><em>Lynx rufus</em></td>
<td>Bobcat</td>
</tr>
<tr>
<td><em>Lynx canadensis</em></td>
<td>Lynx</td>
</tr>
<tr>
<td><em>Felis cattus</em></td>
<td>Domestic Cat</td>
</tr>
</tbody>
</table>

**ARTIODACTYLA**

**Tayassuidae - Peccaries**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Sus scrofa</em></td>
<td>Domestic Pig</td>
</tr>
</tbody>
</table>

**Cervidae - Cervids**

<table>
<thead>
<tr>
<th>Species</th>
<th>Common Name</th>
</tr>
</thead>
<tbody>
<tr>
<td><em>Cervus elaphus</em></td>
<td>Elk (Wapiti)</td>
</tr>
<tr>
<td><em>Odocoileus hemionus hemionus</em></td>
<td>Mule Deer</td>
</tr>
<tr>
<td><em>Odocoileus hemionus columbianus</em></td>
<td>Black-tailed Deer</td>
</tr>
</tbody>
</table>
*Odocoileus virginianus  
  Antilocapridae - Pronghorn

*Antilocapra americana  
  Bovidae - Bovids

Ovis canadensis  
Bos sp.  
Ovis aries  
Capra hircus

Mountain Sheep  
Cow  
Domestic Sheep  
Domestic Goat

PERISSODACTYLA

Equidae - Horses

Equus caballus  
Domestic Horse

*Denotes species that are presently marginal in relation to the Applegate Lake Project Area.