Temporal Variation in Vertebrate Archaeofaunas from Camp Pendleton Marine Corps Base, San Diego County, California

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Abstract

Recent archaeological investigations on and near Camp Pendleton Marine Corps Base, San Diego County, California, have yielded vertebrate skeletal remains including fish, amphibians, reptiles, birds, and mammals. Camp Pendleton vertebrate faunal assemblages from 23 sites are discussed and placed in a broader regional perspective. Research questions addressed through the analysis of these data sets, include subsistence and settlement shifts through time, variation in use of coastal resources, and whether use of this landscape by highly mobile foragers or localized logistical collectors is indicated. A marked difference in species representation, diversity, and relative abundance is seen in Archaic Period bone assemblages when compared to those of the Late Prehistoric Period. Estuarine species are better represented, and the assemblages more diverse in the Archaic Period. A narrowed diet breadth is indicated at the Late Prehistoric Period sites.

Introduction

A variety of vertebrate skeletal remains including fish, amphibians, reptiles, birds, and mammals have been recovered from a number of recently excavated archaeological sites on and near Camp Pendleton Marine Corps Base, San Diego County, California. In this article, Camp Pendleton vertebrate faunal assemblages recovered from 23 sites are discussed in a broader regional perspective through intersite comparison which includes two outside Camp Pendleton. In light of the considerable amount of archaeological and zooarchaeological work conducted on Camp Pendleton in recent years, a number of research questions can be addressed through the analysis of these data sets, including general subsistence and settlement shifts through time, variation in use of coastal resources, and whether the archaeological record reflects use of this landscape by highly mobile foragers or localized logistical collectors. This study sheds further light on the evolution of subsistence-settlement systems in northern San Diego County and serves as a useful comparative base for other coastal regions of California.

Vertebrate Subsistence in San Diego County

Interpreting vertebrate archaeofaunas is not always straightforward. The difficulty of interpreting Protohistoric and Late Prehistoric Period bone assemblages is magnified as time depth and the potential for taphonomic change increases (e.g. Lyman 1994a). This is especially evident

when discussion touches on the Archaic Period, during which a variety of climatic (altithermal) and topographic changes (inundation) are proposed (Carbone 1991; Moratto 1984). Excavation of a number of coastal sites in southern San Diego County has resulted in the development of various subsistence and settlement models for the region, some widely divergent (Bull 1978; Gallegos 1988, 1991; Hudson 1971; Kaldenberg and May 1975; Koerper 1981; Koerper et al. 1991; Kowta 1969; Moratto 1984; Moriarty 1966, 1967, 1969; True 1966; Warren and True 1961).

The various models proposed for the exploitation of far southern Californian coastal environments include:

> 1) Use of coastal sites and resources on a strictly seasonal basis, in either the winter or the summer specifically, by people with an inland residential and subsistence focus who relied on terrestrial animal and plant resources.
>
> 2) A generalized coastal resource and residential focus in which people make seasonal trips to exploit specific inland resources.
>
> 3) A focus on specific maritime oriented sites close to estuaries with periodic occupation of other inland and coastal locations.
>
> 4) Various combinations of the above, with short-term seasonal or semi-permanent coastal occupation by coastal and inland groups with mixed resource foci.

No real consensus has been reached concerning cultural development, and possible subsistence and settlement changes in the region. However, many authors agree that strong evidence for mid-Holocene climatic change does exist (Carbone 1991; Moratto 1984; Gallegos 1991; Gallegos and Carrico 1984). Climatic changes and their effects on the habitat mosaic of coastal southern California may have had profound effects on the prehistory of the region. The San Dieguito/La Jolla in situ development versus cultural replacement debate, in which both schools of thought point to climatic changes as important forces influencing populations and colonization of the region, exemplifies this point perfectly (Gallegos 1991; Kaldenberg and May 1975; Koerper 1981; Koerper et al. 1991; Kowta 1969; Moratto 1984; Moriarty 1966, 1967, 1969; Warren and True 1961). As more coastal sites in this region are excavated and reported, and the overall zooarchaeological database expands, synthesis of these various models concerning cultural development in the region will certainly become more refined. I will show here that marked differences exist between Archaic Period and Late Prehistoric Period vertebrate archaeofaunas on and around Camp Pendleton in Northern Coastal San Diego County, suggesting different subsistence practices and resource foci in these respective time periods.

Methods

This reports focuses on the analysis of vertebrate skeletal remains recovered mostly from archaeological projects conducted on and around Camp Pendleton Marine Corps Base primarily over the last ten years. In order to place the archaeofaunas discussed here into a broader regional context, 23 archaeological sites yielding vertebrate faunal remains on Camp Pendleton are compared (Hudson 1995a, 1995b; Wake 1996, 1997a, 1997b) together with two Early Archaic period sites further south in San Diego County, SDI-9649, the Alan O. Kelly site (Koerper et al. 1991) and SDI-6010, the Whelan Lake Site (Cairns and Altschul 1993) (Table 1, Fig. 1).

The sites discussed here are comparable since the field recovery strategies, analytical techniques, and interpretive frameworks employed by the various investigators are all relatively similar. The vertebrate faunal remains from all sites, except SDI-6010 and SDI-9649, were analyzed in the UCLA Zooarchaeology Laboratory. The Alan O. Kelly (SDI-9649) and Whelan Lake (SDI-6010) sites are included since they produced fish, birds, and mammals, and represent well excavated and reported sites, with recovery techniques broadly similar to the Camp Pendleton sites (Byrd et al. 1995; Cairns and Altschul 1993; Koerper et al. 1991; Reddy 1998; Wake 1996, 1997a, 1997b).

Since the ages of the 23 sites spans the last 7000 years, the sites have been grouped into broad age categories based on available radiocarbon dates (Cairns and Altschul 1993; Koerper et al. 1991; Reddy 1998). I refer to four broad temporal phases; the Early Archaic (8000-5000 BP), the Later Archaic (5000-1000 BP); the Late Prehistoric (1000-1650 AD) and the Ethnohistoric (1650 AD - Present) (See Table 1). Some of these periods, such as the Later Archaic are necessarily quite broad simply due to a lack of resolution in terms of dated archaeofaunas.

While the 23 sites do not represent the same cultural horizon or time period, they provide an opportunity to address potential long term subsistence changes. It is, however, important to note that the sample sizes from these sites differ significantly, especially those from the Late Prehistoric sites, many of which had only one or two excavation units per site. The potential of such sample size effects (e.g. Grayson 1984) is mitigated to some extent by the large number of sites available from the pertinent time periods.

Analysis of the vertebrate archaeofaunas presented here focuses specifically on Number of Identified Specimen (NISP) measures from each site and comparisons of relative abundances and diet breadth. While the pitfalls of NISP-based interpretations are well known and oft repeated (Grayson 1984; Lyman 1994b; Ringrose 1993), exclusive use of NISP measures here was deemed appropriate because it allows for the comparison of the maximum number of sites, serves as a good measure of diet breadth and resource focus, and the techniques for determining NISP were consistent between the reporting authors and therefore broadly comparable (Cairns and Altschul 1993; Hudson 1995a, 1995b; Koerper et al. 1991; Wake 1996,

Table 1. Temporal Affinities for Selected Camp Pendleton Area Archaeological Sites.

Site	Early Archaic 8000-6000 B.P.	Later Archaic 6000 - 1000 B.P.	Late Prehistoric AD 1000 - 1650	Ethnohistoric AD 1650 +
SDI-811		LA		
SDI-812/H			LP (Lower)	E (Upper)
SDI-1074			LP	
SDI-4411			LP	
SDI-4538			LP	
SDI-5138			LP	
SDI-5139			LP	
SDI-5141			LP	
SDI-5145			LP	
SDI-6010	EA			
SDI-9649	EA			
SDI-10726	EA			
SDI-10728	EA (Locus A)		LP (Locus B)	
SDI-12574			LP	
SDI-13325		LA		
SDI-14494			LP	
SDI-14496			LP?	
SDI-14497			LP	
SDI-14505			LP?	
SDI-14516			LP	
SDI-14517/H				E
SDI-14520			LP	
SDI-14521			LP	
SDI-14522		LA		

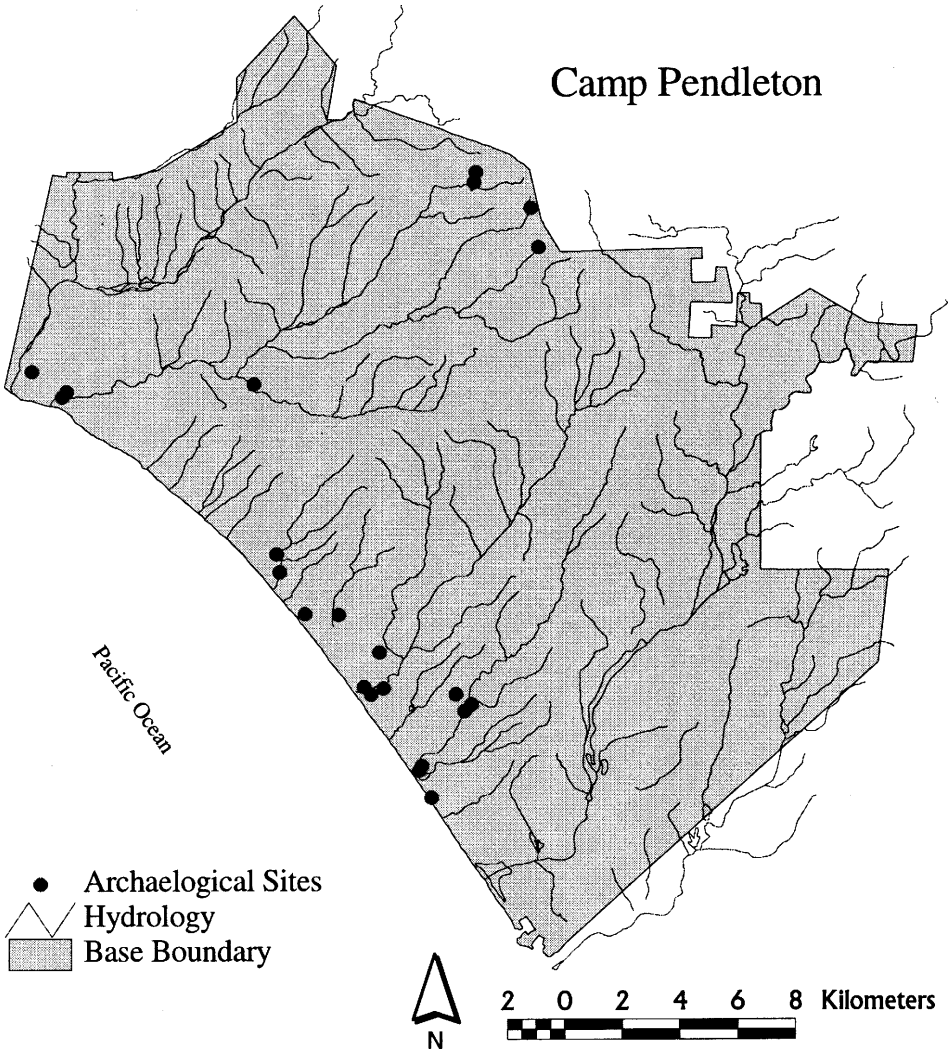

Fig. 1. Sites with Archaeofaunal Remains on Camp Pendleton.

1997a, 1997b). A combination of NISP and MNI (Minimum Number of Individuals) might be preferable in order to mitigate some of the pitfalls of the different measures, however MNI counts were not available for all of the sites and therefore were not included. Weight-based comparisons were rejected since weights were unavailable in some reports and for other theoretical reasons (e.g. Mason et al. 1998). The identified taxon (or taxa) refers to identifications done to the family level or better.

The three most commonly represented vertebrate classes from these sites; fish, birds, and mammals, are discussed here. Reptiles and amphibians, while present at many of these sites, are not numerous or ubiquitous enough to be included in the broader comparisons made here. Twelve of the sites produced fish remains (Table 2), 11 produced bird remains (Table 3), and

all 23 produced mammal remains (Table 4). Based on species representation, the vertebrate faunal remains recovered from these sites suggests an exploitation of a whole range of habitats including open coast, estuaries, woodland, grassland, chaparral, and riparian zones.

Fish

Of the 12 sites that yielded fish remains (Table 2), the greatest numbers and diversity was observed in the Early Archaic contexts at SDI-10,726 (22 taxa, 10.2%) and SDI-10,728 (22 taxa, 17.6%). These Early Archaic sites show the strongest representation of elasmobranchs (SDI-10,726 [10.2%]; SDI-10,728 [17.6%]; SDI-6010 [50.0%]; SDI-9649 [9.7%]). These sites also exhibit the greatest numbers of California halibut (Paralichthys californicus) and other flatfishes. The majority of these flat bodied cartilaginous and bony fish species are commonly found in low energy, relatively calm water, soft bottomed habitats such as bays and estuaries (Eschmeyer et al. 1983; Miller and Lea 1972; Salls 1985, 1987, 1988). Furthermore, anchovies (Engraulidae) and smelts (Atherinidae), both fish families strongly associated with nearshore environments including bays and estuaries (Miller and Lea 1972; Salls 1988), are well represented in the Early Archaic sites (SDI-10,726 [13.4%]; SDI-10,728 [21.3%]). Sardines (Clupeidae) are also present and are known to occasionally enter estuaries. Other open coast fish species (croakers [Scieanidae] and wrasses [Labridae]) are well represented in these sites and suggest the exploitation of nearshore open coast and rocky bottom environments as well.

In the Later Archaic the fish species more commonly encountered beyond the breakers, such as tunas and mackerel (the Scombridae), become more prominent, especially at SDI-13,325 and SDI-811. Flat bodied cartilaginous fishes continue to be present at these sites (SDI-811 [8.5%], SDI-13,325 [2%] and SDI-14,522 [75.0%]). California halibut (*Paralichthys californicus*) are present at SDI-811, and other bony fishes as well as sciaenids and labrids continue to show up during this period as well.

Elasmobranchs and flatfishes virtually disappear in the Late Prehistoric sites. The relative abundances and overall densities of fish also diminish considerably during the Late Prehistoric times. The largest Late Prehistoric fish assemblage which was recovered from SDI-4538 (N=970) yielded only three identified elasmobranch specimens (0.31%). SDI-4538 also yielded a large number of slim topfish (sardines, anchovies, and silversides [N=418, 43.1%]) and croakers (Sciaenidae [N=152, 15.7%]). Wrasses (Labridae) are also well represented at SDI-4538 and are present at two other Late Prehistoric sites (SDI-1074 and SDI-4411). All of these groups of fish are commonly associated with various nearshore environments. The fishing emphasis appears to shift exclusively to open coast and sandy beach species during the Late Prehistoric Period.

Table 2. Fish Remains From Camp Pendleton Area Archaeological Sites (All Sites In San Diego Co.)

Time Period		EA	EA	EA	EA	LA	LA	LA	LP	LP	LP	LP	LP	LP
Taxonomic Categories		22	34	23	5	24	14	4	5	7	21	3	7	1
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	14522	1074	4411	4538	5139	10728b	14521
Smoothound	Triakididae	5	4	6		7	2							
Leopard Shark	*Triakis semifasciata*	2			2									
Requiem sharks	Carcharhinidae							1						
Shovelnose Guitarfish	*Rhinobatos productus*	19	14	44	2	8	6	1			1			
Thornback Ray	*Platyrhinoidis triseriata*		2	11							1			
Short-tailed Stingray	*Dasyatis brevis*	1	1											
Bat Ray	*Myliobatis californica*	59	20	28	2	5	3	1						
Shark/Ray	*Elasmobranchii*		77	252		28				1	1	1		
Herring/Sardine	*Clupeia Sardinops*	46	170	101		12					189		65	
Pacific Sardine	*Sardinops sagax*	2												
Anchovy	*Anchoa Engraulis*		91	121		8					206		16	
Midshipman	*Porichthys*		1											
Silversides	Atherinidae		58	272		3					21		1	
Jacksmelt	*Atherinopsis californiensis*		6	3		15	4				1			
Grunion	*Leuresthes tenuis*	1									1			
Rockfish	*Sebastes*	1	5			15	14							
Bass	*Paralabrax*	2	9	1		6					2			
Jack Mackerel	*Trachurus symmetricus*		2				1				3			
Croaker	Sciaenidae	7	5	28		53		1	1		75		2	
Queenfish	*Seriphus politus*		1	3							25			
Spotfin Croaker	*Roncador stearnsii*	2	3	1										

Table 2 (con't). Fish Remains From Camp Pendleton Area Archaeological Sites.

Time Period		EA	EA	EA	EA	LA	LA	LA	LP	LP	LP	LP	LP	LP
Taxonomic Categories		22	34	23	5	24	14	4	5	7	21	3	7	1
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	14522	1074	4411	4538	5139	10728b	14521
Smoothound	Triakididae	5	4	6		7	2							
White Croaker	*Genyonemus lineatus*		6	4		55	40			1	52			
Yellow Croaker	*Umbrina roncador*		3	1	1									1
White Seabass	*Atractoscion nobilis*	1												
California Corbina	*Menticirrhus undulatus*	1												
Surfperch	Embiotocidae	3	34	45		30	9		1	1	13			
Rubberlip Surfperch	*Rhacochilus toxotes*		1											
Pile Surfperch	*Rhacochilus vacca*	1												
Shiner Surfperch	*Cymatogaster aggregata*		1											
Barred Surfperch	*Amphistichus argenteus*	2												
Blacksmith	*Chromis punctipinnis*		3											
Barracuda	*Sphyraena argentea*		1	1		1	2				1	1		
Senorita	*Oxyjulis californicus*		39	5		3			4	1	30		9	
Sheephead	*Semicossyphus pulcher*	1	3	4		28	18		1	1	10		4	
Prickleback	Stichaeidae					8								
Tunas	Scombridae	9												
Tuna	*Thunnus*		2			1	40			1	1			
Bonito	*Sarda chiliensis*		1				2							
Skipjack Tuna	*Euthynnus pelamis*		2								1			
Pacific Mackerel	*Scomber japonicus*		7			7	39				11			
Flatfish	Pleuronectiformes		1	27		2								

Table 2 (con't). Fish Remains From Camp Pendleton Area Archaeological Sites.

Time Period		EA	EA	EA	EA	LA	LA	LA	LP	LP	LP	LP	LP	LP
Taxonomic Categories		22	34	23	5	24	14	4	5	7	21	3	7	1
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	14522	1074	4411	4538	5139	10728b	14521
Smoothound	Triakididae	5	4	6		7	2							
California Halibut	*Paralichthys californicus*	4	1	2		2								
Bony Fish	Teleostei	718	573	844	5	257	378		4	9	325	4	29	
Fish	Pisces	1	9	8		9								
Total		888	1156	1812	12	563	558	4	11	15	970	6	126	1

Birds

Of the 11 sites which yielded bird remains (Table 3), SDI-10,728 is richest both in number of identified taxa (21) and number (N=334) of bird elements represented. The next most productive site is SDI-13,325, yielding 59 elements and only six identified taxa, and SDI-10,726 yielded 45 elements but only two identified taxa. The most taxonomically rich site after SDI-10,728 is the Alan O. Kelly site (SDI-9649 outside Camp Pendleton), which yielded 34 elements belonging to 10 identified taxa. The remaining sites, most of which date to the Late Prehistoric Period (and one Ethnohistoric Period site), yielded 22 elements or less, with a total of 53 elements (Table 2).

The sites dating to the Early Archaic period (SDI-10,728:21 taxa; SDI-9649: 10 taxa; SDI-13,325: 6 taxa; and SDI-6010:7 taxa) are the richest in terms of identified taxa. The most common bird taxa at these sites is waterfowl, primarily ducks (Table 3). At SDI-10,278 estuarine waterfowl account for 85.7% (N=108) of the identified bird taxa, and at SDI-13,325 they constitute 58.3% (N=7). The Early Archaic period bird remains suggests exploitation of estuarine or marshy habitats that would support the waterfowl represented in these assemblages. While some of the waterfowl species represented at these sites are resident, many are migratory, and currently reach their greatest concentrations in the fall and winter, suggesting occupation of these sites at least during those times of year.

The Late Prehistoric Period avifuana is comparatively depauperate, producing fewer elements representing fewer identified taxa. Virtually no waterfowl are identified. Most of the identified specimens represent local terrestrial taxa such as California quail and doves that are found in a variety of habitats all year round.

Table 3. Bird Remains From Camp Pendleton Area Archaeological Sites (All Sites in San Diego Co.).

Time Period	EA	EA	EA	EA	LA	LA	LP	LP	LP	LP	LP	LP	LP	E
Taxonomic Categories	11	4	25	9	3	10	2	8	1	2	1	2	3	5
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	1074	4411	5139	10728b	14494	14497	14505
Arctic Loon	*Gavia arctica*	4												
Loon	*Gavia sp.*						1	1						
Pied-billed Grebe	*Podilymbus podiceps*			1										
Cormorant	*Phalacrocorax sp.*			1										
Double-crested Cormorant	*Phalacrocorax auritus*			2			4							
American Wigeon	*Anas americana*			1										
Green-winged Teal	*Anas crecca*	2												
Cinnamon Teal	*Anas cyanoptera*		1	30										
Mallard	*Anas platyrhynchos*			8			3		1					
Gadwall	*Anas streptera*				1									
Duck	*Anas sp.*		1	8	1		2		1					
Lesser Scaup	*Aythya affinis*			10										
Greater Scaup	*Aythya marila*			3										
Pochard	*Aythya sp.*	2												
Canada Goose	*Branta canadensis*			1			2							
Goose	*Anser sp.*								1					
Ducks and Geese, Large	Anatidae, L			1										
Ducks and Geese, Small	Anatidae, S			2										
Ducks and Geese	Anatidae			25									1	
Common Moorhen	*Gallinula chloropus*	1												
American Coot	*Fulica americana*			18	1									
Plover	*Charadrius sp.*				1									
Wading Bird	Scolopacidae			1										
Western Gull	*Larus occidentalis*	1												
Gull	*Larus sp.*			1										
Burrowing Owl	*Athene cunicularia*	3												
Red-tailed Hawk	*Buteo jamaicensis*									1				
Hawks	Accipitridae			1										
California Quail	*Callipepla californica*	5		2										1
Turkey	*Meleagris gallopavo*								3					
Chicken	*Gallus gallus*	1												
Mourning Dove	*Zenaida macroura*			1										1

Table 3 (con't). Bird Remains From Camp Pendleton Area Archaeological Sites.

Time Period	EA	EA	EA	EA	LA	LA	LP	LP	LP	LP	LP	LP	LP	E
Taxonomic Categories	11	4	25	9	3	10	2	8	1	2	1	2	3	5
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	1074	4411	5139	10728b	14494	14497	14505
Dove	*Zenaida sp.*				3									
Northwestern Crow	*Corvus caurinus*	1												
Meadowlark	*Sturnella sp.*				1									
Crows and Jays	Corvidae								1					
American Robin	*Turdus migratorius*						1							
Sparrow	*Zonotrichia sp.*				1									
Sparrows	Passeridae	2		7										
Finches	Fringillidae			2										
Birds, Large				8			9		8					
Birds, Medium				82	4	3	1		4		1	1	1	
Birds, Small			5	19	11	3	2				1			
Birds		12	38	97		4	34	1	1					1
Total		34	45	332	24	10	59	2	20	1	2	1	2	3

The overall pattern of bird exploitation in the Camp Pendleton region shows a general decrease in the diversity and numbers of bird species through time. Ducks and other waterfowl, in particular, diminish markedly. Terrestrial bird species remain consistent in their representation during the Archaic Period and in the more recent sites. The general pattern evident in the bird data set, like that of the fish, indicates the presence of relatively productive estuarine systems in northern San Diego County during the Early Archaic, and suggests the subsequent disappearance, or possibly under-exploitation, of these same environments in later prehistory.

Mammals

Mammals are well represented in most of the 23 sites and are compared in Table 4. Mammals are especially well represented in SDI-10,728, Locus A, which has the greatest number of mammal elements (N=7507) and highest taxonomic diversity (30 taxa). The identified mammal assemblage from SDI-10,728 is dominated by rodents (77.7%) and followed by rabbits (19.5%), with deer and dogs (*Canis* sp.) in low frequencies. At another Early Archaic site (SDI-9649), rabbits are clearly dominant (67.4%), with rodents (10.4%), and large mammals in low frequencies (3.1%). Deer (N=40, 3.1%), however, are more abundant at SDI-9649 than any other site discussed here. Small mammals, rabbits and rodents, are clearly the most common and diverse taxa at Early Archaic sites. Deer are the best represented large mammal species, and while contributing relatively low NISP counts, represent large amounts of meat and are considered important dietary contributions.

Table 4. Mammal Remains From Camp Pendleton Area Archaeological Sites (All Sites in San Diego County).

Time Period	EA	EA	EA	EA	LA	LA	LA	LP	LP	LP	LP	LP	LP	LP
Taxonomic Categories	19	21	37	16	16	25	13	12	10	18	1	8	13	5
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	14522	1074	4411	4538	5137	5138	5139
Black-Tailed Jackrabbit	*Lepus californicus*	191	6	79		14	86	1			1			
Hare	*Lepus sp.*		4	8	19									2
Brush Rabbit	*Sylvilagus bachmani*	14					2							
Desert Cottontail	*Sylvilagus auduboni*	7		69	19		36							
Cottontail	*Sylvilagus sp.*	598	88	130	48	85	171	5	3	6	47		10	16
Rabbits	Leporidae	246	23	46		4	34	1			1			
Western Grey Squirrel	*Sciurus griseus*		1	6			3				1			1
Tree Squirrel	*Sciurus sp.*				3									
California Ground Squirrel	*Spermophilus beecheyi*	13	3	32			6		4	2	8		1	2
Squirrel/Chipmunk	Sciuridae		5	5	7	3	1							
Merriam's Kangaroo Rat	*Dipodomys merriami*										1			
Kangaroo Rat	*Dipodomys sp.*	4		7	2									
California Pocket Mouse	*Chaetodipus californicus*			1										
Little Pocket Mouse	*Perognathus longimembris*		1											
Desert Pocket Mouse	*Perognathus penicillatus*													1
Pocket Mouse	*Perognathus sp.*		2	10	3	1					4			
Botta's Pocket Gopher	*Thomomys bottae*	76	93	498	58	29	26	13	13	11	38		7	6
Dusky-footed Wood Rat	*Neotoma fuscipes*				2									
Wood Rat	*Neotoma sp.*	4	4	13		5	6		1		1		1	
S. Grasshopper Mouse	*Onychomys torridus*			1										
Grasshopper Mouse	*Onychomys sp.*			1										
Pinon Mouse	*Peromyscus truei*													
Deer Mouse	*Peromyscus sp.*	1	2	5										
Western Harvest Mouse	*Reithrodontomys megalotis*	1		12										
California Vole	*Microtus californicus*	17	2	6				2	1	1	12			
Rodent, L.	Rodentia, L.			1										
Rodent, S.	Rodentia, S.			389									2	
Rodent	Rodentia	31	130	303		25	37	4	12	2	1			

Table 4 (con't). Mammal Remains From Camp Pendleton Area Archaeological Sites.

Time Period	EA	EA	EA	EA	LA	LA	LA	LP	LP	LP	LP	LP	LP	LP
Taxonomic Categories	19	21	37	16	16	25	13	12	10	18	1	8	13	5
Common Name	Scientific Name	9649	10726	10728a	6010	811	13325	14522	1074	4411	4538	5137	5138	5139
Grey Fox	*Urocyon cinereoargenteus*					1								
Coyote	*Canis latrans*			5				1						
Dog	*Canis sp.*	34	3	14	12	2	2				2			
Canid	Canidae			1										
Bobcat	*Lynx rufus*													1
Raccoon	*Procyon lotor*			1	1		1							
Striped Skunk	*Mephitis mephitis*													1
Long Tailed Weasel	*Mustela frenata*						1							
Badger	*Taxidea taxus*	2												
Sea Otter	*Enhydra lutris*			1		3	8							
Mustelids	Mustelidae													
Carnivore	Carnivora	3	1	6		1		1	1					
Dolphin	Delphinidae								1					
Southern Fur Seal	*Arctocephalus townsendi*			1		2	1							
California Sea Lion	*Zalophus californianus*						20							
Eared Seals	Otariidae			1										
Seals	Pinnipedia		2				24				1			
Pig	*Sus scrofa*									5			1	
Black-Tailed Deer	*Odocoileus hemionus*	40		13	1	2	36				2		1	6
Sheep	*Ovis aries*													
Cow	*Bos taurus*			1						5				
Artiodactyl	Artiodactyla	1	1	2			7							1
Mammal, Large			36	285	11	41	449	5	7	70	48	1	2	111
Mammal, Medium			74	129	46	19	47	3	3	10	58			6
Mammal, Small			1199	5144	1135	205	869	114	9	18	1489			12
Mammal		550	73	281		7	232	5	2		1			
Total		1833	1752	7507	1368	446	2107	156	57	130	1716	1	25	166

At SDI-13,325, a transitional Later Archaic site, small mammals remain important but large mammals become more common numerically (Hudson 1995a, 1995b, Wake 1996). Pinnipeds (seals and sea lions) are not present in the Early Archaic sites, with the exception of a lone otariid element from SDI-10,728. Marine mammals, both seals (Pinnipedia) and sea otters

(*Enhydra lutris*) appear in their highest numbers at SDI-13,325 (N=46, 10.6% of the identified mammal NISP). Seals and sea otters occur in low frequencies at other later Archaic sites (SDI-811 and SDI-14,522), but disappear entirely in the Late Prehistoric Period.

The Late Prehistoric sites are dominated by small mammal taxa, primarily rodents, followed by rabbits. Large mammal remains are present but rare, and include primarily deer (the pig and cattle remains listed in Table 4 clearly represent historic period additions to these assemblages) and one dolphin specimen at SDI-1047. Although the small sample sizes of these sites limit their interpretive utility in comparison to the other more extensively excavated sites in the region, the pattern of low frequencies and faunal diversity, remains consistent in the 14 Late Prehistoric Period samples available from Camp Pendleton.

Discussion

The distributions in the archaeofauna from Camp Pendleton suggests that Early and Later Archaic Period subsistence strategies differ substantially from those of later prehistory. This is not necessarily a surprise since the respective material cultures differ substantially as well (Byrd et al. 1995; Reddy 1996, 1998). As more sites are analyzed and added to the existing database this pattern becomes more evident and robust. It appears that along the San Diego County coast (southern and northern) in areas closely associated with coastal or estuarine environments, the vertebrate animal portion of subsistence systems (not including plants resources) focused on two primary habitat mosaics: estuaries and their contact zones with the ocean, and the surrounding terrestrial habitats (Erlandson and Colten 1991; Gallegos 1988, 1991).

The species frequencies evident in the Early Archaic Period sites (SDI-6010, SDI-9649, SDI-10,726, and SDI-10,728) correspond well with data and interpretations of other broadly contemporaneous sites in the broader San Diego County region. Several authors have suggested the exploitation of estuaries, as indicated by fish and waterfowl, and local terrestrial habitats, with an emphasis on locally available small mammals, especially rabbits during the Early Archaic Period in southern San Diego County (Gallegos 1988, 1991; McHenry 1995). Patterns observed in archaeofauna data at SDI-6010, SDI-9649, SDI-10,726 and SDI-10,728 are repeated in vertebrate faunal assemblages reported from SDI-5130, near Whelan Lake, SDI-48, and SDI-10,965 (Cairns and Altschul 1993; Gallegos 1991; McHenry 1995; Moratto et al. 1994; Vanderpot et al. 1993).

The majority of bird species present in the Camp Pendleton archaeofaunas represent waterfowl. The bulk of the waterfowl taxa identified in the 11 sites compared in Table 3 suggest the exploitation of estuarine environments, or locations with standing bodies of water large enough to support, and sustain waterfowl populations. This pattern appears consistent with what is reported from Archaic Period sites in central and southern San Diego County (Cairns and Altschul 1993; Gallegos 1991; McHenry 1995; Moratto et al. 1994; Vanderpot et al.

1993). The availability and exploitation of estuarine habitats suggested by the Archaic Period bird assemblages is further supported by the presence of calm water and estuary associated fish taxa such as flat bodies elasmobranchs and flatfishes.

The Late Prehistoric vertebrate subsistence strategy does not appear similar to that of the Early Archaic period. The high frequencies of aquatic bird taxa observed in the Archaic Period are absent at the Late Prehistoric sites. The flat bodied fish taxa present in the Archaic Period disappear and fish diversity and frequency in general is greatly reduced in the Late Prehistoric Period. Terrestrial bird taxa, while somewhat rare, are still present.

The pattern of mammal representation during the Early Archaic and Late Prehistoric Period sites reflects the exploitation of local terrestrial environments, probably close to estuary systems when they were present, and in riparian, woodland and chaparral environments. Many sites on Camp Pendleton throughout prehistory are dominated numerically by small mammals, especially leporids (rabbits), and rodents. Small mammals can be captured by less risky means than large mammals. These less risky means include the use of snares, throwing sticks, and drives (Hudson and Blackburn 1979). Small mammal exploitation certainly does not necessitate refined technologies such as bows and arrows or even spears. Large terrestrial mammals, often considered the most highly ranked resources from an optimal foraging perspective (Broughton 1994a 1994b, 1999; Simons 1992), are present, but generally not very common.

A noteworthy exception to this general pattern is observed at SDI-13,325 (Later Archaic Period), where marine mammals are strongly represented. The peak in marine mammal exploitation combined with a peak in deeper water fishes (scombrids) at SDI-13,325 suggests a somewhat anomalous maritime focus more commonly seen in Orange County and Los Angeles County coastal sites. This pattern does not continue into later prehistory either.

Summary

Based on the data presented here, subsistence strategies show some interesting changes over time, from Early Archaic through the Late Prehistoric periods. The most noteworthy of these are the disappearance of calmer water, soft-bottom associated fish species (most of the elasmobranchs and the flatfishes) and an overall decrease in fish diversity at the end of the Archaic Period; a radical decrease in representation and diversity of waterfowl at the close of the Archaic Period; an increase in marine mammal representation seen at SDI-13,325 and SDI-14,522 which does not appear in the Late Prehistoric Period; and a general decrease in overall mammalian taxonomic diversity and a concomitant decrease in the presence and apparent importance of large terrestrial mammals.

Sites representing the Archaic Period are generally larger, with higher taxonomic diversity and greater overall densities of vertebrate faunal remains, and also appear to represent relatively

long-term habitations. The Late Prehistoric sites exhibit low relative densities of vertebrate remains and are dominated by small mammals. Most of these sites were probably occupied sporadically or for short periods of time. They appear to range from special purpose short term occupations, to longer term, possibly more permanent seasonal camps.

Overall, the patterns of taxonomic diversity and representation of certain species or groups of species suggest two very different vertebrate resource subsistence strategies in the Early and Later Archaic Periods compared to the Late Prehistoric Period. Archaic sites on Camp Pendleton area appear to have had an estuarine emphasis or at least had estuarine environments available for exploitation to some degree. The Late Prehistoric sites show a narrowed diet breadth with overall lower species diversity and bone density, and few, if any estuarine associated taxa. This trend is best illustrated at SDI-10,728. SDI-10,728, Locus A, dated to the Early Archaic Period, fits the Early Archaic Period pattern perfectly, with estuarine fish and bird taxa well represented; while Locus B, a spatially distinct Late Prehistoric occupation, bears none of the hallmarks of Early Archaic Period subsistence practices, and follows a pattern of a generally depauperate beach and brush Late Prehistoric Period species representation.

Conclusions

By 1000 B.P. the subsistence strategy along the northern San Diego County coast had changed radically. Possible explanations for such a change include climatic or topographic shifts that eliminated productive estuarine habitats or drought, which could limit availability of resources dependent on large or at least consistently available sources of fresh water. Both of these possibilities would necessitate a change in dietary focus and resource extraction techniques if local populations were to thrive. An influx of new peoples with different lifeways might represent another plausible explanation for the changes in dietary focus seen in Later Prehistory. The integration of more faunal analysis with analyses of other artifact classes and radiocarbon dates will yield much stronger conclusions and provide for interesting future study.

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