WESTERN MOJAVE SUBSISTENCE:

FAUNAL ANALYSIS AT THE FARM DROP ZONE SITE LAn-1296 & 1158

Lynne E. Christenson
Department of Anthropology
San Diego State University
San Diego, CA

ABSTRACT

Faunal remains from the Farm Drop Zone Site were compared with other Mojave Desert sites to test the hypothesis that this site was representative of the Desert Village Strategy. Long term habitation Mojave Desert sites are shown to have species diversity and minimal burned remains. Based on the high quantity of lagomorphs and a high percentage of burned bone, it was determined that the Farm Drop Zone site was a special purpose site devoted specifically to the capture and processing of lagomorphs. A possible range of subsistence activities at Mojave Desert sites is defined.

INTRODUCTION

Subsistence activities, as determined through faunal analyses, is a topic receiving more emphasis in all areas of research (Keene 1981; Ellen 1982; Jones 1983; Erlandson 1988). Because of some recent extensive excavation projects, the Western Mojave Desert can now be included in this body of research (Sutton 1986, 1988; Schnieder 1988; Sutton and Wilke 1988). With subsurface evaluation, more information can be obtained, and this provides better material with which to test hypotheses. The Farm Drop Zone Site at the Air Force Flight Test Center, Edwards Air Force Base, is in Antelope Valley in the Western Mojave Desert. It is located between Lake Rogers and Lake Rosamond, residuals of prehistoric Lake Thompson. This site provided the focus for a study in Western Mojave subsistence practices, that will ultimately affect settlement pattern analyses as well. The Farm Drop Zone site has previously been designated as a part of Bettinger's Desert Village Strategy (Sutton 1988). This report is the result of a cross cultural comparison between the Farm Drop Zone site and other Western Mojave desert sites conducted to test the hypothesis that this was a site representative of the Desert Village Strategy.

RESULTS

A total of 4899 pieces of bone weighing 911.9 grams were submitted for analysis (Table 1). Of the total assemblage, no bird or fish bone were recovered, and no bone tools or pathologies were noted. No bones had sawing or chopping marks

representing butchering activities. Seasonality determination was not possible.

TABLE 1

FARM DROP ZONE FAUNAL ANALYSIS TOTALS

SITE/ LOCUS	LM NO.	% LOCUS	WT.	% LOCUS	SM NO.	% LOCUS	WT.	% LOCUS	BURNED NO.	% LOCUS	WT.	% LOCUS	LAGOMORPH NO.	% LOCUS	NO.	% TOTAL	WT.	% TOTAL
1158	3	6.8	4.2	39.6	41	93.2	6.4	60.4	14	31.8	6.6	62.3	2	4.5	44	0.9	10.6	1.2
1296																		
B	4	1.2	50.6	59.1	335	98.5	40.5	40.9	77	22.6	8.5	8.6	28	8.2	340	6.9	99.1	10.9
C	3	6.5	6.4	55.2	43	93.5	5.2	44.0	4	8.7	1	8.6	1	2.2	46	0.9	11.6	1.3
D	4	2.8	4.8	16.1	199	98.0	25.1	83.9	71	35.0	9.1	30.4	16	7.9	203	4.1	29.9	3.3
E	276	6.6	224.3	29.9	3934	93.4	525.7	70.1	3629	86.2	544	72.5	356	8.5	4210	85.9	750	82.3
769	0		0		56	100.0	10.4	100.0	10	32.1	3.1	29.0	10	17.9	56	1.1	10.4	1.1
TOTAL	290	5.9	290.3	32.7	4608	94.1	613.3	67.3	3813	77.0	572.3	62.0	413	8.4	4899	100	911.6	100

The Farm Drop Zone Site covers a large area and has been designated by numerous trinomials. LAn-1296 subsumes several previous trinomial designations, but the Farm Drop Zone site, as discussed in this report, also includes LAn-1158 and 769. LAn-1158 and 769 produced only small amounts of bone, much of which was naturally not culturally deposited. The five loci at LAn-1296 produced many more bone, and the focus of the faunal analysis is on this section of the Farm Drop Zone site, specifically Loci E.

Large mammal remains were a small part of the assemblage by count and by weight. This shows the discrepancy between count and weight totals in assemblages with a predominance of small mammal bone. Loci E had the most large mammal bone, primarily unidentifiable to genus or species. Over 85% of the large mammal bone from Loci E came from one unit and all of it was burned.

Small mammal bone dominated the assemblage at all parts of the site. Again note the discrepancy between the count and weight numbers and percentages for the various loci. At Loci C only three large mammal bones were recovered, but they were 55% of the total weight of bone.

An important feature at the Farm Drop Zone was the large amount of burned bone. The percentage of burned bone is high for all areas, except Loci C. Of the total bone recovered, 78% by count and 63% by weight were burned. The overall amount of burned bone, mostly from small mammals, is indicative of cultural activity.

The most frequently identified animal was the desert cottontail rabbit (6.2%), 62% of which were burned. Next in abundance was the blacktailed hare, again half of which were burned (Table 1). Significantly, lagomorphs constituted 95% of all identified animals.

DISCUSSION

All the animals recovered in this project are native to the area (Jaeger 1957) (Table 2). Approximately 67% to 76% of the live weight of small mammals like mice, gophers and squirrels is edible (Stahl 1982:827). This amount increases when the animal is eaten whole or when bone is ground with the meat (Stahl 1982). It has been documented that prehistoric and historic people ground the bone of both small and large mammals (Sparkman 1908:197, 198; Michelsen 1967; Bean 1974; Hicks 1963). Three reasons account for this practice:

1. Ground bone added flavor from the fat rich bone marrow;
2. Ground bone produced a glue like substance, which, when mixed with meat, produced a pemmican-like substance; and
3. Ground bone provided calcium frequently missing from the meat and vegetable diet (Christenson 1986).

TABLE 2

SPECIES IDENTIFIED FROM THE FARM DROP ZONE

GENUS AND SPECIES	COMMON NAME
Sylvilagus auduboni	Desert cottontail
Lepus californicus	Blacktailed jackrabbit
Thomomys bottae	Southern pocket gopher
Neotoma sp.	Wood rat
Lynx rufus	Bobcat
Perognathus sp.	Pocket mouse

Most of the meat eaten by the inhabitants of the site came from small mammals and this is consistent with the ethnographic literature (Zigmond 1986:400; Warren 1988). Rabbits, woodrats, pocket gophers and mice remains were found and were probably eaten. Depending on the source, rabbits provide between 50% and 62% of their body weight in usable meat when raw and only 35% when stewed (White 1953; Paul and McCance 1978:110). The hare, however, are about 44% edible when stewed.

Processing techniques used by the inhabitants of these sites show that the rabbits and hares were roasted, a common practice in the Mojave (Warren et al. 1980:155). The dominant elements recovered were from those parts of the rabbits containing the most meat. The shoulder girdle, represented by the scapula and humerus elements, totaled 25% of the identified bone, while the

femur and tibia elements were 18% of the identified elements. Bones from the head also totaled about 25% of the identified bones. The brains of rabbits were considered a delicacy by the Cahuilla (Bean 1988, personal communication) and the heads were used in soups by the Kumeyaay (Williams 1986, personal communication). Over half of the identified elements showed signs of burning, indicating that the means of cooking was roasting, rather than boiling or stewing.

The assemblage is strongly representative of rabbit drives, where large numbers of rabbits and hares are driven into nets and clubbed to death. This generally works well with hares since they do not have burrows to escape the drives, but rabbits would also be caught up in the drive. Communal rabbit drives were the most common cooperative hunting activity employing a large number of men. Each had a rabbit net that was strung consecutively across bushes along the valley floor. Hunters stood behind the nets with clubs and other weapons while the rest of the group drove the rabbits into the nets (Warren et al. 1980). This could produce a large amount of meat at one time, but apparently concentrations of rabbits large enough to warrant this effort were rare in the Mojave. Analysis at a village site, Ker-733, by Yohe (1984) produced evidence of such communal jackrabbit drives. At this site blacktailed jackrabbit comprised 98% of the identified remains, but only 35% of the bones by count were burned.

The absence of fish and birds is of interest. Not only is this site located on the edge of prehistoric Lake Thompson but near Lake Rosamond and Lake Rogers. Not much is known of these lakes, but it is possible that they did not contain fish. It appears that they were closed systems, formed from runoff. If fish were available, the inhabitants of the site apparently did not avail themselves of them. This situation is known ethnographically (Laird 1976:141). An alternate explanation may be that these sites were occupied at a time of increased aridity, then fish were not available. It would be expected that the lakes would draw migrating birds, offering many opportunities for exploitation, but birds are also not represented in this assemblage.

The large mammal remains recovered were all surface finds. Only bighorn sheep were identified. Two of the identified remains are problematic. These elements were from the surface of units in which no other surface remains were found. The bones were not burned, nor did they have butchering marks. Located approximately 1 Km apart with a ridgeline in between, they were not likely from the same animal. One of these units was excavated to 20 cm, the bone remains were from small mammals, were unburned and unidentifiable. With 78% of the bones from the two sites burned, unburned bones are not conclusive of natural deposition but are certainly questionable.

Determining cultural versus natural deposition in arid regions is frequently difficult (Christenson 1987b). Both Thomas (1971) and Bocek (1986) have discussed methods of differentiation for small mammals. But for large mammals determination can be based on the presence/absence of burning or butchering marks. The bighorn remains were not burned nor did they contain butchering marks. Another determining factor is environment. If a large mammal is found in an ecological area which it is not known to inhabit, then cultural factors may be assumed. This is not the situation at these western Mojave sites. The presence of lakes and springs would naturally draw the bighorn to the area (Ryan 1968). Alternately, these remains could be from a butchering area, where the animal was killed by ambush near the water hole (Warren et al. 1980:49; Hicks 1963:186). In this case, predators would have removed or scattered post-cranial elements. No other subsistence activities would be represented near these bones. Whereas it would be tempting to indicate that these bighorn remains were from prehistoric butchering areas, there is no evidence to sustain this. At this time they would have to be designated as questionably culturally deposited.

Western Mojave Desert Sites Faunal Remains Compared

In an attempt to review the hypothesis that this site was a Desert Village Complex site, the subsistence remains from the Farm Drop Zone were compared with six other Western Mojave Desert sites (Table 3, Fig.1). Two of the sites were determined to be long term habitation sites, two were focused activity sites, and two were short term habitation sites. While these sites were not occupied by the same groups or even similar linguistic cultures, the environments were ecologically similar offering limited subsistence options. For example, Central Mojave sites, are dominated by one of three types of animals (Warren 1988). Bighorn, tortoise, and lagomorphs were found depending upon micro-environment, season of occupation, and duration of occupation.

Two projects examined the sites in the Cronise Lake Basin and show a focused subsistence activity. Drover (1979) excavated sites with large ash lenses and Langenwalter et al. (1979) analyzed the faunal remains. They determined that the ash was from fires used to steam mussels caught in Cronise Lake, and that the animal resources were a secondary resource. Very few fish remains were recovered. The burned bone was not a significant percentage of the remains. Another Cronise Lake ash lens was excavated by York and the faunal analysis performed by Christenson (1988), with the same results as Drover. No tortoise and very few fish remains were recovered. Both bighorn and deer elements were identified. While the majority of bone from the sites was from the ash lens, only 24% of the bone was burned. Also, there was a small percentage of lagomorphs

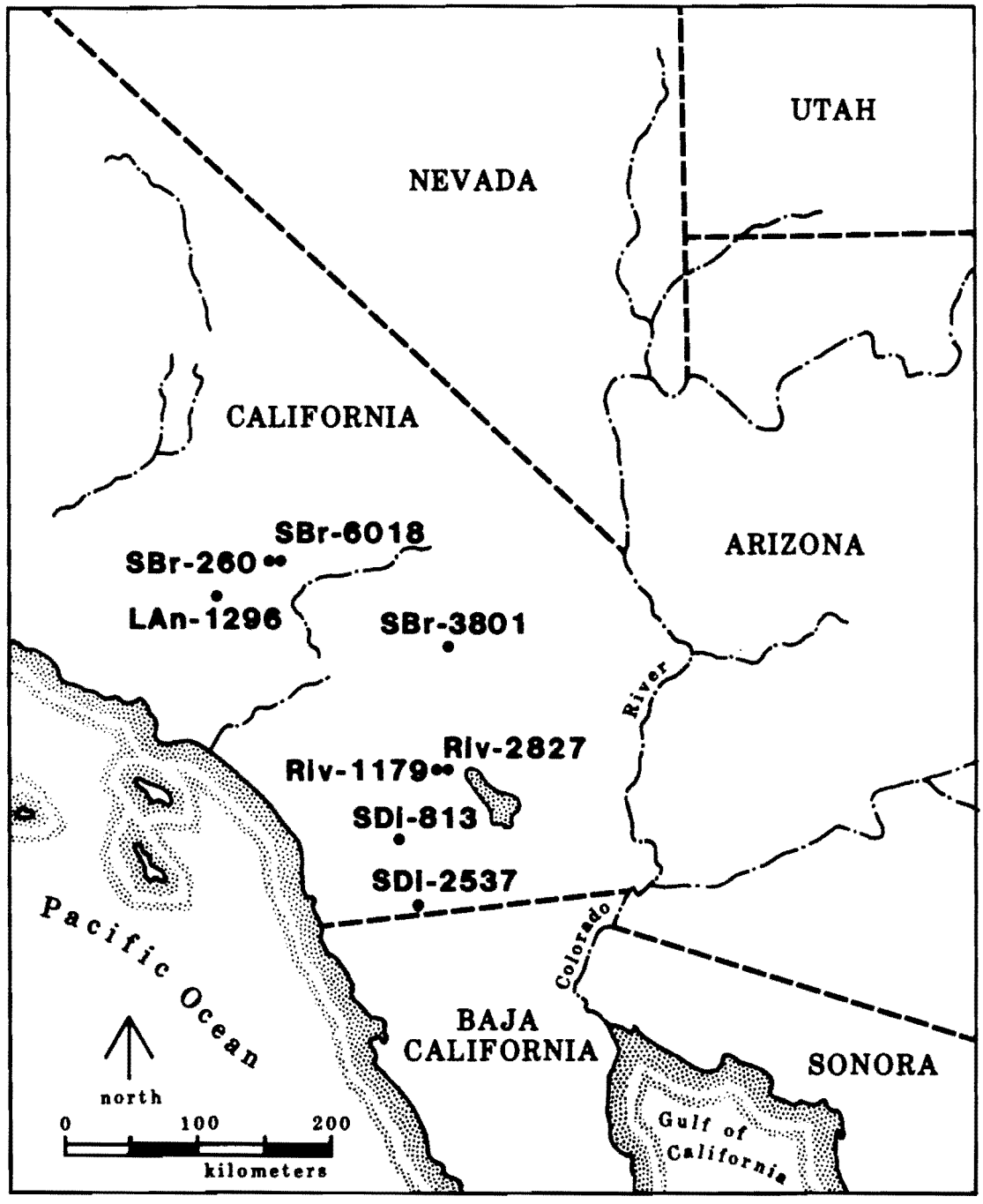

Figure 1. Western Mojave Desert Sites.

TABLE 3

WESTERN MOJAVE SITES USED FOR FAUNAL ANALYSIS COMPARISONS

SITE	COMMON NAME	SOURCE
LAn-1158 LAn-1296	FARM DROP ZONE	Hector et al. 1988 (Christenson 1988a)
SBr-6017 SBr-6018	CRONISE BASIN	York (1988) (Christenson 1988b)
SDi-2537	INDIAN HILL	Wilke et al. 1986 (Yohe et al. 1986)
SDi-813		Sampson (in progress) (Christenson 1987a)
SBr-260a	CRONISE BASIN	Drover 1979 (Langenwalter et al. 1979)
SBr-3801	OWL CANYON	Sutton 1986 (Langenwalter 1986)
Riv-1179 Riv-2827	LA QUINTA	Sutton and Wilke 1988 (Sutton and Yohe 1988, Follett 1988)

() = Faunal analysis source

identified. This substantiates Drover's contention of a subsistence strategy where faunal material was third in importance, behind vegetal material and mussels.

Riv-1179 and Riv-2827 were investigated by Sutton and faunal analyses were conducted by Sutton and Yohe, and Follett (in Sutton and Wilke 1988). These two sites are considered separate loci of the same functioning camp. Based on ecological and artifactual remains, these sites reflect short-term use, probably seasonal camps. Located at the edge of Lake Cahuilla, these sites contained many fish remains. While lagomorphs dominated the terrestrial remains, birds were also abundant. The majority of bones were unburned.

Another short-term habitation site is SBr-3801, the Owl Canyon site (Sutton 1986). Faunal analysis by Langenwalter showed a predominance of blacktailed jackrabbit, and only 1% of the bone was burned. Located on a mesa above an arroyo, it is not a lake margin site.

Indian Hill rockshelter, the first long term habitation site used for comparison, was excavated by Wilke et al. (1986) and the faunal material analyzed by Yohe et al. (1986). This site is located in the southern part of the Anza Borrego Desert State Park and is associated with Lake Cahuilla. Based on the fish species present, the inhabitants had a lacustrine economy. Migratory birds were also present. Large and medium sized mammals were identified. Coprolytes produced remains of the smaller animals like mice. These all indicate a broad based subsistence economy, not one focused like that at the sites in Western Mojave.

Another long term habitation site in the north end of the park also associated with Lake Cahuilla is SDi-813, excavated by Sampson with faunal analysis by Christenson (1987a). This site is located on a small knoll between two drainages, and contained many identified large mammal remains. While this site also produced a wide variety of medium and small mammals, a very small percentage was burned, indicating different processing activities from those identified at the Farm Drop Zone. Lagomorphs were only a part of the broad subsistence activities.

Sutton (1980, 1988) has proposed that the Farm Drop Zone site is one of the large village sites located in the Western Mojave, based on Bettinger's Desert Village adaptive strategy (Bettinger 1978; Moratto 1984). This appears to be contrary to the faunal evidence. Broad based subsistence economies at Indian Hill Rockshelter and SDi-813 are more representative of village (or long term habitation) sites. The Cronise Basin sites are special purpose sites with a focused activity. Owl Canyon and La Quinta represent short-term seasonal camps. With a predominance of lagomorphs and a high percentage of burned bone, The Farm Drop Zone site appears to be a special purpose short-term occupation site (Table 4). Based on information from the Central Mojave, it is speculated that as conditions became more arid, sites tended to be special purpose sites, because the environment could not sustain a population for extended periods (Warren 1988:49; Schneider 1988). Hunting of bighorn was most likely at waterholes on an encounter basis. This is the pattern seen at the Farm Drop Zone site.

The Desert Village adaptive strategy as initially proposed by Bettinger (1978) consisted of permanent settlements, which were the focus of activity in the spring, summer, early fall, and most winters. Bettinger proposed that a variety of riparian plants, dry land plants, and pinyon nuts composed the major part of the diet, with small mammals a secondary resource. The evidence at the Farm Drop Zone Site is not consistent with this concept. The environment is more arid and supports mesquite, not pinyon. One alternative based on the faunal evidence is occupation of this site during a period of aridity when the lake levels were very low, and, it would be projected, when the

TABLE 4

FAUNAL ANALYSIS RESULTS FROM WESTERN MOJAVE DESERT SITES

SITE	COMMON NAME	LAGOMORPHS NO.	TOTALS NO.	TOTALS WT.	BURNED NO.	BURNED WT.
LAn-1158	FARM DROP	413	4899	911.6	3813	572.3
LAn-1296	ZONE	(8)			(78)	(63)
SBr-6017	CRONISE	31	1503	173.0	360	49.5
SBr-6018	BASIN	(2)			(24)	(29)
SDi-2537	INDIAN	1486	35530	5027.8	____	____
	HILL	(4)				
SDi-813	____	50	2408	425.2	334	76.0
		(2)			(14)	(18)
SBr-260a	CRONISE	368	6000	____	____	____
	BASIN	(6)				
SBr-3801	OWL	127	1049	____	100	____
	CANYON	(12)			(10)	
Riv-1179		96	424	____	____	____
	LA	(23)				
Riv-2827	QUINTA	9	115	____	____	____
		(8)				

() = percent of site totals

available riparian plants would be limited. The number of species recovered at the Farm Drop Zone Site is not representative of a site permanently occupied (Table 5). Six species were recovered, while the long term habitation site at SDi-813 had 14 and Indian Hill had 28. At Ker-733, a Mojave Desert site, where the faunal analysis was conducted by Yohe (1984), a focus on jackrabbit drives was the subsistence pattern. Even with an acknowledged mammal exploitation strategy focused on jackrabbits, this site produced 15 different species, including two fish. Consequently, the Farm Drop Zone site is different in all aspects from Western Mojave Desert long term habitation sites, and more closely resembles focused activity sites from the same area.

CONCLUSION

The faunal remains from the Farm Drop Zone Site located in the Western Mojave desert represent activities at a special purpose site. Small mammals were the main focus of the meat part of the diet. Desert cottontails were identified most often,

TABLE 5
COMPARISON OF SPECIES BY SITE

Common Animal Name	LAn-1296 Farm Drop Zone	Ker-733	SBr-6017 Cronise	SBR-260a Cronise	Riv-1179 La Quinta	Riv-2827 La Quinta	SBr-3801 Owl Canyon	SDi 813	SDi-2537 Indian Hill
MAMMALS									
Mule deer		X	X					X	X
Bighorn sheep	X		X	X	X	X		X	X
Pronghorn		X							X
Mountain lion				X				X	
Bobcat	X		X	X	X	X			X
Coyote/dog				X					X
Gray fox				X				X	X
Fox		X							X
Badger		X							
Ringtail									X
Rabbits		X			X	X	X		X
Blacktailed jackrabbit	X	X	X	X	X	X	X	X	X
Desert cottontail	X	X	X	X	X		X	X	X
Pocket gopher	X								X
Packrat		X	X	X	X	X	X	X	X
Vole					X	X			X
Pocket mouse	X	X	X		X	X	X	X	X
Deermouse								X	
Kangaroo rat		X			X	X	X		X
Antelope ground squirrel				X			X		X
Ground squirrel		X							X
Round-tailed ground squirrel		X							
RETILES									
Western whiptail		X							
Skink								X	
Desert iguana					X	X		X	X
Chuckwalla				X	X	X			X
Desert Tortoise							X		
FISH									
Humpback sucker					X	X			X
Boneytail					X	X		X	
Hardhead minnow		X							
Col. River Squawfish					X	X			
BIRDS									
Rock dove						X			
Hawks				X					
Ducks				X	X				
Least bittern				X					
White pelican				X	X				
Eared grebe				X					
Cooper's hawk		X							
Mourning dove									X
Great horned owl									X
American coot					X				
TOTAL	6	15	7	15	18	13	8	12	23

indicating an environment with much cover. Blacktailed jackrabbit were second in abundance, representing an ecotone between open desert type environments and a mesic environment with cover. Large mammals were a small part of the subsistence activities. Several bighorn remains could not be definitely determined to be culturally deposited. The absence of fish and bird remains may be from a preferred exclusion of these species or because the environment was becoming more arid, and the lakes were drying.

Processing techniques were obvious from the remains. Over 70% of the bone was burned indicating roasting as a cooking technique. The post-cranial elements most often found were from the highest meat bearing areas, and the presence of many cranial elements could be from accessing the brains. By comparing the Farm Drop Zone remains with those from other Mojave and Sonoran Desert sites, it was determined that the faunal pattern represented a special purpose site, most likely for rabbit drives.

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