Throw Me a Bone! Modeling Meat Sharing Behaviors in Western Great Basin Households During the Late Archaic

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Abstract: Sharing is a common hunter-gatherer behavior, especially as it applies to faunal resources. Ethnoarchaeologists have documented the archaeological visibility of sharing behaviors. Methods exist by which to infer sharing from the analysis of zooarchaeological remains. An ethnographically derived model for meat sharing behaviors among Late Archaic households within North America's Great Basin is proposed. Expected results are discussed.

Key words: Food sharing, hunter/gatherers, faunal analysis, refits, Great Basin, Archaic

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Sharing food may be identified as a social behavior by which one individual provides a portion of his food to another individual. Meat-sharing behaviors among disparate egalitarian foraging societies (Binford 1984; Gould 1982; Hudson 1990; Kaplan 1985; Kent 1993; Marshall 1993; Woodburn 1982) are abundant and complex, as are the reasons anthropologists give for these behaviors (Bird 2006; Blurton Jones 1984; Gurven 2004; Hawkes 2001; Howell 2010; Kaplan 1985; Marlowe 2010; Sahlins 1972; Weisner 1982; Winterhalder 1986; Woodburn 1982). The focus of this paper, however, is to propose a series of tests for identifying the archaeological visibility of meat sharing within the Western Great Basin of North America. The proposed model specifies expected zooarchaeological signatures by which we may recognize meat-sharing behaviors represented within the faunal assemblages recovered from Late Archaic residential sites of the Western Great Basin. Large and small mammal species are considered.

Ethnoarchaeologists focusing their research on the archaeological visibility of meat sharing (Binford 1978; Hudson 1990; Yellen 1977) provide analogs by which others may test the zooarchaeological record for evidence of meatsharing. The application of such studies (Waguespack 2002) to zooarchaeological subjects is limited. Zooarchaeologists examine faunal assemblages for meat-sharing behaviors by conducting a variety of analytical assessments. Carcass segments (Binford 1984; Marshall 1994), food utility indices (Metcalfe 1988), refit patterns (Enloe 1992), and spatial distributions (Zeder 1996) of faunal remains are all tools zooarchaeologists employ to investigate evidence for sharing behaviors. Results from such analyses may be used to model specific modes of sharing (e.g. Waguespack 2002) and allow for the physical delineation of sharing behaviors in space and through time (Binford 1978; Hudson 1990; Yellen 1977). Quantitative and qualitative methods for identifying the archaeological manifestation of meat-sharing behavior are discussed later in this paper.

Archaeologists have not yet investigated the Western Great Basin zooarchaeological record for evidence of meat-sharing behaviors during the Late Archaic. While the area's archaeological record exhibits evidence for changing mobility and subsistence behaviors (Cannon et al. 1990; Fowler 1993; Heizer 1967; Kelly 2001; Larsen 1995, 1995:107-133; Larsen, et al. 1995; Raven and Elston 1989; Thomas 1985; Zeanah 2004) it remains unknown how meat-sharing behaviors may have changed during this time. Zooarchaeological and house

Field Notes: A Journal of Collegiate Anthropology 4(1): 154-172. (May 2012)

structure data exists for Late Archaic sites within the Western Great Basin (e.g. Eiselt 1997; Elston 1979; Kelly 2001; Larsen and Kelly 1995; Livingston 1986; Mueller 2007; O'Connell 1975) (Figure 1). Given that meat sharing is associated with egalitarian groups' social behaviors and is archaeologically visible, we should expect to find a social system of meatsharing visible at residential sites within the Western Great Basin.

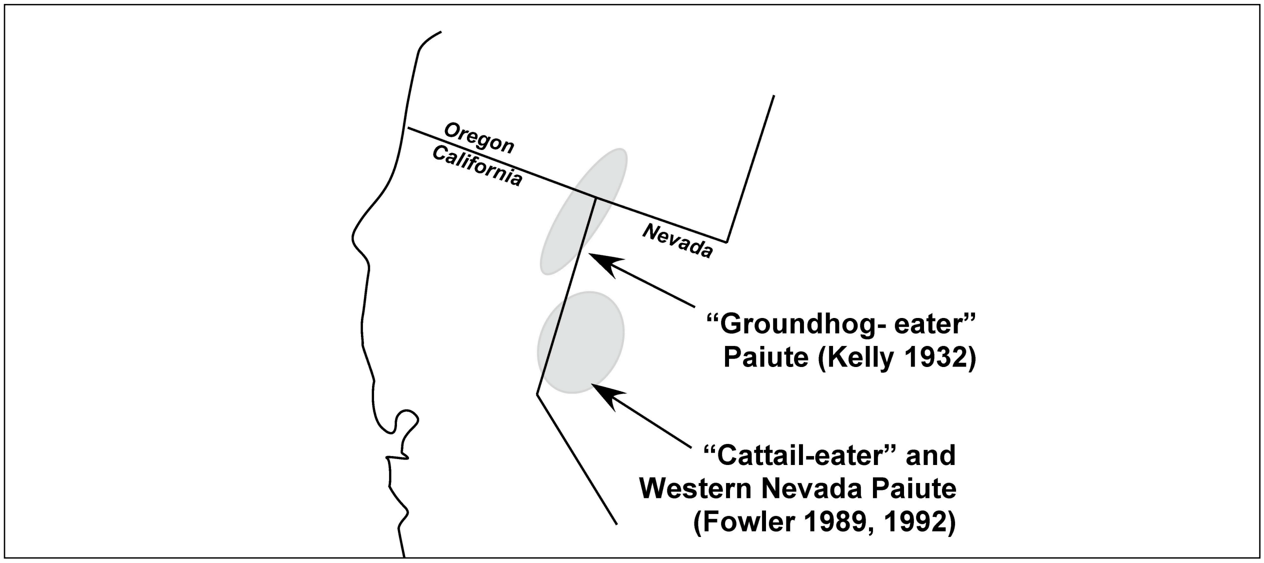

Figure 1. Western Great Basin ethnographic group locations.

Sharing Among Foragers

Anthropologists provide a variety of reasons to explain sharing behaviors among foraging groups. Marcel Mauss (1954:45) famously stated that gifts indebt the receiver to the giver for a return gift, spawning continuous circulation of gifts "side by side with the circulation of persons and rights". O'Shea (1981) suggests sharing behaviors account for "social storage," such that givers create indebtedness in the receiver who is obligated to pay back the giver in the future. Other explanations (Binford 1984; Gould 1982; Isaac 1977a,b; Weisner 1982; Woodburn 1982) originating from a wide variety of anthropological studies focus on sharing as resource risk management or offer explanations anchored in evolutionary fitness (Bird 2006; Gurven 2004; Hawkes 2001; Howell 2010; Kaplan 1985; Marlowe 2010; Weisner 1982; Winterhalder 1986).

Glenn Isaac (1977a,b) identifies sharing as the fundamental difference separating modern foragers from other primates. Specifically, major characteristics of *Homo sapiens sapiens* social systems include sharing meat and foraging from central places. Isaac (1977b) suggested that the spatial concentration of bone fragments and stone in east African Plio/Pleistocene Hominid sites constitutes evidence of early hominid food sharing.

While their studies are very different, Binford (1984) and Gould (1982) suggest environmental factors affected groups' sharing decisions. Based on his research of the Western Desert Aborigines of Australia, Gould (1982) suggests sharing is related to the limiting factors of marginal environments. Binford (1984) identified Nunamiut sharing as a combination of kinship obligations and sensitivity to need. Need may be caused by unfavorable environmental conditions affecting resource levels.

Wiessner (1982) considers food sharing to be a mechanism by which the risk of resource scarcity may be averted and occurs via social relations of production. Due to the minimal organization required for resource procurement in foraging societies, avoiding risk of resource shortfall requires cooperation and affects social organization. The archaeological record, therefore, represents resource variability and the social relations of production required to mitigate risk of resource shortfall. Woodburn (1982) likewise associates social and economic factors with respect to resource sharing behaviors. Among strongly egalitarian foraging groups, sharing is most likely to occur when resources are procured on an immediate return basis. Social relationships are flexible and extend to resource procurement, among other elements of social life, such that group members are not dependent on specific other people for access to basic requirements for living. The flexible nature of strongly egalitarian foragers "disengages people from property, from the potentiality in property rights for creating dependency" (Woodburn 1982:431).

Evolutionary ecology anchors behavioral ecological explanations for mens' and womens' food sharing behaviors, including tolerated theft, variance reduction, and cooperative acquisition. Behavioral ecological explanations suggest foragers make decisions about whether or not to engage in behaviors based on energetic efficiency and fitness considerations within an array of possible constraints (Bird 2006). From a behavioral ecological perspective, sharing is most likely to occur when the behavior results in reproductively successful mating opportunities, social and ecological parameters notwithstanding.

Tolerated theft may be defined as sharing that "occurs as a result of badgering and solicitation" (Kelly 1995:174). If individual A has meat desired by person B and the cost to individual A of keeping the meat *from* person B is more expensive than the benefits individual A may gain from keeping the meat entirely for himself, we should expect individual A to share meat with person B. In the previous example of tolerated theft, an asymmetry in the perceived value of the resource exists with relation to the two parties involved (Kaplan 1985:22; Jones 1984). Tolerated theft suggests that individual A presumably has had an adequate share of the meat package in his possession and is now willing to share with person B who is in need of meat. Tolerated theft is likely to occur when one individual acquires more of a resource than he can actually consume himself.

Variance reduction, also known as risk reduction, tit-for-tat, or reciprocal altruism, is a mode of sharing in which foragers offset the risk of future subsistence resource variability by sharing widely with one another in the present (Winterhalder 1986). Participating in variance reduction may be thought of as paying a health insurance premium (Gurven 2004). Individuals share resources with others when they have resources so that during times they find themselves in need they can expect to receive shares from individuals to whom they shared resources in the past. Variance, or risk reduction modes for sharing, assumes that all parties within the pool of potential sharers are acutely aware of when and what individuals share thereby conditioning individuals to continue participation in the pool, receiving *and* sharing food (Hawkes 2001:114). Similarly, Howell's (2010) "Nuturance Hypothesis" suggests that prosocial behaviors, recognizing someone in need, facilitate longevity and are related to evolved traits of human body form (207-8). Marlowe (2010) puts sharing in a spatial context with "Central Place Provisioning," where food is shared at residential locations in exchange for babysitting (103). Variance reduction thus assumes that the variability in resource availability does not stifle an entire group (e.g. mass piñon harvest failure), so that individuals can expect some members of the group will always be able to procure resources and thus be able to share with those in need.

Cooperative acquisition suggests that prey resources hunted by a group of individuals will be shared due to the higher return yielded from group procurement and to solidify the intent of the group to cooperatively acquire resources in the future (Kaplan 1985:227). It is conversely expected that smaller returns result from the efforts of single individuals targeting prey resources. Unequally distributed returns from cooperatively hunted resources should discourage future group hunts.

Explanations for meat-sharing behavior are diverse and represent varied approaches to understanding human sharing behaviors. The explanations summarized above situate discussions of meat-sharing behavior at a theoretical level. In the next section, I review the Western Great Basin ethnographic record relevant to the archaeological context in which sharing is evaluated.

Sharing in the Western Great Basin: The Ethnographic Record and the Spatial Context

The spatial context for sharing may vary, but in this paper, meat sharing is considered as it occurs among households within residential sites located in the ethnographic territories of the Cattail-eater and Groundhog-eater Northern Paiute during the last 2,000 years. The Cattail-eater and Groundhog-eater Northern Paiute ethnographies (Fowler 1989; Fowler 1992; Kelly 1932) from which I draw information about Northern Paiute households and meat-sharing behaviors are therefore appropriate analogs for the archaeological subject. Kelly's (1932) ethnography concerned the ground hog-eater Paiute, or *Gidütikad*$^{\ddot{u}}$, of Warner Valley, Oregon and Surprise Valley, California. Fowler (1989) compiled Willard Z. Park's notes on five Western Great Basin groups, including the *Kuyuidɨkadɨ*, or Fish-eaters; the *Agaidɨkadɨ*, or Trout-eaters; the *Toidɨkadɨ*, or Cattail-eaters; the *Wadadɨkadɨ*, or Wada-eaters; and the *Ha'paDdɨkadɨ*. Fowler's 1992 publication concerned the *Toidɨkadɨ*, or Cattail-eaters. In this paper, the Binfordian sense of residential site is used; an entire habitation group occupies a residential site, which may include more than one household (Binford 1980).

According to Kelly (1932), Surprise Valley Paiute winter houses were conical mat or grass covered structures, for which willow provided the supporting poles (104-5). A smoke hole was positioned at the top of the house, above the central hearth, which provided warmth and a place to cook food. Blankets may be layered on the outside of houses for added protection from the elements. During the winter months, all cooking and eating was done in the house (105). Far less substantial structures like windbreaks or sun shelters were fashioned from similar materials and used as houses used during the spring, summer, and fall. Sometimes no shelter at all was employed during the warmest months.

Western Nevada Northern Paiute groups used similar structures for housing (Fowler 1989:90-95; Fowler 1992:89-99). A central fire, excavated slightly below the floor of the house, provided the main cooking heat source and provided warmth for the family. Each household had about 12 cooking stones that were carried in a buckskin bag each time the family moved (Fowler 1989:75). Cooking and eating could occur inside a family's house at the central hearth or at a separate fire nearby and outside the family's dwelling (Fowler 1992:94).

In this research, a household may represent a social group that residentially occupied a single house structure with a central hearth feature. A house structure may be identified archaeologically by the presence of a hearth in association with a compacted sediment lens that may have a circular outline of postholes, representing the supportive frame of a wickiup structure. Residential sites exist within a broader social system of landscape use in which people create a variety of site types concomitant with overlapping activities (Binford 1983). Residential sites may be delineated from non-residential sites.

Examples of non-residential and special purpose site types include: hunting blinds, antelope drive corrals, and pit-fall traps. Non-residential sites possess traits that may be contrasted to those of residential sites. Delineated differences (Table 1) are heuristically useful for considering the behaviors associated with one or the other site type within the greater social system of landscape use.

Table 1. Residential and non-residential site characteristics.

	Residential	Non-residential
MNI	High	Lower
Density of zooarchaeological assemblage	Higher	Lower
Evidence for midden features in which osteological material exhibits carnivore gnawing	Higher	Lower
Diversity of material culture	Higher	Lower
Dwelling structures (e.g. wickiup)	Present	Absent
	Examples of associated features: Storage pits, site furniture (e.g., hopper mortars)	Examples: Antelope drive corral Hunting blind Pit-fall trap

Ethnographic records (Fowler 1989, 1992; Kelly 1932) indicate Northern Paiute groups discussed in this article (Figure 1) shared small (Table 2) and large (Table 3) mammalian resources within the greater context of their annual economic cycle (Table 4). Sharing rules vary according to the species procured, who participates in procurement, whether individuals had specific roles, and consideration of special circumstances.

Table 2. Small mammal use by Northern Paiute groups discussed in the article.

		Jackrabbits		**Marmot**	**Porcupine**
		Individual	**Group**	**Individual**	**Individual**
Procurement method and personnel	SVP	Tracked by dogs in the snow; trapped (Kelly 1932:88)	Drive; everyone participates; Headmen are netowners (Kelly 1932:88)	Hunted by individual male with dogs (Kelly 1932:87)	Hunted by individual (Kelly 1932:87)
	WNP	Individual hunter (Fowler 1989:27-29; 1989:79)	Drive; male participants (Fowler 1989:27), Rabbit captain, or leader (Fowler 1992:77)	Hunted by individual male, sometimes with dogs (Fowler 1989:25)	Hunted by individual (Fowler 1989:25)
Season:	SVP	All year(Kelly 1932:88)	Fall, continuing into January (Kelly 1932:88); Winter (Kelly 1932:78)	May through July (Fowler 1989:25)	May through July (Fowler 1989:25)
	WNP	Any time (Fowler 1989:27-29, 79)	Fall (Fowler 1989:27-29, 78-79)		
Dispatch method:	SVP	Arrow; Snared (Kelly 1932:88)	Strangulation; clubbing (Kelly 1932:88)	Clubbing, jaw cracked (Kelly 1932:87)	Smoked (Kelly 1932:87)
	WNP	Arrow (Fowler 1992:78)	Arrow; clubbing; rabbit's neck broken after snared in net (Fowler 1989:28)	Smoke, trapped, arrow, stabbing with sticks (Fowler 1989:25)	Clubbing (Fowler 1989:25)
Butchery locations:	SVP	carried back to camp (Kelly 1932:88)	field dressed at net hunting site, skinned and processed at residential camp (Kelly 1932:88)	carried back to residential camp (Kelly 1932:87)	carried back to residential camp (Kelly 1932:87)
	WNP	Camp	Net hunting camp, post-net hunting residence (Fowler 1989: 27-29; 1989: 78-79)		
Parts of animal used:	SVP	Whole rabbit (Kelly 1932:88)	Whole rabbit; furs (Kelly 1932:88)		
	WNP	Whole rabbit; skins or hides (Fowler 1989: 27-29; 1989: 78-79)	Whole rabbit; skins or hides (Fowler 1989: 27-29; 1989: 78-79)		
Distribution or sharing rules:	SVP	Whole rabbit to hunter (Kelly 1932:88)	One rabbit per drive participant, surplus to headman (Kelly 1932: 82); Divided evenly except in cases of unusual success, then the headmean received more than others (Kelly 1932:88); "If one person in the drive does not get any, others would give him a gew but they would keep the skins" (Fowler 1989:28); "All hunters contributed some [rabbits] to widows and the infirm" (Fowler 1992:78).	Whole animal roasted on coals after evisceration (Kelly 1932:87)	Whole animal roasted on coals after evisceration (Kelly 1932:87)
	WNP	Whole rabbit goes to hunter's family (Fowler 1992:78)	Rabbits caught in net go to net owner (Fowler 1989:28; 1992:78). Rabbits shot by drivers go to that driver (1989:28)		
Archaeologically visible:	SVP	Entire skeleton	Entire skeleton	Entire skeleton	Entire skeleton
	WNP	Entire skeleton	Entire skeleton	Entire skeleton	Entire skeleton

Notes: SVP indicates Surprise Valley Paiute (Kelly 1932); WVP indicates Northern Paiute groups covered in Fowler (1989; 1992).

Table 3. Large mammal use by Western Northern Paiute groups discussed in article.

		Mule Deer		Pronghorn Antelope	
		Individual	Group	Individual	Group
Procurement method and personnel	SVP	Stalked, Trapped (Kelly 1932:82)	Stalked, trapped, fire driving (Kelly 1932:82)		Drive; all participate; special personnel: shaman (antelope charmer), headman or boss, and runner (Kelly 1932:82-86).
	WNP	Trailing, laying in wait, stalking in disguise, sneaking (Fowler 1989:11-14)	Driving (Kelly 1932: 1989:11-14)		Drive; all participate; special personnel: shaman (antelope charmer) and runner (Fowler 1989: 14-19)
Season:	SVP	All year (Kelly 1932:82)	All year. August when using fire driving method (Kelly 1932:82)	Winter (Kelly 1932:82-86)	Winter (Kelly 1932:78, 82-86)
	WNP	Late September through March (Fowler 1989:11-14)	Late September through March (Fowler 1989:11-14)		March (Fowler 1989:14-19)
Dispatch method:	SVP	Arrow; pit falls (Kelly 1932:82)	Arrow; pit falls (Kelly 1932:82)	Arrow (Kelly 1932:82-86)	Arrow (Kelly 1932:82-86)
	WNP	Poison arrows (Fowler 1989:11-14)	Poison arrows (Fowler 1989:11-14)		Arrow (Fowler 1989:14-19)
Butchery locations:	SVP	Field dressed and skinned after kill; processed at residential camp (Kelly 1932:82)	Field dressed and skinned after kill; processed at residential camp (Kelly 1932:82)	Field dressed and skinned after kill; processed at residential camp (Kelly 1932:82)	First two killed within corral. Remaining antelope butchered within the antelope camp (Kelly 1932:82-86)
	WNP	Residential Camp (Fowler 1989:11-14)	Hunting and/or residential camp (Fowler 1989:11-14)		
Parts of animal used:	SVP	Whole deer (Kelly 1932:82)	Hide; head & back sinews; meat (Kelly1932:82)	Whole antelope (Kelly 1932:82-86)	Whole antelope (Kelly 1932:82-86)
	WNP	Whole deer (Fowler 1989:11-14)	Whole deer (Fowler 1989:11-14)	Whole antelope (Fowler 1989:14-19)	Whole antelope (Fowler 1989:14-19)
Distribution or sharing rules:	SVP	Meat shared at camp (Kelly 1932:82)	Hide to hunter whose arrow killed the deer. Head & back sinews go to boss. Meat is evenly divided among the hunters (Kelly1932:82).	Meat shared at camp (Kelly 1932:82-86)	Everyone gets a share of first two killed (P). First killed goes to boss (TA). "First luck," the first doe and fawn killed, is divided among everyone (SW). Most of the buckhorns are given to the headman, which are then piled on sagebrush in the middle of the camp circle (P). All heads are turned toward the charmer's camp. They cook the head's under the ashes and all eat, each person getting one head (P). The boss got all the heads (BA). The doctor got most of the heads. They roasted them in the ground. The hides were divided. A doctor gathered all the horns which he strung and wore about his neck (SW). (Kelly 1932:82-86)
	WNP		Hide goes to hunter who killed the dear (Fowler 1989:12). Distribution of other parts determined by hunter placing hand on that part of the animal, indicating his share (Fowler 1989:20)		First killed goes to shaman. Skin goes to individual who touches the antelope, man or woman. Meat goes to individual who kills the antelope. Meat and fat shared equally after getting pounded together in a metate. Heads distributd equally to all. Heads roasted, each family roasted heads in family fire pit. Skins and meat distributed equally to all (Fowler 1989:14-19)
Archaeologically visible:	SVP	Portions of skeleton represented at different houses	Portions of skeleton represented at different houses	Portions of skeleton represented at different houses	Horns, cranial elements
	WNP	Portions of skeleton represented at different houses	Portions of skeleton represented at different houses	Portions of skeleton represented at different houses	Cranial elements represented at all houses. Some houses have appendicular elements represented.

Notes: SVP indicates Surprise Valley Paiute (Kelly 1932); WVP indicates Northern Paiute groups covered in Fowler (1989; 1992). Following Kelly (1932:69; 82-86); specific informants are noted parenthetically in the table above, such that *(BA)* indicates Bige Archie, *(P)* indicates Piudy, *(SW)* Dr. Sam Wata, and *(TA)* Tom Anderson.

Table 4. Animal resource procurement model based on Kelly (1932) and Fowler (1989; 1992).

	April	**May**	**June**	**July**	**August**	**September**	**October**	**November**	**December**	**January**	**February**	**March**
Elevation ------->		<------- Marmot --------->										
		<------ Porcupine ------->										
	<-- Mule Deer --->											
						<------------------------------------- Pronghorn ------------------------------------>						
						<----------------- Jackrabbit -------------------->						
Camp size	<------- A few households ------>					<------------------------- Multiple household groups --------------------------->						

Note: This table is for heuristic purposes only; it is not intended to suggest the only economic scheduling model practiced by the Cattail-eater or Surprise Valley Northern Paiute. Also, species listed in the table do vary in their distribution across the landscape depending upon the season; pronghorn, for example, may be found at much higher elevations during the summer months.

In Cattail-eater country, Jackrabbit drives lasted for 10-15 days and included the efforts of many people from surrounding communities, where the economic activity provided social benefits in the forms of evening dances. Men produced the nets used in the drive that, when combined, produced a large enclosure into which the jackrabbits were driven by other adult males. The jackrabbits caught in a man's net belonged to him, but hunters who killed jackrabbits before the animals reached the net kept their kills (Fowler 1992:78). Children ran dispatched animals back to their mothers and other women at camp who were ready to process the animals' skin and meat for their families. Jackrabbit skins were transported away from net hunting camps along with dried meat (though it's not clear if that meat was kept on the skeletal carcass) (Fowler 1992:78). Other western Nevada Paiute brought Jackrabbits home to skin (Fowler 1989:29). Cattail-eater Paiute hunters gave away some of their family's jackrabbit catch to widows or the infirm (Fowler 1992:78), while neighboring groups sometimes provided meat to unsuccessful hunters, but retained the skins for the hunter's family (1989:28).

Among the Surprise Valley Paiute, men, women, and children participated in jackrabbit drives as drivers (Kelly 1932:88). Jackrabbit headmen are those males who own the nets used in the drive. Different informants provided Kelly (1932) with different accounts for sharing the yield of jackrabbit drives; Joshua states that one rabbit went to each drive participant and the surplus went to the headman while Piudy and Daisy indicated that jackrabbits were divided evenly except in cases of an unusually high yield where the surplus went to the headman (88). Missing form Kelly's account is an understanding of what constitutes a surplus. Given that rabbit backbones and adhering flesh were pounded with tallow providing storable food (Kelly 1932:94), it is conceivable that entire carcasses may have been transported from jackrabbit net driving sites to residences for final processing into blankets or meat.

Individual hunters procured jackrabbits, marmots and porcupine, in addition to ground squirrels (Fowler 1989:25, 1992:78; Kelly 1932:87). All accounts indicate that individual hunters brought the carcasses of small mammals back to camp after hunting forays. Ethnographic records indicate that small mammals were *not* shared outside a hunter's household.

Northern Paiute hunting groups from western Nevada may trail, stalk in disguise, drive, or sneak up on deer so as to shoot them with poison arrows. The hunter who kills a deer receives the hide (Fowler 1989:12). Fowler (1989) reports that the "distribution of other parts were determined by the hunter placing his hand on that part of the animal, indicating his share"

(20). Ethnographic data collected by Fowler (1989:13-19) indicate that during extended hunting trips groups of men would butcher deer carcasses at their hunting camp and return to the residential site with the hide and small portions of dried meat in sacks. If deer were processed with an emphasis on producing dried strips of meat, it is conceivable that a hunting group may not bring zooarchaeological evidence for their hunt back to the residential site. The zooarchaeological record, however, indicates that hunters did bring deer carcasses back to residential sites.

Surprise Valley Paiute hunted deer in groups choosing to stalk or fire drive their prey, but pitfall traps were also excavated (Kelly 1932:82). Distribution rules suggest that the hide went to the hunter whose arrow killed the deer, the head and back sinews go to the boss, and the meat is divided up evenly among all hunters (Kelly 1932:82). After initial processing, cooking and consumption, meat procured in sufficient quantity was then stored in tule bags and buried beneath earth and rocks (Kelly 1932:94). Individual hunters from Surprise Valley and Western Nevada shared out meat to the rest of their residential camp following a successful hunt (Fowler 1989:11-14; Kelly 1932:81-82). Neither Kelly nor Fowler specifies whether stored meat resources were shared among households.

Western Nevada Northern Paiute groups congregated to participate in antelope drives in March (Fowler 1989:14-19). Able group members participated in the drive, but a shaman was responsible for charming the antelope and a runner was required to adequately tire the animals trapped in the corrals prior to their dispatch (Fowler 1989:14-19). The first antelope killed was apportioned to the shaman, but the skin of the animal goes to the individual who touches the antelope. Thereafter the meat of an antelope belonged to the hunter that killed it, but Fowler also reports that antelope meat and skins were distributed among the participants equally (Fowler 1989:14-19). Antelope heads distributed equally to all and roasted by families in their own fire pits (Fowler 1989:19). Fowler (1989) reports that people skinned antelope at the corral site following the drive, but carcasses were brought back to [residential] camps to butcher (16).

A shaman, or doctor, was also responsible for charming antelope among the Surprise Valley Paiute during the winter months (Kelly 1932:82). A headman, or boss, and a runner were also figures with special roles in antelope drives (Kelly 1932:82). Some variation exists among informants regarding distribution of the first antelope killed; some suggested everyone gets a share of these first killed animals, while Tom Anderson indicated the first animal killed goes to the boss (Kelly 1932:85). According to Piudy, most of the buckhorns are given to the headman, which are then piled on sagebrush in the middle of the camp circle (Kelly 1932:84). Informant Dr. Sam Wata noted that most of the horns went to the doctor, which he strung and wore about his neck (Kelly1932: 86). All the heads are gathered and turned toward the charmer's camp before Antelope meat procured via drives was butchered at the corral site and the heads were roasted in mass there for the communal feast following drives in which everyone is allocated one head (Kelly 1932:84). As with information concerning buckhorns, individual informants provided unique information regarding the distribution of heads; most went to the doctor or the boss got all of the heads (Kelly 1932:84-85). Hides are divided among the participants (Kelly1932:85). Tom Anderson of Fort Bidwell reports that "If one person got more than his share the people would never be able to catch antelope again" (Kelly1932: 85), provocatively underscoring the cultural and economic importance of shared resources.

Large game mammals, unlike small mammals, appear to be shared among households, according to the ethnographic records for the Surprise Valley Paiute and the Northern Paiute groups of Western Nevada. Evidence suggests that other Paiute groups also shared game. Among the Harney Valley Paiute, Whiting (1950) reports, "In the old days, they [women] collected the seeds and roots which were the staple foods and, because of the custom of sharing any game which was killed among all the households, even obtained meat" (68). Steward's (1999) geographically expansive ethnographic research allowed him to comment on the importance of sharing meat: "A hunter was entitled to keep the skin and some choice portion of the meat for his family but was obliged to share the remainder with his village members, first consideration being given to his relatives" (253). Steward's research suggests that sharing large game was important for Paiute and Shoshone groups across the Great Basin and he provides evidence for primary and secondary sharing events.

Ethnographic evidence for sharing the meat of large game among households exists for Paiute groups across the Great Basin (Fowler 1989, 1992; Kelly 1932; Steward 1999; Whiting 1950). However, ethnographic records do not indicate households shared small mammals or stored large game resources. Ethnographic records for sharing large game mammals in Northern Great Basin contexts provide a means by which to develop appropriate models for investigating the zooarchaeological visibility of such behaviors. In the next section, I review existing analyses used to identify sharing in the zooarchaeological record.

Archaeological Visibility of Meat-Sharing Behaviors

Archaeologists have translated modes of meat-sharing behaviors into specific expectations for zooarchaeological assemblages (Waugespak 2002) based on methods used to identify sharing in a general sense. Carcass segments (Binford 1984; Marshall 1994), element frequencies (Binford 1984), food utility indices (Jones and Metcalfe 1988), and a variety of refits (Enloe and David 1992; Rapson and Todd 1992; Todd and Frison 1992) are analytical tools used to infer meat sharing. Kent (1993), Weissner (1982), Yellen (1977), and Zeder and Arter (1999) focused on the spatial distribution of faunal remains. Hudson's (1990) redistribution value provides a quantitative measure by which to evaluate sharing behavior, the utility of which she demonstrated via ethnoarchaeological research. Enloe (2003) provides a relatively recent review of the meat-sharing literature, as does Waugespak (2002). In this section, I review a selection of the aforementioned methods as they apply to the interpretation of zooarchaeological assemblages recovered from residential sites. In the following section, specified methods and resultant expectations may be used to test and identify meat sharing at residential sites in the Northern and Western Great Basin.

Common concepts in methods for discerning shared meat include: refits, carcass segments, and food utility indices. Anatomical refits are based on bilateral symmetry such that a given species, barring some antemortem accident, has a predictable number of bilateral refits. Caribou, deer, and bighorn sheep all have morphologically distinctive fore and hind limbs and can be refit based on morphological and metric evaluation to identify a single animal in an assemblage. "As carcasses are distributed between providers and receivers, the number of interand intrahousehold bilateral and intermembral refits increases" such that "refits therefore 'track' the movement of limb segments between households (Waugespack 2002:401).

Carcass segments are conceptual models for cuts of meat rather than specific osteological elements, though they obviously include bones and joints. Carcass segments are used to explore the utility of food originating from a specific animal, allowing for the quantification of food utility indices (FUI) that can compare the relative utility of different carcass portions. In all the examples that follow, human use of space was either observed ethnoarchaeologically (Binford 1978; Hudson 1990) or inferred (Enloe and David 1992). Regardless, interpretations for human meat-sharing behaviors rely upon a spatial boundary, separating sharer from receiver.

Binford explored the variation in caribou anatomical parts at Nunamiut winter houses for "unambiguous" evidence of sharing (1978; 1984:245-248). Sharing evidence was seen in the dispersal of caribou elements from a single animal across a number of households. The elements represented at one household, therefore, are not represented in another; "different anatomical segments are the units shared out by hunters" (Binford 1984:246). Thus, households' zooarchaeological assemblages should demonstrate sharing based on the variably represented anatomical elements from specific species. The visibility of sharing breaks down as occupation length increases (Binford 1984:246); over time variation in hunting success, household population, and other cultural conventions can result in the evening out of represented elements.

Enloe and David (1992) used re-fit reindeer specimens recovered from an upper Paleolithic site in France to test for meat sharing among three contemporaneous hearths, assumed to represent distinct household spaces. The premise of their argument is that for a single animal to be shared among multiple households, fragments of a particular element or portions of that animal (representing one or more articulations) are disbursed between two or more hearth locations. Sharing is archaeologically visible, therefore, when distinct fragments recovered from two separate hearth locations re-fit to represent a single element or when two bi-lateral elements from a single animal are found in separate hearth locations (Enloe and David 1992: 296).

Hudson (1990) observed the Aka share meat at a residential net hunting site in the Central African Republic and found a number of methods accurately demonstrated the archaeological visibility of meat sharing (624). She found blue duiker, medium duiker, and monkey were scattered across sites rather than being clustered in a single small area and then used the NISP (Number of Individual Specimens) generated for each species at a site to verify her conclusions based on visual inspections (625-6). The MNI (Minimum Number of Individuals) accurately predicted the number of individual species consumed at each Aka camp which then allowed Hudson to reason, "taxa with an MNI of one have the potential to provide the least ambiguous evidence of meat sharing when using counts per species" (626). For example, MNI for monkey at one camp accurately totaled one and monkey elements were found associated with each household at the site such that the sum of the household MNIs was greater than that calculated for the site alone. However, sites for which an animal's MNI is greater than one can also be accessed for sharing by comparing the site MNI with household MNIs. "If maximal redistribution occurs, the sum of the household MNIs will be greater than the site MNI by a factor equivalent to the number of households," indicating some redistribution occurred (Hudson 1990:627). Hudson's redistribution value is calculated for each species based on the forgoing comparison of household and site MNIs. When a species redistribution value is greater than one, redistribution between households has occurred (Hudson1990:627).

Marshall's (1993) ethnoarchaeological investigation of Okiek meat-sharing is also relevant to the model proposed below. The Okiek practice multiple sharing events that reach households separated by great distances. Resulting zooarchaeological residues suggest: 1) successful hunters' households exhibit higher NISP and higher utility portions, but 2) the houses of unsuccessful hunters may mimic what may be considered kill site residues.

Scholars also rely upon the spatial distribution of zooarchaeological remains to infer sharing behaviors. The reduced variation of represented fauna between two camps, as represented by similar taxonomic abundance and taxonomic diversity, are used to infer sharing by Kent (1993) for a sedentary Kalahari community. Kent's model assumes that when sharing occurs between different camps the resulting zooarchaeological assemblages for the camps will be similar with respect to MNI, NISP, and taxonomic richness. Conversely, an absence of meat sharing between camps results in different values for the same zooarchaeological measures for abundance and diversity.

Based on a comparative assessment of butchery patterns, Weissner (1982:171-178) suggests disparate zooarchaeological patterns relative to predominant patterns of sharing or household storage of large game. Among groups that regularly share large game, Weissner hypothesizes greater regularity of butchering practices and distribution. Groups predominantly practicing household storage of large game create zooarchaeological assemblages with less regular butchering practices.

A variety of methods may be employed to evaluate meat-sharing behaviors, taphonomic issues notwithstanding. Refitting techniques can clearly establish the distribution of a single animal across multiple households. Hudson's (1990) redistribution value provides a quantitative indicator for the identification of sharing among households. A consideration for the spatial distribution of subsistence fauna is inherently important to carcass segment distribution and all other methods mentioned.

Modeling Zooarchaeologically Visible Meat-Sharing Behavior within the Northwestern Great Basin

Western Great Basin residential sites provide an opportunity to test the aforementioned meat-sharing models. The complete excavation of residential sites facilitates the ability to apply analytical methods for evaluating zooarchaeological assemblages for meat-sharing behavior. Methods for identifying meat-sharing behavior at residential sites may be applied to those sites containing structural evidence for houses and positively identified hearth features.

Complete zooarchaeological identification and basic analysis must occur prior to analyzing the assemblage for evidence of sharing, thus providing taxonomic abundance and diversity data. Intrusive rodent specimens and rodent specimens lacking clear evidence of cultural modification (e.g., burning, cut marks) are not to be considered as evidence for cultural sharing behaviors. NISP, site MNI (following Lyman 1994:104-105; Reitz and Wing 1999:195), and household MNI values will be determined as part of this process. Sharing will be inferred based on the identification of refits. Anatomical refits (following Waugespak 2002) will allow for the tracking of layered sharing events. Mechanically refit, fragmentary specimens (following Enloe and David 1992) will be considered as an assisting method in the event anatomical fragments are too fragmentary to use in the identification of anatomical refits. Refits will be crosschecked against Hudson's (1990:627) redistribution value in temporally isolated occupational layers. The horizontal density of faunal remains distributed across the site should verify the identification of house structures as central foci for household meat consumption (Fisher and Strickland 1991). Results from the data collection will be considered in association with spatial data collected for the site and the zooarchaeological assemblage.

Within Late Archaic residential sites of the Western Great Basin, evidence for meat-sharing behaviors is expected within distinct households to be represented by a spatial concentration of subsistence fauna. The taxonomic abundance at individual households may be comparable, but the taxonomic diversity should be equal. The redistribution value for species should exceed one. Species' MNI are expected to be greater than one, in which case the redistribution value should reflect that relationship. Anatomical refits will track sharing events of bilaterally symmetrical species. Three ethnographically derived site types are used to model expectations for culturally specific sharing behaviors as they pertain to the small and large mammals discussed above.

At short-term residential sites occupied during the late Spring, we would expect to find archaeological evidence for species hunted or trapped by individual hunters, based on the ethnographic model described above (Tables 2 and 3). We would also expect to find mule deer, a shared species that may be procured by an individual or a group of hunters, represented in all the camp's households producing a redistribution value exceeding one. While a hypothetical situation (Table 5), one should expect to find anatomical refits between the mule deer limb elements of Houses 1 and 3 and between 2 and 3, tracking the shared deer across the three households. In this generic late spring residential camp, we find that the site MNI for Mule Deer equals one, site MNI for Marmot equals two, site MNI for rabbit equals one, and site MNI for Porcupine equals one. At the generic late Spring camp (Table 5), the redistribution value for deer is 3; mule deer is identified at all the individual households, but the camp MNI totals one. Marmots, porcupine, and rabbits are represented in distinct households with an MNI of one or more, but their remains are not identified in all households. NISP values for Marmot and Porcupine were absent in Houses 1 and 3 and no Rabbit was identified within Houses 1 and 2. One can infer that the high NISP values for the small mammal species in houses where MNI values for those species equal one is an indication that an entire individual may be represented and portions of that animal were not shared out. Since a successful hunter retains the choicer carcass segments for his household group, one can infer that a successful hunter lives in House 1. The House 1 hunter kept the mule deer's Left Haunch and back strap, but shared the right haunch, shoulders, and shanks to Houses 2 and 3.

Table 5. Short-term, Late Spring/Early Summer Residential Site Example.

	House 1		**House 2 MNI**		**House 3 MNI**		**CAMP MNI**	**CAMP NISP**
	MNI	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**		
Mule Deer	1	3	1	20	1	6	1	29
(portion)	(Back strap; Left Haunch)		(Hind and fore shanks; Left Shoulder)		(Right haunch; Right Shoulder)			
Marmot	0	0	2	200	0	0	2	200
Porcupine	0	0	1	100	0	0	1	100
Rabbit	0	0	0	0	1	100	1	100

Cooperatively acquired resources, however, will result in a more even distribution of those species among residential site households. The number of households in a pronghorn antelope drive camp is greater than at the Late Spring/Early Summer site due to aggregation of household groups associated with the cooperatively acquired resource. At a fictive antelope drive camp (Table 6) the camp MNI total for pronghorn antelope totals 17 while the MNI for Jackrabbit totals 2. In this case, anatomical refits would be limited to matching the bilateral hind and forelimbs of the "First Luck" Doe and Fawn; complete skeletons would be found associated with individual households, a generic application of the ethnographic models for sharing small and large game described above (Tables 2 and 3). Pronghorn antelope MNI for each household total one or more and Jackrabbits are found in only two houses where the respective household MNI for that species equals one. While the redistribution value for pronghorn equals one, the sum of the household MNIs equals 35, a factor over two times the site MNI for pronghorn antelope, suggesting sharing did occur. One can infer House 6 represents a shaman's house given the clustering of antelope buck horns. One can also infer that Houses 1, 2, and 5 were not as successful in the group drive as Houses 3 and 4, but received antelope nonetheless per cultural sharing rules.

Table 6. Pronghorn Antelope Drive Site Example.

	House 1		**House 2 MNI**		**House 3 MNI**		**House 4 MNI**		**House 5 MNI**		**House 6 MNI**		**CAMP MNI**	**CAMP NISP**
	MNI	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**		
Pronghorn buck	1	100+ (complete skeleton except horns)	1	100+ (complete skeleton except horns)	4	400+ (complete skeletons except horns)	1	100+ (complete skeleton except horns)	1	100+ (complete skeleton except horns)	8	16 (Buckhorns)	**17 (8 Bucks, 7 Does, 1 "First Luck" Doe, 1 "First Luck" Fawn)**	**1500**
Pronghorn doe	1	100+ (complete skeleton)	1	100+ (complete skeleton)	1	100+ (complete skeleton)	2	200+ (complete skeletons)	1	100+ (complete skeleton)	1	100+ (complete skeleton)		
"First Luck" doe	1	<10 (Right lower hind limb)	1	<10 (Left lower hind limb)	1	<150 (Right shoulder, cranium	1	<15 (Right lower fore limb)	1	<15 (Left lower fore limb)	1	<75 (Left Shoulder, Backstrap)		
"First Luck" Fawn	1	<75 (Backstrap, Right shoulder)	1	<15 (Right lower hind limb)	1	<15 (Left lower hind limb)	1	<15 (Right lower fore limb)	1	<15 (Left lower fore limb)	1	<150 (Left Shoulder, Cranium)		
Rabbit	1	100	1	100	0	0	0	0	0	0	0	0	**2**	**200**

One would expect a similar pattern to result from a jackrabbit drive (Table 7) following the ethnographic model for sharing (Table 2). The number of households at this site is greater than at the Late Spring/Early Summer site due to aggregation of household groups associated with the cooperatively acquired resource. At a fictive jackrabbit drive camp, the camp MNI total for jackrabbit totals 20. In this case, analysis via anatomical refits would be impossible; the assumption is that whole carcasses would be processed and consumed at individual houses. Jackrabbit MNI per household exceeds one and the redistribution value equals one, correctly indicating a lack of redistribution. One can infer that the headman lives in House 6 based on the high MNI and NISP value.

Table 7. Jackrabbit drive example.

	House 1		**House 2 MNI**		**House 3 MNI**		**House 4 MNI**		**House 5 MNI**		**House 6 MNI**		**CAMP MNI**	**CAMP NISP**
	MNI	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**	**MNI**	**NISP**		
Jackrabbit	2	200	2	100	3	300	3	400	2	200	8	800	**20**	**2000**

Discussion and Summary

The aforementioned model has only been applied to the hypothetical Western Great Basin cases described above. In reality, testing the proposed model is admittedly a very tall order. The best test of the model requires excavating an entire multi-house village, or at least multiple houses within a multi-house village, where bone preservation is good enough to facilitate required identifications. If one is not excavating the site, access to excavation records and the results of zooarchaeological analyses are required. While multi-house village sites exist within Cattail-eater and Surprise Valley Paiute ethnographic territories, not all were excavated with complete horizontal exposure and not all have completely identified zooarchaeological assemblages. Access to excavation records may prove challenging.

Nevertheless, the proposed model is a possible means by which to identify meat sharing among households at residential sites. Residential sites within the Western Great Basin (e.g., Kelly 2001, Larsen and Kelly 1995, Livingston 1986, Mueller 2007) provide an excellent opportunity to assess the zooarchaeological record for evidence of sharing during the Late Archaic. Testing the aforementioned model for meat-sharing behaviors against the archaeological record may produce results that complicate and add to an increasingly nuanced understanding for past subsistence in the Great Basin (e.g., Broughton et al. 2011; Cannon et al. 1990; Fowler 1993; Kelly 2001; Larsen 1995, 1995:107-133; Larsen, et al. 1995; Raven and Elston 1989; Thomas 1985; Zeanah 2004).

Acknowledgements

Jean Hudson, Patrick O’Grady, Adrienne Frie, and anonymous reviews provided valuable comments and suggestions.

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