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Ancient Lakeside Culture in the Northern Great Basin: Malheur Lake, Oregon

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THE Malheur National Wildlife Refuge Headquarters (HQ) site (35HA403; Fig. 1), on the southern edge of Malheur Lake just east of the mouth of Blitzen River, was a major locus of prehistoric human occupation. It was listed on the National Register of Historic Places in 1979 because it exemplifies the lifeway and culture of a significant period of North American prehistory.

The HQ site is the most extensively investigated of several currently known focal points of aboriginal life around Malheur Lake. A wide-ranging archaeological reconnaissance of the Refuge in 1973 and 1974 resulted in the identification of 166 sites of ancient human activity around Malheur and Harney lakes and south along the Blitzen River (Newman et al. 1974). Widely scattered and often abundant surface traces suggest that most such spots were visited many times over the years for brief periods, probably for some specific purpose. Deep, rich accumulations of artifacts, bones, and other cultural remains that bespeak long-term occupation of a specific place are much less common. The HQ site is one such accumulation; others so far known include the Squaw Pit site (35HA1038) on the north shore of Malheur Lake, and the Blitzen Marsh (35HA9) and Diamond Marsh (35HA1263) sites in the riparian area south of the lake (Fagan 1973, 1974; Goddard 1974; Aikens 1983a; Toepel et al. 1985). The geographical placement of these four sites (and other evidence) suggests that each was a center for local exploitation of plant and animal resources (Fig. 1). This paper compares data obtained during 1985 research at the HQ site to the results of earlier work there and at the other three sites to define a prehistoric Malheur lakeshore culture and place it in the broader context of the prehistory of the Desert West.

ARCHAEOLOGICAL INVESTIGATIONS AT THE MALHEUR HQ SITE

The HQ site has been known to Fish and Wildlife Service personnel since the 1930s. The Malheur National Wildlife Refuge Headquarters complex is built on the prehistoric site, and excavations for construction and other purposes have repeatedly exposed evidence of human occupation. In 1978, 1983, 1984, and 1985, monitoring and limited test excavations were carried out along with work on a water system serving the refuge headquarters. During the summer of 1985, a program of mapping and constant-volume sampling of trench profiles accompanied the laying of waterlines to a new drainfield (Aikens and Greenspan 1986). The data collected at that time are central to the present synthesis.

Forty-eight profiles of the trench wall, spaced at intervals of 10 m. or less, were mapped. These show that for some 350 m. across the central portion of the site there exists a single massive bed of silt that contains stone artifacts and bones of fish, small mammals, and birds. This bed was seen to be 70 cm. thick in the one profile of a portion of the trench that struck basal clays. All profiles showed that the deposit lacks visible stratification, beyond the fact that it

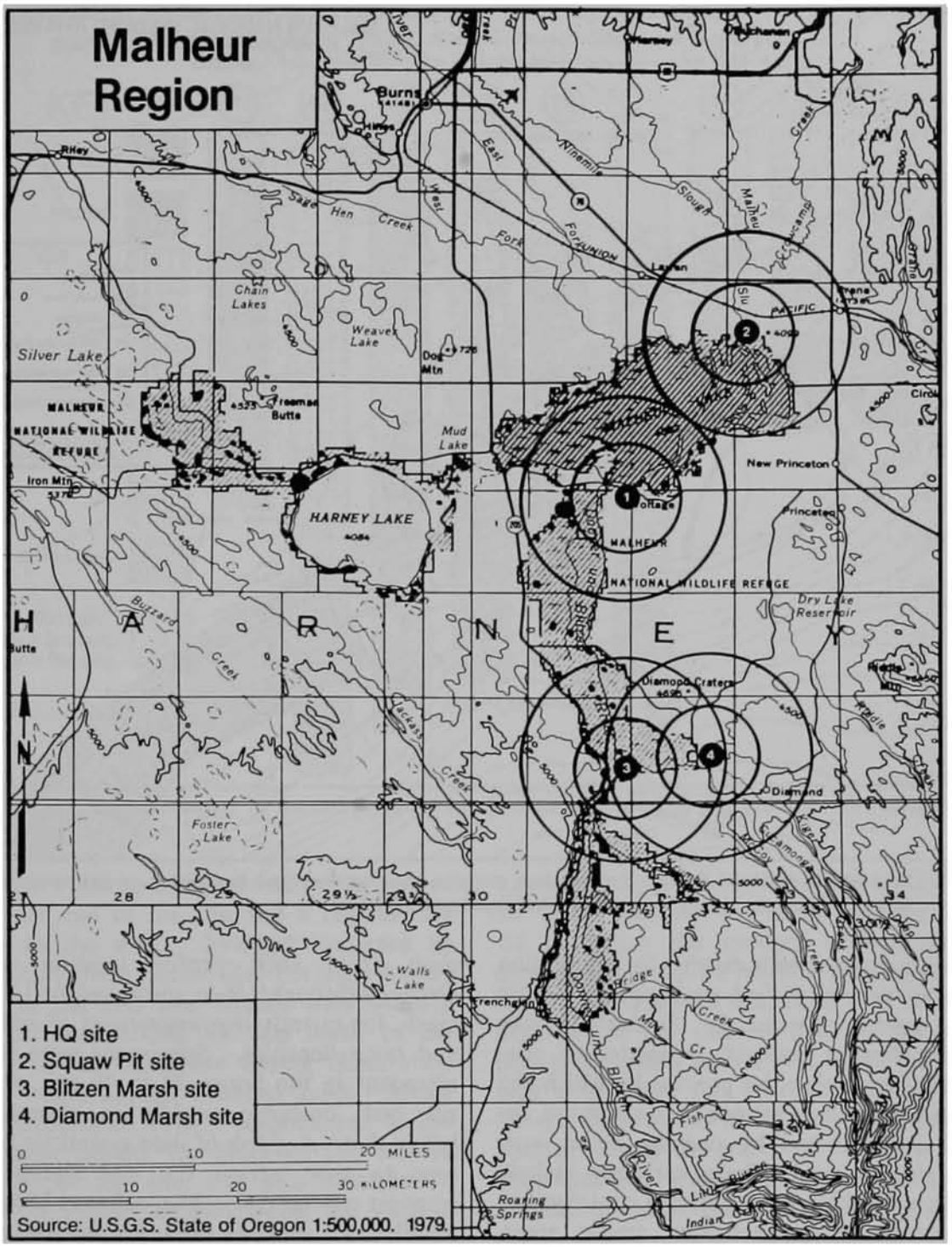

Fig. 1. Prehistoric sites around Malheur Lake, Southeast Oregon. Circles at 3-mile and 6-mile radii around these sites show potential short-range foraging areas. Other sites indicated are known only from surface survey (Newman et al. 1974).

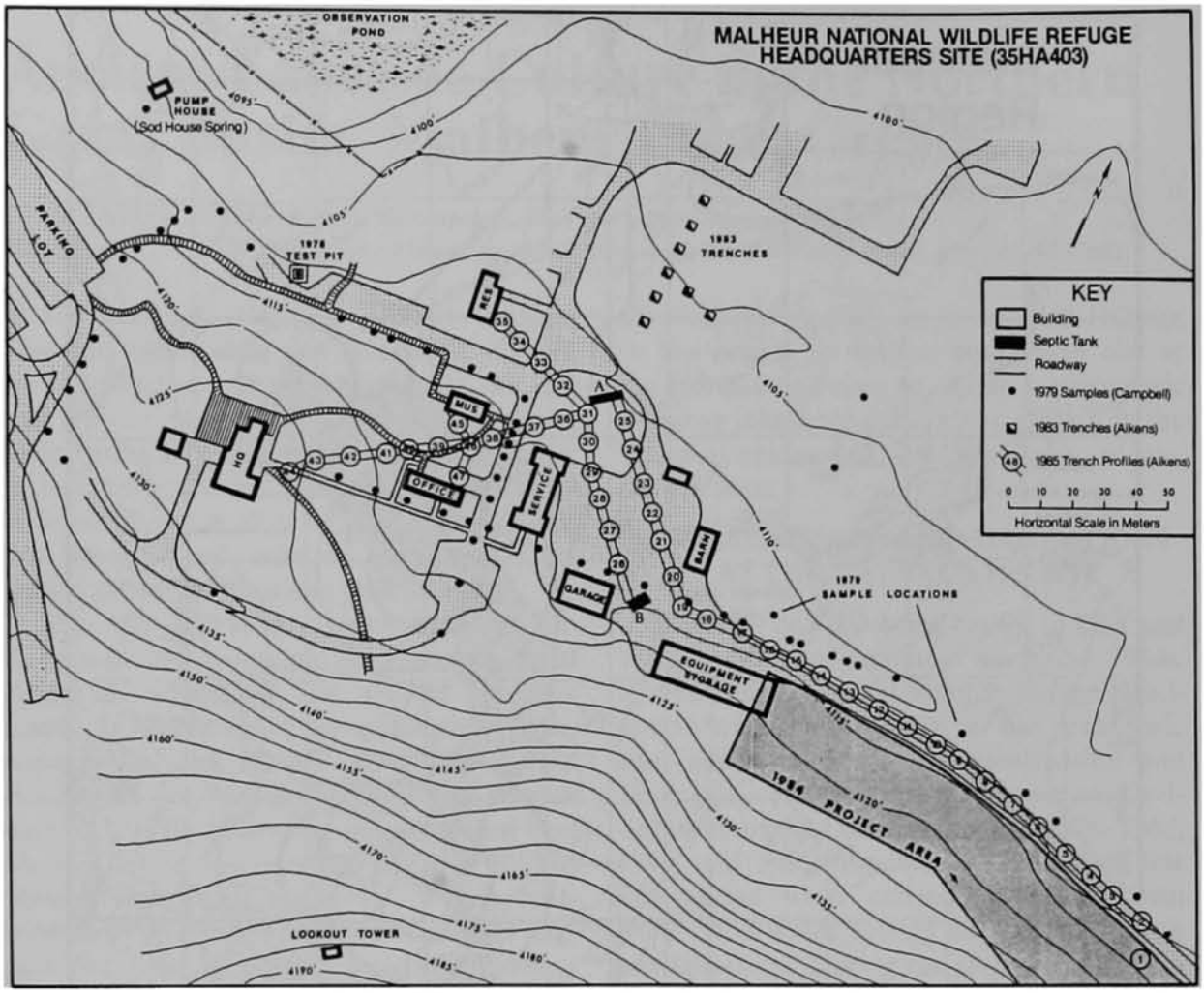

Fig. 2. Map of the Malheur Refuge Headquarters complex, showing tests and exploratory probes excavated at various times in the HQ site (after Minor and Greenspan 1985:16a).

becomes coarser with depth. No occupation surfaces were identified, perhaps because the silts were reworked by fluctuating lake waters; further research is needed to adequately determine the process by which the cultural layer was formed. The cultural deposit is blanketed by one or more post-aboriginal layers. These variously include sandstone rubble from building construction, cinders placed in vehicular traffic areas, whitish clay, and brownish earth used as a base for planting lawn grass (Figs. 2, 3).

Constant-volume samples of cultural deposit from each profile location were screened through 1/4-in. mesh and/or 1/8-in. mesh, for quantitative assessment of artifact and bone densities. Specimens were most abundant in the upper 20 to 40 cm. of the silt bed, declining rapidly in abundance below that. A graph of item quantities from east to west across the site shows the heaviest concentration of specimens between profiles 19 and 44--that is, in the area between the service building and the headquarters building (Figs. 2, 4).

Most striking in Figure 4 is the division

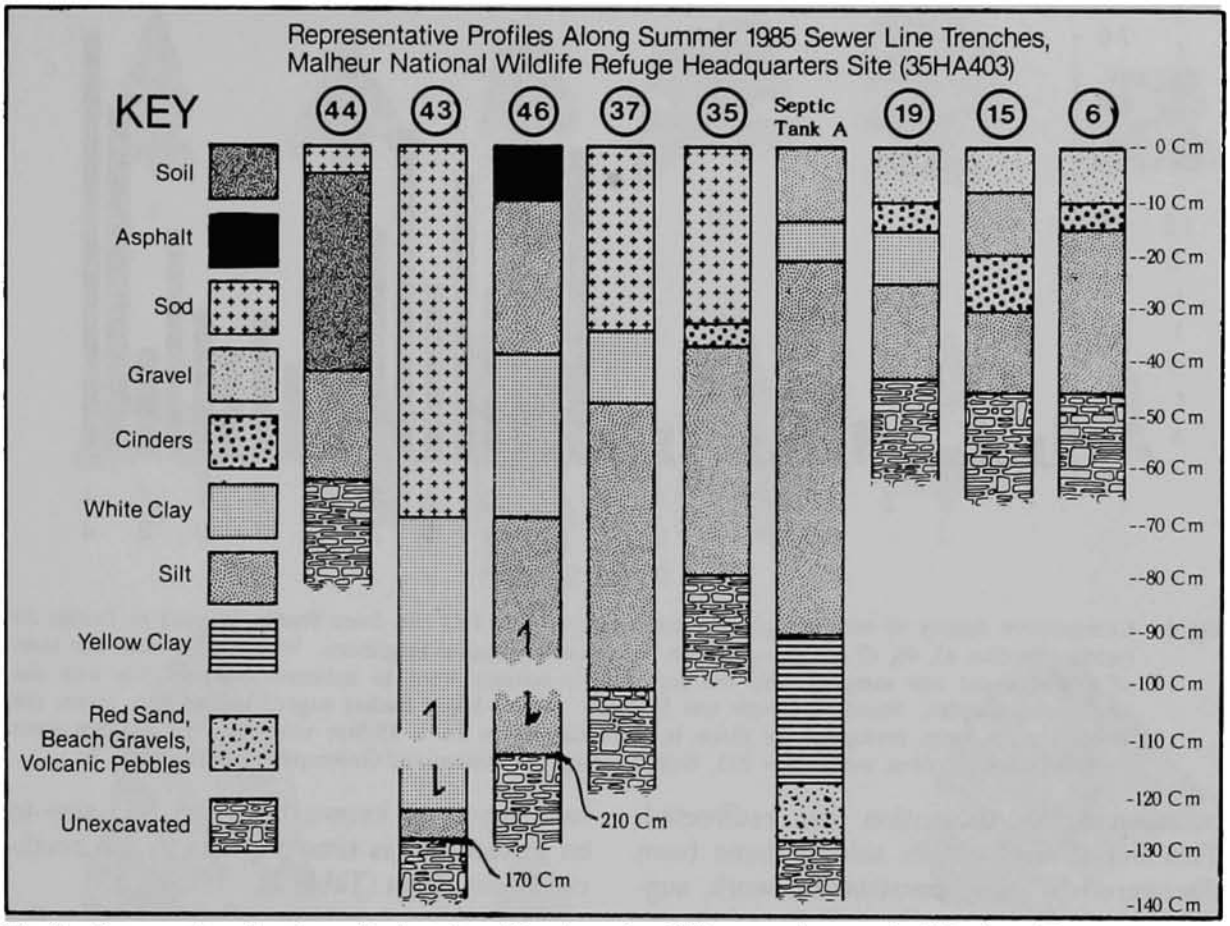

Fig. 3. Cross-section drawings of selected profiles from the 1985 excavations at the HQ site. For profile locations, see Figure 2.

between a low specimen-density zone toward the east end of the site and a high-density zone to the west. Evidence reported by Campbell (MS) shows that the high-density area of the HQ site extends west beneath the current parking lot and north to the shore of the Sodhouse Spring observation pond which adjoins Malheur Lake. Minor and Greenspan (1985) documented a low specimen density for much of the eastern portion of the site, but also identified a zone of higher density along the eastern periphery.

No cultural features such as pits, hearths, or occupation floors were recognized in the limited 1985 exposures, but a human burial was partly exposed between profiles 37 and 38. The discovery was made at a depth of 1.2 m. below the modern surface during hand-digging under a modern rock wall. The remains of a femur, mandible, and cranium observed *in situ* showed that the deceased person had been placed in a flexed position, face down, with the head toward the east. Several large stones and a number of smaller ones protected the grave. No artifacts were observed, but specimens could have gone undetected in the limited exposure. Excavation was immediately halted and the burial was left in its original position and covered with earth. Appropriate authorities were notified, and the construction work that

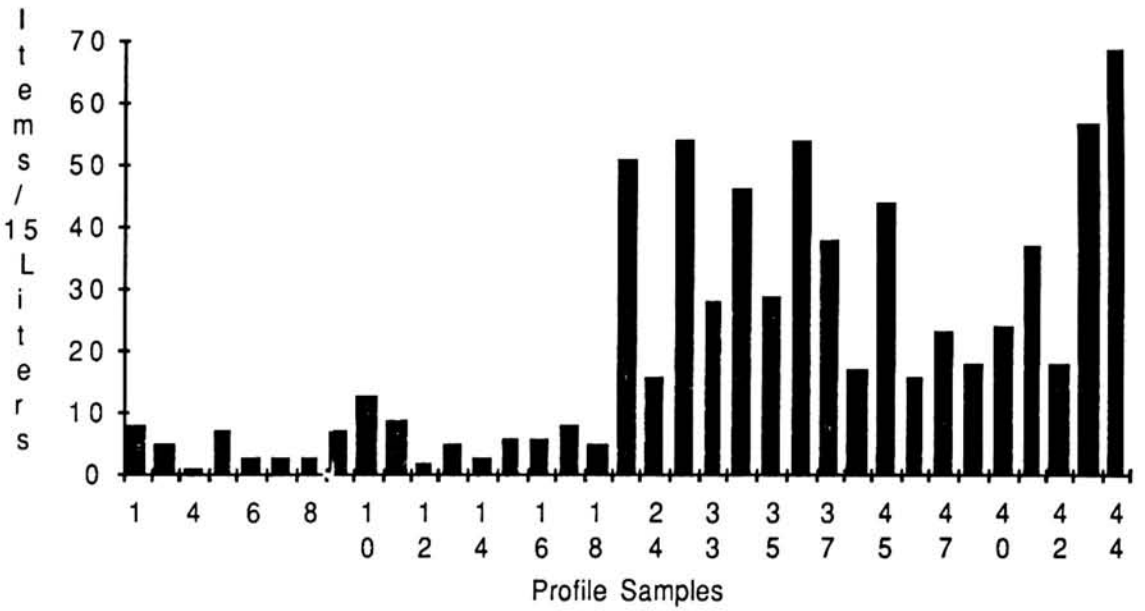

Fig. 4. Comparative density of archaeological specimens across the HQ site from Profile 1 (east) to Profile 44 (west). Profiles 45, 46, 47 are grouped with their nearest physical neighbors. Where more than one level of a profile cut was sampled, only the top level is counted here, to maintain comparability with the single-level samples. Standard sample was 15 liters. Where 5-liter bucket auger samples were taken, the actual figures were multiplied by three to normalize them to a 15-liter volume. All samples were screened through 1/4-in. mesh. N = 733. Selected data from Aikens and Greenspan (1986:Tables 8, 9).

occasioned the excavation was redirected. This burial, and others said to have been discovered by early construction work, suggest relatively intense human usage of the site (Campbell MS).

Artifacts

Artifacts collected during 1985 totalled 1,360 specimens; 30 are formed tools of flaked or ground stone, and 1,330 are unworked flakes and debitage. Table 1 lists these specimens along with others reported from previous work at the site. Because all the formed specimens are individually illustrated (Figs. 5-7), they are presented without further descriptive comment.

Both arrowpoints and dart points (Fig. 5) sorted easily into established Great Basin types (Heizer and Hester 1978). A recent study by Wilde (1985:100-164) showed the Desert Side-notched, Rosegate, Elko, Northern Side-notched, and Humboldt Concave-base types--all known from the HQ site--to be serviceable as time-markers in the northern Great Basin (Table 2).

In studying previous collections from the HQ site, Campbell (MS) and Minor and Greenspan (1985) gave considerable attention to the lithic raw materials (chert, obsidian, and basalt). Campbell (MS:Table 9) documented significant differences (by Chi-square) in the proportions of shaped specimens, modified specimens, and debitage, that were made from black obsidian, grey obsidian, basalt, and chert. She suggested that shaped chert specimens were made on the site itself, while objects of the other materials apparently were brought there in finished form. Minor and Greenspan (1985) confirmed the use of different kinds of stone for various tools, and suggested that the observed variation in frequencies of different raw materials at the site probably reflects differing distances from local and regional

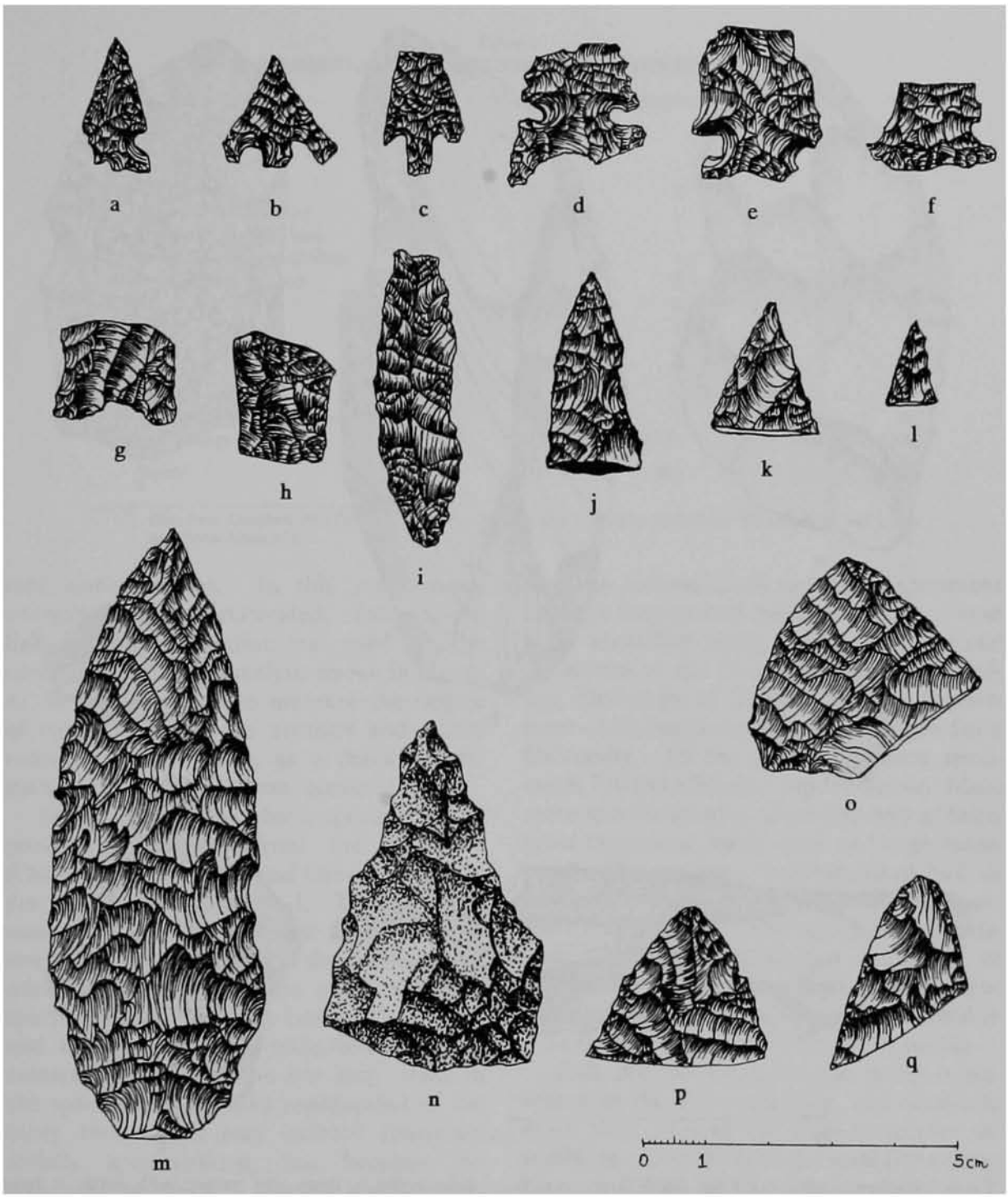

Fig. 5. Projectile points and bifaces from the HQ site. a, Desert Side-notched; b, Rosegate (basally notched); c, Rosegate (straight stem); d, e, Northern Side-notched; f, Broad-necked side-notched; g, Humboldt Concave-base fragment; h, Humboldt-like lanceolate base fragment; i, resharpened Humboldt (?); j, k, l, tip fragments; m, large foliate; n, resharpened large lanceolate; o, basal fragment of large foliate; p, q, tip fragments. Actual size. Provenience data in Aikens and Greenspan (1986:Tables 5, 7).

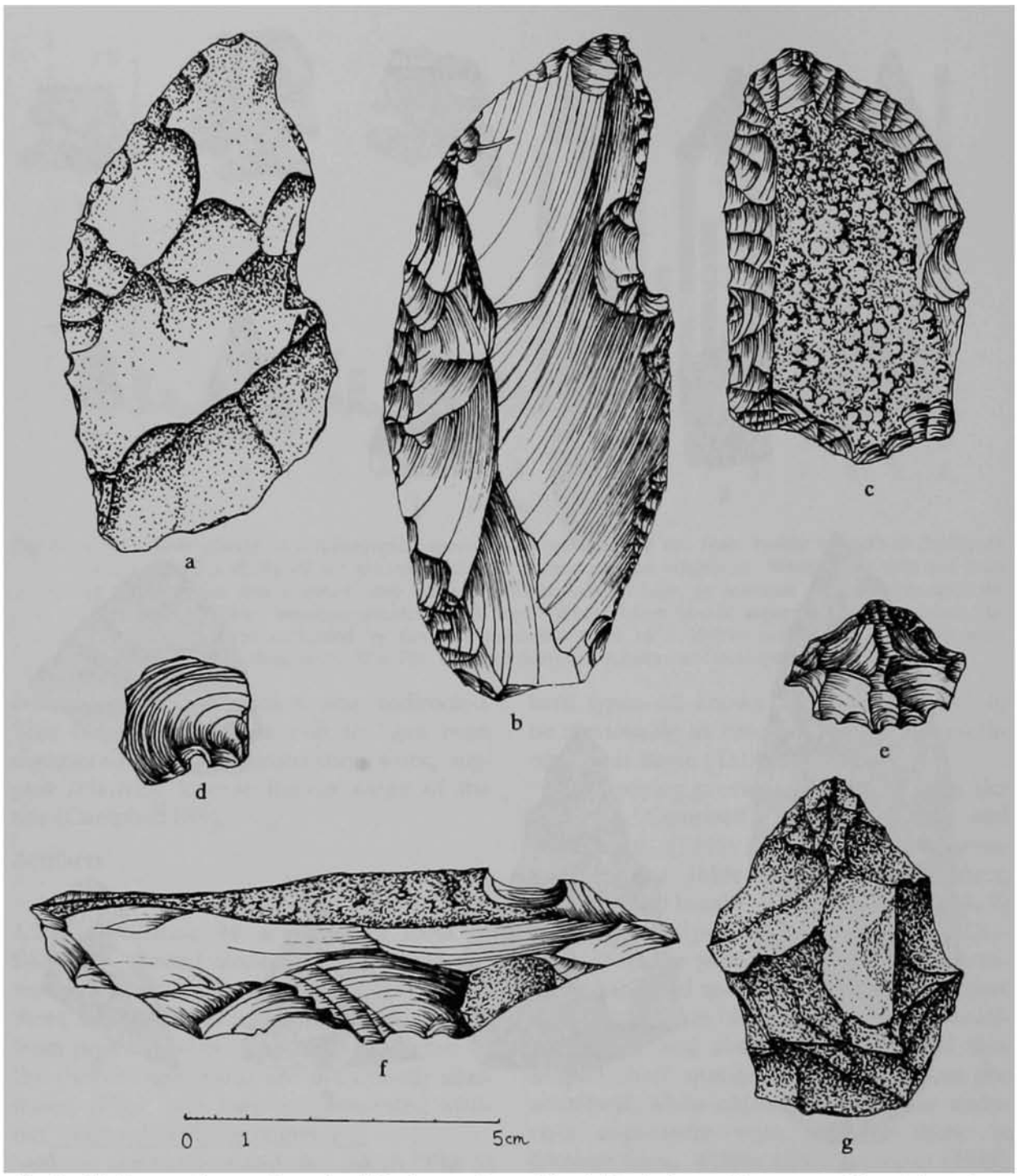

Fig. 6. Unifaces and cores from the HQ site. a, large flake knife; b, large side scraper with notch; c, large end/side scraper; d, notched flake; e, exhausted core; f, elongate core; g, blocky core. Provenience data in Aikens and Greenspan (1986:Tables 5, 7).

Table 1
MAJOR CLASSES OF ARTIFACTS FROM THE HQ SITE[a]

Major Class	Campbell	Minor and Greenspan	1985	Total
Projectile points				
Desert Side-notched	2	-	1	3
Rosegate	11	-	2	13
Elko series	4	2	1	7
Northern Side-notched	1	-	2	3
Humboldt Concave-base	3	-	3	6
Stemmed/lanceolate/foliate	5	-	-	5
Cutters, piercers, scrapers	11	8	9	28
Cores	34	2	3	39
Metates	4	1	1	6
Manos	8	2	2	12
Mortars	2	-	1	3
Pestles	-	-	2	2
Unclassifiable fragments, miscellaneous	35	7	3	45
Flakes/debitage	3,121	1,728	1,330	6,179
Totals	3,241	1,750	1,360	6,351

[a] Data from Campbell (MS:Tables 8, 10, and 11); Minor and Greenspan (1985:Table VII-1); Aikens and Greenspan (1986:Tables 5-7).

tool stone sources. In this study, these analyses were not reiterated. Instead, the flake/debitage collection was used for the occupational density analysis shown in Figure 4. It also was used to measure the degree of correlation between artifacts and faunal remains from the site, as a check on the cultural derivation of those remains (Fig. 8).

In addition to the above specimens, two previous collections from the HQ site (Campbell MS; Minor and Greenspan 1985) are summarized in Table 1. The collection made by Campbell and that from the 1985 work were both obtained in the same general part of the site, and the same range of specimens is attested in both. The Minor and Greenspan (1985) collection from the eastern periphery of the site lacks some of the specimen categories represented in the other two. This may indicate functional activity specialization, but because the collection is small, it merely could reflect sampling error.

Faunal Remains

Faunal remains collected during the 1985 research include 2,116 vertebrate specimens and one fragment of freshwater shell. These were identified using comparative skeletal collections at the Condon Museum of Geology, University of Oregon, and the Department of Fisheries and Wildlife, Oregon State University. Of the 2,116 vertebrate specimens, 716 (33.8%) were unidentifiable. Many more specimens were identified only at fairly gross taxonomic levels, such as "large mammal." The category "medium-sized bird or mammal" consists of non-diagnostic longbone shaft fragments of a size and texture consistent with either hare-sized mammals or duck-sized birds. Complete identification data, by provenience unit, were presented in Aikens and Greenspan (1986:48-54, 63-72).

Fish are the largest single group represented in the 1985 collection, and constitute more than 40% of the total vertebrate assemblage. Over 40% of the total fish assemblage and 69% of the fish identified to at least the generic level are positively identified as *Gila bicolor*, the tui chub; 7.1% of the total fish and 12.3% of the identified fish are positively identified as *Catostomus*

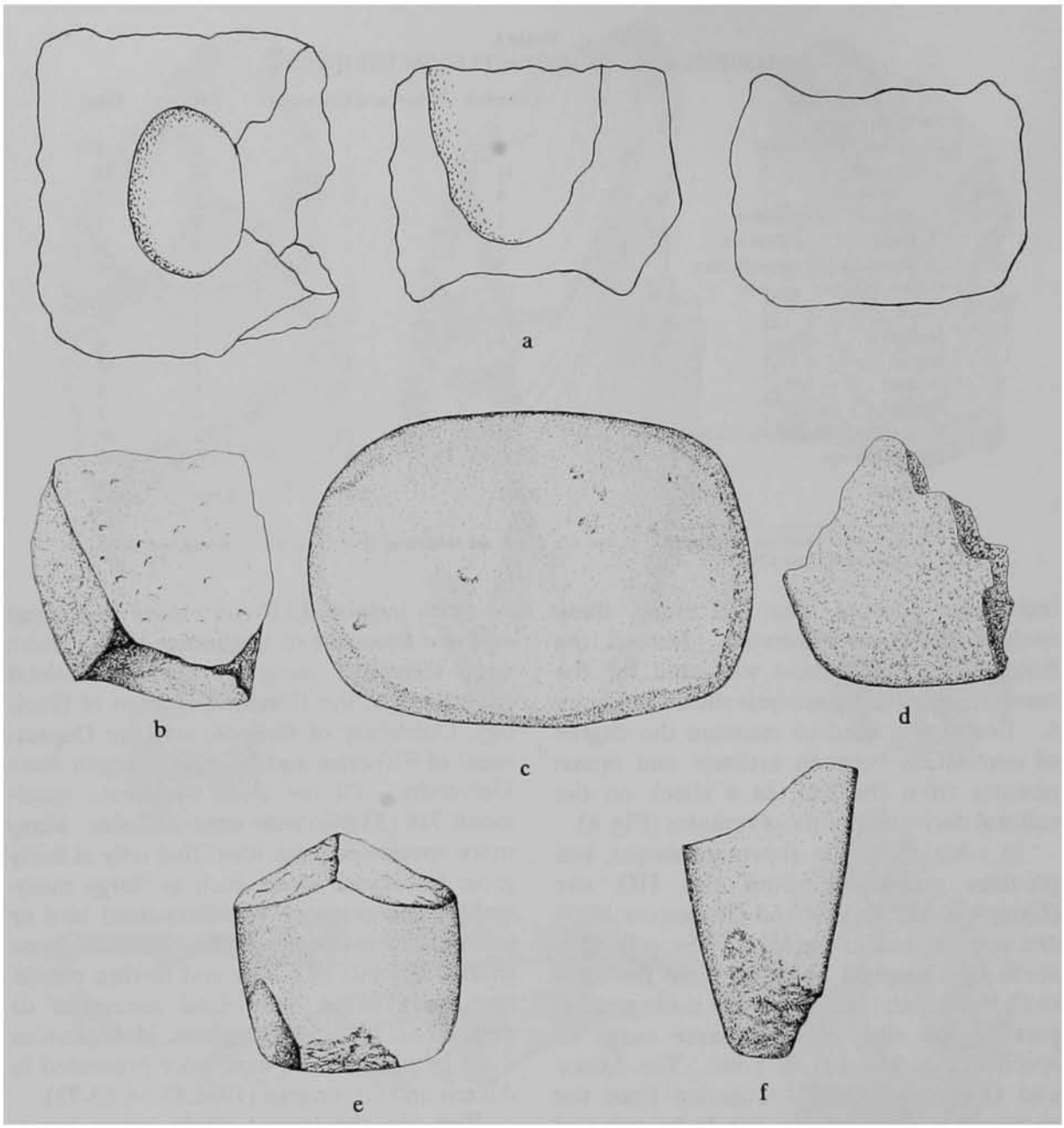

Fig. 7. Ground stone artifacts from the HQ site. a, bowl mortar with hopper mortar on base: left to right, top, cross section, and hopper surface turned upright; b, metate fragment; c, mano; d, mano fragment; e, f, pestle fragments. a, 17% actual size; b-f, 25% actual size. Provenience data in Aikens and Greenspan (1986:Table 6).

sp., or sucker. A few specimens of *Ptychocheilus oregonensis* (northern squawfish) are also represented (Fig. 9). When fish identified from earlier projects are included, the proportion of *Catostomus* is augmented somewhat (Table 3).

Ondatra zibethicus (muskrat) constitutes more than 55% of the identified mammals re-

Table 2
RADIOCARBON CHRONOLOGY OF PROJECTILE POINT FORMS FROM THE HQ SITE (DATA FROM VARIOUS GREAT BASIN SITES)[a]

Years B. P.	Desert Side-notched	Rosegate	Elko	Humboldt Concave-base	Northern Side-notched
200-400	+ + + + +	+ + +			
400-600	+ + +				
600-800	+				
800-1,000	+	+ + + + + +	+ +		
1,000-1,200		+ +			
1,200-1,400		+ + + +			
1,400-1,600	+ +	+ +	+		
1,600-1,800			+ + +		
1,800-2,000			+ +		
2,000-2,200			+ + + +	+ +	
2,200-2,400		+	+ + +		
2,400-2,600					
2,600-2,800		+	+ +		
2,800-3,000			+ + + +	+	
3,000-3,200			+ + +	+	
3,200-3,400			+ + +	+	
3,400-3,600					
3,600-3,800			+		
3,800-4,000			+	+	
4,000-4,200				+	
4,200-4,400			+	+ +	
4,400-4,600					
4,600-4,800				+ +	
4,800-5,000				+	
5,000-5,200				+	
5,200-5,400				+ +	+
5,400-5,600				+	
5,600-5,800					
5,800-6,000					
6,000-6,200			+		+
6,200-6,400			+ +		+ + +
6,400-6,600					
6,600-6,800					
6,800-7,000			+	+	+ +
7,000-7,200			+		+
7,200-7,400					
7,400-7,600				+	

[a] Data from Wilde (1985:Table 22, Fig. 14).

covered during the 1985 project. *Lepus* sp. (hares) is the next most common taxon, comprising over 30% of the identified mammals. Specimens of *Sylvilagus* sp. (rabbits), *Thomomys* sp. (pocket gophers), *Spermophilus* sp. (ground squirrels), *Microtus* sp. (voles), *Perognathus* sp. (pocket mice), *Canis* sp. (dogs, coyotes, wolves), *Equus* sp. (horses), and *Bos taurus* (cattle) were present in small numbers. The horse, cow, and possibly dog are considered recent intrusions into the site (Fig. 10, Table 4).

Table 5 compares the faunal assemblage with those reported by Campbell (MS) and Minor and Greenspan (1985). Shellfish and birds, poorly represented in all, seem to vary

Table 3
IDENTIFIED FISH ELEMENTS FROM THE HQ SITE[a]

Taxon	1985	1984	1978	Totals
Gila bicolor	343	22	11	376
Cyprinidae, cf. *G. bicolor*	86	0	0	86
Ptychocheilus oregonensis	3	0	1	4
Cyprinidae, cf. *P. oregonensis*	4	1	1	6
Catostomus sp.	61	2	26	89
Cyprinidae	0	13	13	26
Cyprinidae/Catostomidae	0	5	0	5
Other	0	5	22	27
Totals	497	48	74	619

[a] Data from Aikens and Greenspan (1986:Table 12) and Greenspan (1985:Tables 31, 32).

Table 4
IDENTIFIED MAMMALS FROM THE 1985 WORK AT THE HQ SITE

Taxon	Number of Specimens
Lepus sp.	46
Sylvilagus sp.	4
Ondatra zibethicus	85
Thomomys townsendii	1
Thomomys sp.	1
Spermophilus sp.	5
Microtus sp.	1
Perognathus sp.	2
Canis sp.	3
Equus sp.	2
Bos taurus	3
Total	153

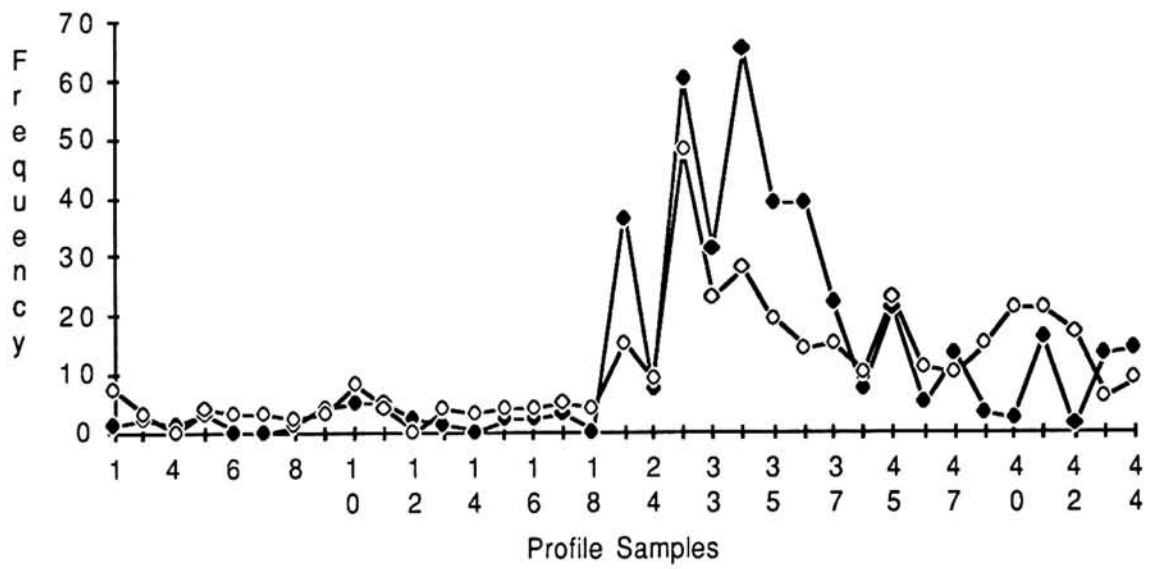

Fig. 8. Correlation of animal bones and lithic artifacts from profiles 1-47 at the HQ site. Open symbols indicate flakes; closed symbols, bones. The high correlation between bones and indisputable artifacts shows that bones occur in the site due to human activity and not merely to fortuitous natural deposition. N = 3,303. Correlation coefficient = 0.798. Data from Aikens and Greenspan (1986:Tables 8, 9).

Table 5
SUMMARY OF IDENTIFIABLE FAUNA FROM THE HQ SITE[a]

Taxonomic Class	Campbell MS	Minor and Greenspan 1985	Aikens and Greenspan 1986
Mammals	48.0%	80.8%	20.4%
Birds	6.5%	3.8%	1.9%
Fish	45.4%	13.9%	77.2%
Shell	0.1%	1.5%	<0.1%

[a] See Aikens and Greenspan (1986:Table 13) for a tabulation that includes unidentified specimens.

little, but the proportions of mammals and fish vary considerably between collections. In the Campbell collection, fish and mammals are more or less equally represented. Mammals are strongly dominant in the Minor and Greenspan collection, but fish are strongly dominant in our collection. The disparity between the Campbell collection and that obtained by us, both from the same general area of the site, is probably due to differ-

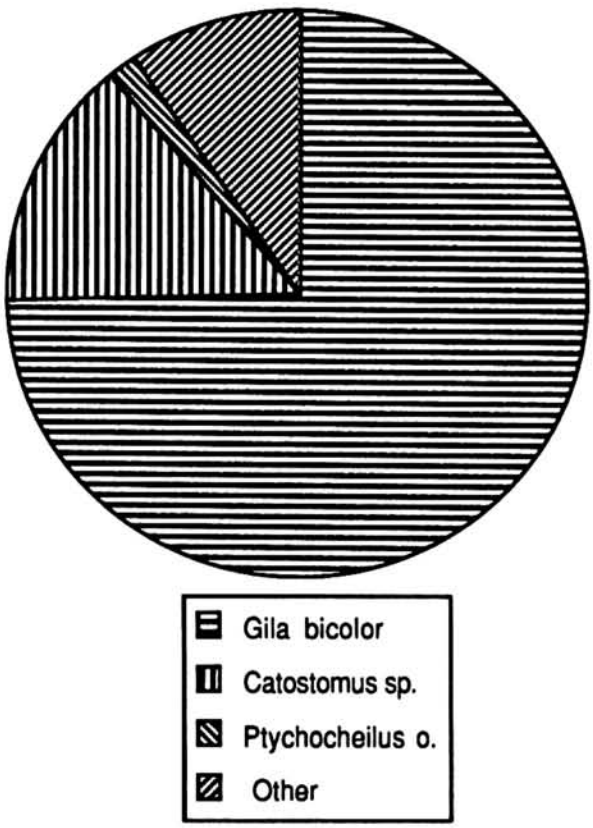

Fig. 9. Relative proportions of identified fish from all work at the HQ site. Data from Table 3. Those specimens referable to a given species in Table 3 are grouped with that species in this figure. N = 619.

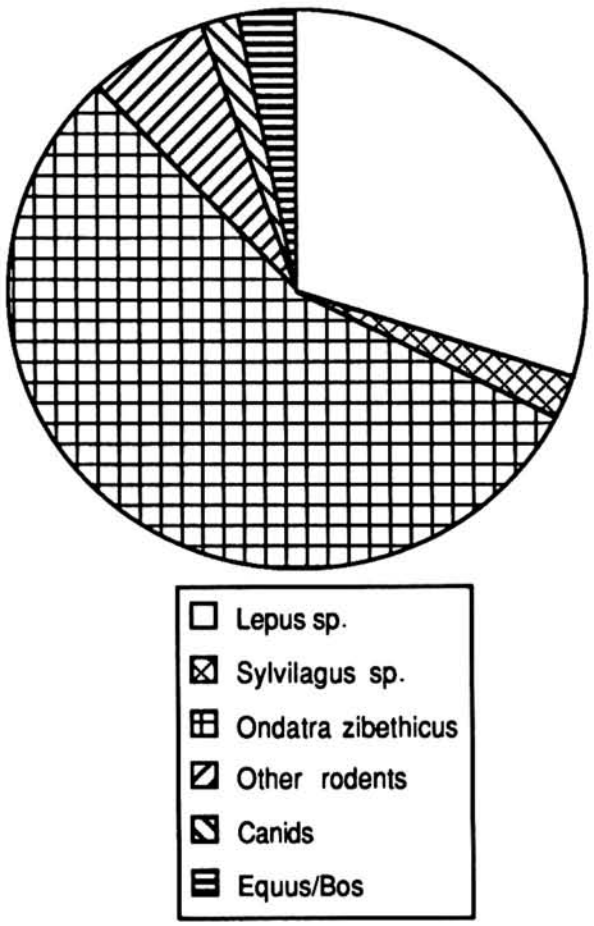

Fig. 10. Major classes of mammals from 1985 work at the HQ site. Data from Table 4. N = 153.

ences in field methods and analysis. Campbell used 1/4-in. mesh screen exclusively, whereas in 1985 both 1/4-in. and 1/8-in. mesh were used. Further, Campbell's materials have not been studied in detail. The numbers reported here are based on a preliminary analysis of a sample of the recovered specimens. The same factors do not, however, affect the comparison between the Minor and Greenspan collection and our collections. Minor and Greenspan used 1/8-in. mesh screens only--which particularly enhance recovery of small fish bones--and thus the relative scarcity of fish from the eastern part of the site, which they sampled, undoubtedly is genuine. It may reflect the greater distance of that locus from the lakeshore and from Sodhouse Spring.

A Note on Recovery

During the 1985 work, 1/4-in. mesh screens were routinely employed. In addition, 1/8-in. mesh screens were used to take a series of matched samples from the deposits where sampling control was best. Figure 11 and Table 6 compare the yields of paired constant-volume samples from 1/4-in. and 1/8-in. mesh screens. The use of 1/8-in. mesh screen multiplied fish bone recovery by a factor of 10. Small and medium-sized bird/mammal bone recovery was multiplied by a factor of 6. Clearly, numerical yield

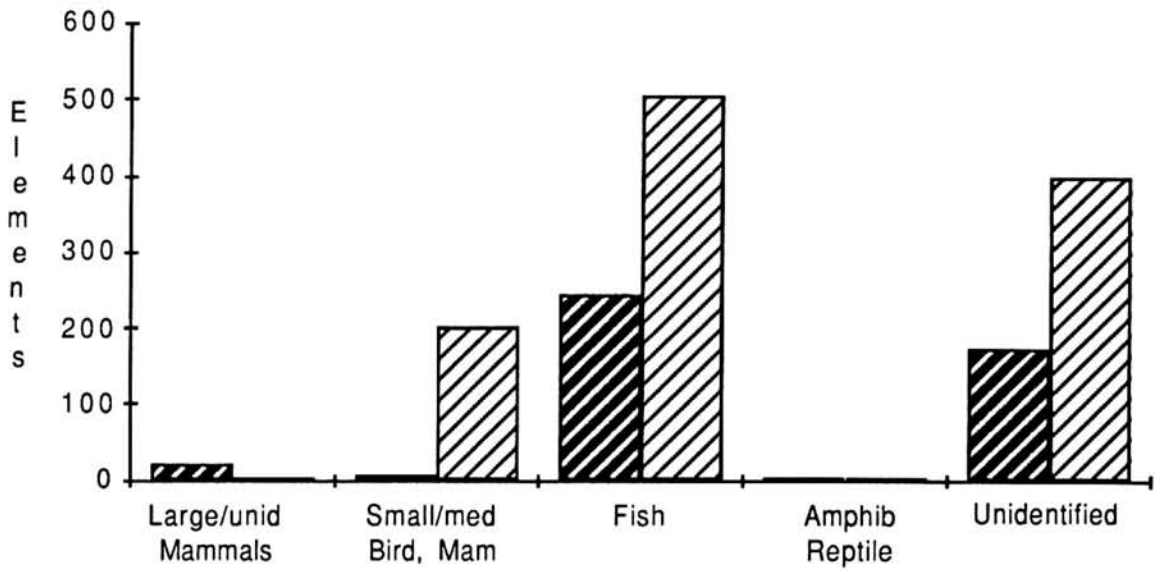

Fig. 11. Recovery rates at HQ site (1985) of faunal remains using 1/4-in. (dark bars) and 1/8-in. (light bars) screens. Data from Table 6. N = 1,553.

Table 6
FAUNAL REMAINS FROM PAIRED SAMPLES SCREENED THROUGH 1/4-IN. AND 1/8-IN. MESH SCREENS DURING SUMMER 1985 WORK AT THE HQ SITE

Taxonomic Category	Quantities Recovered from 1/4-in. Mesh		Quantities Recovered from 1/8-in. Mesh	
	Frequency	Density	Frequency	Density
Large and unidentified mammals	21	.03/liter	0	
Small/medium birds, mammals	6	.24/liter	202	1.50/liter
Fish	242	.38/liter	506	3.75/liter
Amphibians, reptiles	1	<.01/liter	3	<.01/liter
Unidentifiable	173	.27/liter	399	2.96/liter

(and, thereby, representativeness) is dramatically improved by the use of finer-mesh screen for faunal recovery.

A Note on Taphonomy

It has become increasingly clear that the animal bones found in archaeological sites cannot simply be assumed to reflect hunting/fishing activities by humans. Natural deaths, predator kills, collecting activities by rodents, and other factors may also bring bones to human occupation sites (Grayson 1984). Open areas like the HQ site are less subject to suspicion than are caves, for example, but even in the open, natural factors such as wave action along a lake shoreline could concentrate bones in a misleading way.

One test of whether human artifacts and animal bones found together in an archaeological context are both attributable to human activity is the degree of correlation between them. Figure 8 shows the correspondence between bones and lithic artifacts obtained from 47 profile samples distributed across a transect of the HQ site more than 350 m. long. A correlation coefficient of nearly 0.80 gives some confidence that the bones from the site were indeed derived from the same human activity that resulted in deposition of the stone artifacts.

Synthesis

The Malheur HQ site attracted human visitors because of its favorable geographic setting, adjacent to the high-volume Sodhouse Spring at a point where the Blitzen River enters Malheur Lake. This placement gave its occupants immediate access to riverine, marshland, and upland resource zones. The site was almost certainly a focal point of native American cultural activity throughout its period of occupation. The faunal assemblage shows that fish, small mammals, and birds--in that order--were the most important animals collected by people there. The tui chub and muskrat were most intensively exploited. Surprising as it may seem, wildfowl--so abundant on the Malheur Refuge today--apparently were not much hunted at this location (though they were elsewhere in the region, as at Blitzen Marsh). Numerous flaked stone arrowpoints and cutting and scraping tools reflect hunting and processing activities. Nothing identifiable specifically as fishing gear was recovered, suggesting that the fish were taken by hand or through the use of wooden or fiber tools that have not survived. It may be, of course, that we simply cannot recognize generalized stone tools actually used in fishing. Plant foods were also relied upon, as indicated by millingstones, handstones, mortars, and pestles. These objects no doubt reflect the harvesting and grinding of wild seeds, bulbs, and tubers produced by a variety of plants native to the vicinity.

Flaked stone tools were made of both obsidian and chert. Obsidian was most commonly used for refined tools such as projectile points, while chert generally served for coarser scrapers and choppers. Metamorphic and igneous rocks were used for the various kinds of milling stones.

In the absence of radiocarbon determinations from the HQ site, the best dates for human occupation are furnished by the projectile point assemblage. Small arrowpoints of types made within the last 2,000 years or so constitute about half of the set of good time-markers, while points of types made between about 2,000 and 7,000 years ago comprise the other half (Table 1). Earlier occupation may have been less intensive (perhaps more intermittent) than that of later times, but in any case a very long period of site use is indicated.

The HQ site exhibits unusual potential for a future paleofaunal/geoarchaeological study of environmental change over time. It occupies a topographic setting strongly affected by climatically induced fluctuations of Malheur Lake, and different lake levels at various times in the past undoubtedly would have affected the resource base available to local occupants. Extensive paleoclimatic information recently has been generated for the Malheur region, and is available as a reference point for future studies at the HQ site (Mehringer 1985; Wigand 1985; Mehringer and Wigand 1986, 1987, n.d.). Further, there is good potential for geoarchaeological studies. Because of its situation at the base of a steep hill, adjacent to both lakeshore and river mouth, the site could have been dominated by different agents of local deposition at various times in the past. These may have enclosed cultural remains of different periods in distinctive sediments, signalling changes in the local environment. Charcoal for radiocarbon dating should also be available, given the generally high organic content of the site; failing the recovery of adequate charcoal, dates could be assayed on the animal bone so abundant there. Further work at the HQ site will be crucial to testing the reconstruction set out below.

LAKE-MARSH VILLAGE OCCUPATION IN THE MALHEUR REGION

Comparison of the artifacts and faunal

remains from the HQ site with specimens from the Squaw Pit, Blitzen Marsh, and Diamond Marsh sites allows tentative definition of a pattern of lake-marsh exploitation in the Malheur setting. These sites occur at the junctures of different floral and faunal zones. The HQ and Squaw Pit sites are both located where rivers enter Malheur Lake at the edge of broad, open sagebrush-grasslands. The HQ site has the further advantage of being adjacent to Sodhouse Spring, one of the largest and most dependable sources of potable water for miles around. The Blitzen Marsh and Diamond Marsh sites are located between the rich marshland along the meandering Blitzen River and the sagebrush-grassland zone, with the high country of Steens Mountain beyond (Fig. 1). Along such ecotones, where major biotic zones converge, a wide variety of resources could be exploited. The most dependably productive of these zones would be the marshlands of lakeshore and river edge, and good access points to them would have been particularly attractive to human settlement.

These geographical factors, in conjunction with the archaeological evidence, make it a reasonable hypothesis that the HQ site and its neighboring Squaw Pit, Blitzen Marsh, and Diamond Marsh sites were sedentary or semisedentary lake-marsh villages. The dating evidence shows that these focal spots were returned to again and again, over millennia. These repeated visits were probably quite long-term and residential in character. This is indicated by the known presence of human burials at the HQ site, and by deep cultural deposits rich in artifacts and faunal remains at all four. In contrast, the more numerous but much sparser lithic artifact scatters known from surrounding areas probably mark briefly visited collecting locations that were complementary to residential encampments (Fig. 1).

At the Blitzen Marsh and Squaw Pit sites, test excavations furnished additional evidence of sedentary occupation (Fagan 1974; Goddard 1974; Aikens 1983b). Circular depressions were visible on the surface at both sites, and digging at both exposed distinct buried surfaces on which artifacts and bones lay. These surfaces were believed by their excavators to be pit house floors, although conclusive evidence for architectural superstructure was lacking. A possible house pit was exposed in a trench profile at the Diamond Marsh site as well, although the limited extent of the excavations makes identification less than certain (Toepel et al. 1985). No evidence of pit houses is known from the HQ site, but excavation has been far too limited to rule out their existence.

The artifact assemblages from the HQ, Blitzen Marsh, and Diamond Marsh sites have much in common. The Squaw Pit site has received little detailed study, but nearly 2,000 lithic flakes and animal bones from two small excavations indicate its richness. Projectile points, milling stone fragments, and other specimens observed on the surface are like those of the other sites (Aikens 1983b). The HQ, Blitzen Marsh, and Diamond Marsh sites all are characterized by projectile points, cutting, piercing, and scraping tools, and metates and manos (Fig. 12). At the HQ and Blitzen Marsh sites, mortars and pestles were present as well. In all cases the dominant artifact classes reflect tasks associated with hunting (projectile points), processing of animal and plant foods (cutters, scrapers, and grinding stones), and the working of wood and leather (cutters, piercers, and scrapers). Differences between sites in the frequency of certain tool types may reflect local variations in the relative importance of certain tasks, but this cannot be demonstrated from the limited data at hand.

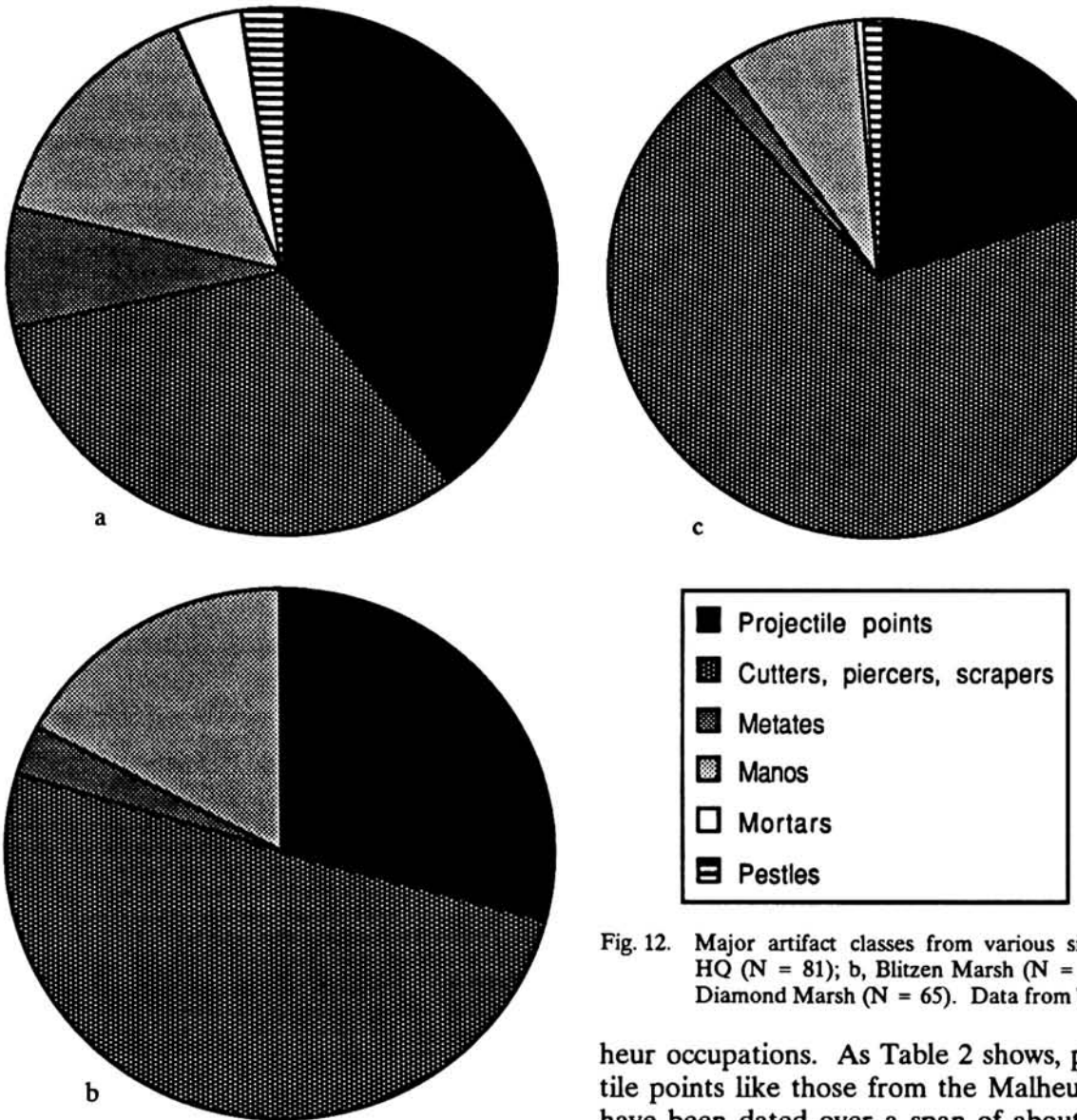

Fig. 12. Major artifact classes from various sites. a, HQ (N = 81); b, Blitzen Marsh (N = 482); c, Diamond Marsh (N = 65). Data from Table 7.

CHRONOLOGICAL PLACEMENT OF THE MALHEUR LAKE SITES

No radiocarbon dates are available for the HQ or Squaw Pit sites, but a single date from the Diamond Marsh site, a suite of dates from Blitzen Marsh, and artifact comparisons between these sites and others radiocarbon-dated elsewhere, make it possible to suggest the temporal range of the Malheur occupations. As Table 2 shows, projectile points like those from the Malheur sites have been dated over a span of about 7,000 years at other Great Basin localities.

Table 7 shows the relative proportions of various temporally sensitive point types found at the HQ, Blitzen Marsh, and Diamond Marsh sites. Radiocarbon dates from Blitzen Marsh, spanning the last 2,500 years, are presented in Table 8. A date of 1,480± 110 radiocarbon years B.P. from Diamond Marsh is congruent with these (Toepel et al. 1985:70). The comparison demonstrates that point types from the last 2,000 years or so

Table 7
MAJOR ARTIFACT CLASSES FROM THE HQ, BLITZEN MARSH, AND DIAMOND MARSH SITES[a]

Class	HQ Site	Blitzen Marsh	Diamond Marsh
Projectile points			
Desert Side-notched	3	3	-
Rosegate	13	62	10
Elko series	7	25	2
Northern Side-notched	3	3	3
Humboldt Concave-base	6	2	1
Stemmed/indented base/lanceolate/foliate	5	10	-
Fragments, unidentified	-	12	3
Cutters, piercers, scrapers	28	407	33
Metates	6	10	2
Manos	12	48	11
Mortars	3	1	-
Pestles	2	5	-
Cores	39	-	3
Unclassifiable fragments, miscellaneous lithics	45	68	-
Flakes, debitage	6,179	-	-
Flakes, cores	-	265	-
Debitage	-	-	1,503

[a] Data from this paper, Table 1; Fagan (1974:Table 4); Toepel, Minor, and Greenspan (1985:Table VII-4).

Table 8
RADIOCARBON DETERMINATIONS FROM THE BLITZEN MARSH SITE[a]

Sample Number	Laboratory Number	Radiocarbon Years B.P.
1	Gak3302	2,350±80
2	Gak3301	1,820±110
3	Gak3300	1,400±100
4	Gak3295	1,280±90
5	Gak3299	1,110±80
6	Gak3297	930±150
7	Gak3296	220±80
8	Gak3294	170±80
9	Gak3293	Modern

[a] Libby half-life, 5,570 years. Not tree-ring corrected. Data from Fagan (1974:Table 16).

are abundant at all three sites. Point types spanning an earlier interval (roughly 2,000 to 7,000 B.P.) are represented by fewer specimens, distributed over a longer period. It thus appears that occupation of the Malheur region may have intensified somewhat in later prehistoric times.

HUNTING AND FISHING IN THE MALHEUR REGION

The favorable location of the Malheur Refuge sites with respect to resource availability is evident from their faunal assemblages. These remains indicate a generalized subsistence base, including the use of a variety of aquatic and terrestrial resources (Fig. 13, Table 9).

Fish and large and small mammals are represented at all sites. The available breakdown of faunal data from Hogwallow Spring and Blitzen Marsh does not distinguish birds as a separate category (Fagan 1973:88, 102), but an unpublished preliminary analysis indicates that birds were present at Blitzen Marsh in significant numbers (D. K. Grayson, personal communication 1983). Birds are represented in small numbers at the Diamond Marsh and HQ sites; in Table 8 they are lumped with small and medium mammals. Large mammals are well represented at Hog-

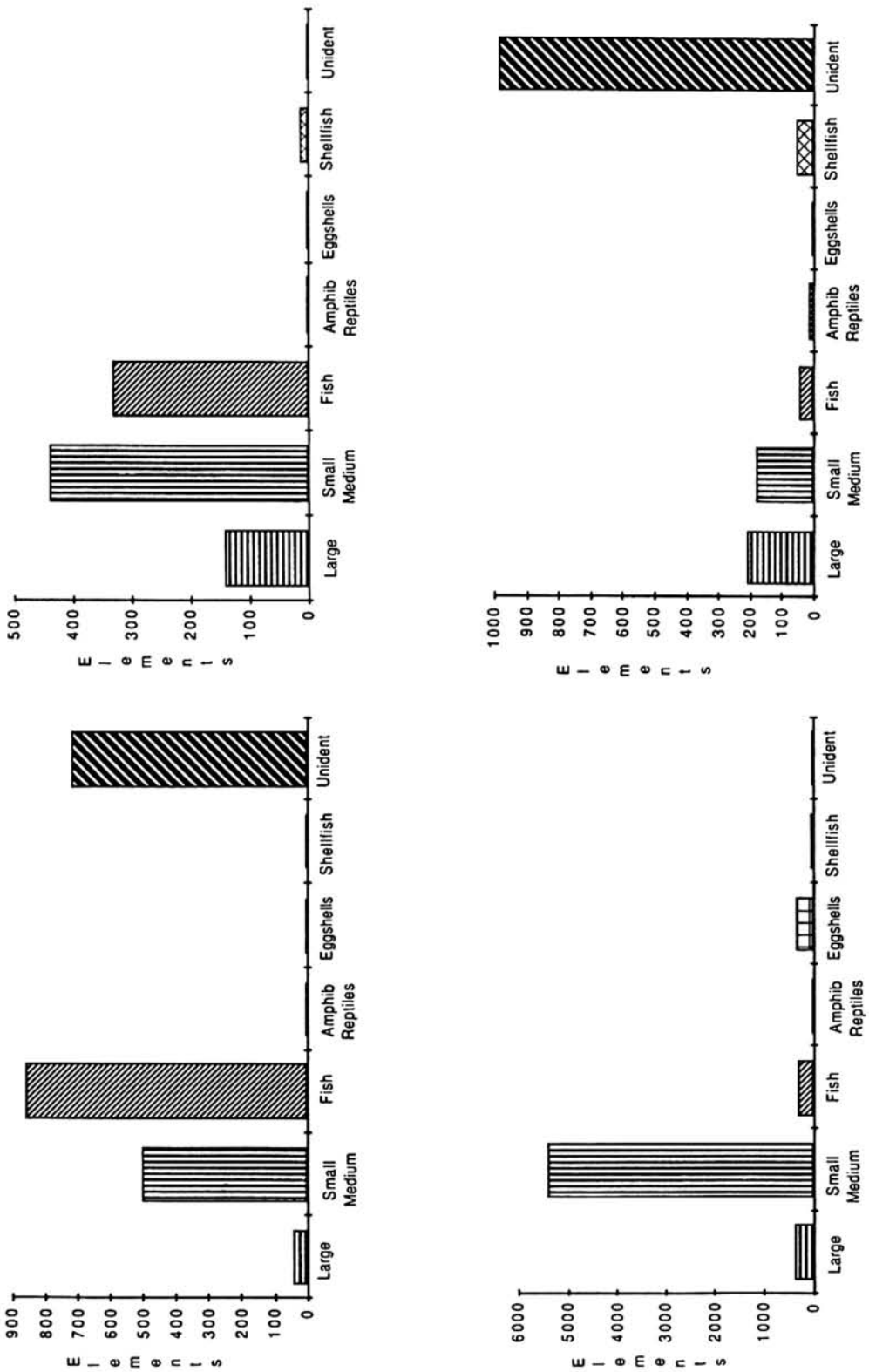

Fig. 13. Prevalence of general faunal categories at four Malheur Lake sites. Upper left, HQ site (N = 2,117); upper right, Hogwallow Spring (N = 924); lower left, Blitzen Marsh (N = 6,481); lower right, Diamond Marsh (N = 1,491). Data from Table 8.

Table 9
NUMBER OF ELEMENTS REPRESENTING GENERAL FAUNAL CATEGORIES AT MALHEUR REGION SITES[a]

Faunal Category	Blitzen Marsh		Hogwallow Spring		Diamond Marsh		HQ Site	
	Freq.	%	Freq.	%	Freq.	%	Freq.	%
Large mammals					210	14.1%	42	2.0
Large animals[b]	383	5.9%	142	15.4%				
Small and medium birds and mammals					181	12.1%	499	23.6
Small animals[b]	5,403	83.4%	438	47.4%				
Fish	297	4.6%	331	35.8%	42	2.8%	855	40.4
Amphibians and reptiles					17	1.1%	4	0.2
Egg shells	345	5.3%	2	0.2%				
Shellfish	53	0.8%	11	1.2%	54	3.7%	1	<0.1
Unidentifiable					987	66.2%	716	33.8
Totals	6,481		924		1,491		2,117	

[a] Data from Fagan (1973:88, 102); Toepel, Minor, and Greenspan (1985:106); Aikens and Greenspan (1986:Table 10).
[b] Available data not broken down further than "large animals" and "small animals."

wallow Spring and strongly represented at the Diamond Marsh site, but are fairly minor constituents at the Blitzen Marsh and the HQ sites. Overall, the data suggest generalized hunting and fishing, with a strong emphasis on small and medium-sized animals such as muskrat, hares, fish, and birds.

The differing proportions of various taxa from site to site are no doubt due in some part to the placement of the sites with respect to particular resources. For example, the Diamond Marsh site is located adjacent to a small stream. It is much less favorably situated for exploiting seasonal fish runs than the other sites, which are on the lower reaches of the Blitzen River. On the other hand, fish would have been comparably accessible at Blitzen Marsh and Hogwallow Spring, yet they constitute a significantly greater proportion of the faunal assemblage (but a smaller absolute number of specimens) at Hogwallow Spring than at Blitzen Marsh. This may be attributed to apparent differences in site function. Hogwallow Spring has been interpreted as a seasonal camp (Fagan 1973, 1974) where fishing was a major, perhaps the primary, activity (Greenspan 1985). Blitzen Marsh, on the other hand, is thought to have been a village site, and exhibits a broader range of subsistence activities.

AN ETHNOGRAPHIC MODEL FOR THE SEASONAL ROUND

The Northern Paiute community now resident at Burns, Oregon, is descended from the *Wadatika*[1] (Wada Eaters) band. This band formerly ranged throughout the Malheur region, from the headwaters of the Silvies and Malheur rivers north and east of Burns, to the Catlow Valley/Steens Mountain area south of Malheur Lake and the Blitzen Valley (Fig. 14). The *Wadatika* lived in small groups that spent roughly half the year in sedentary settlements of three to ten households. The other half of the year, people moved about in smaller family units, harvesting various locally and seasonally available resources (Whiting 1950; Couture 1978; Couture et al. 1981; Couture et al. 1986). The nature of this seasonal round (Figs. 15, 16) was pithily described by Whiting (1950:17-19):

> In the old days, the entire life of the Paiutes was oriented around the quest for food, which was none too plentiful.

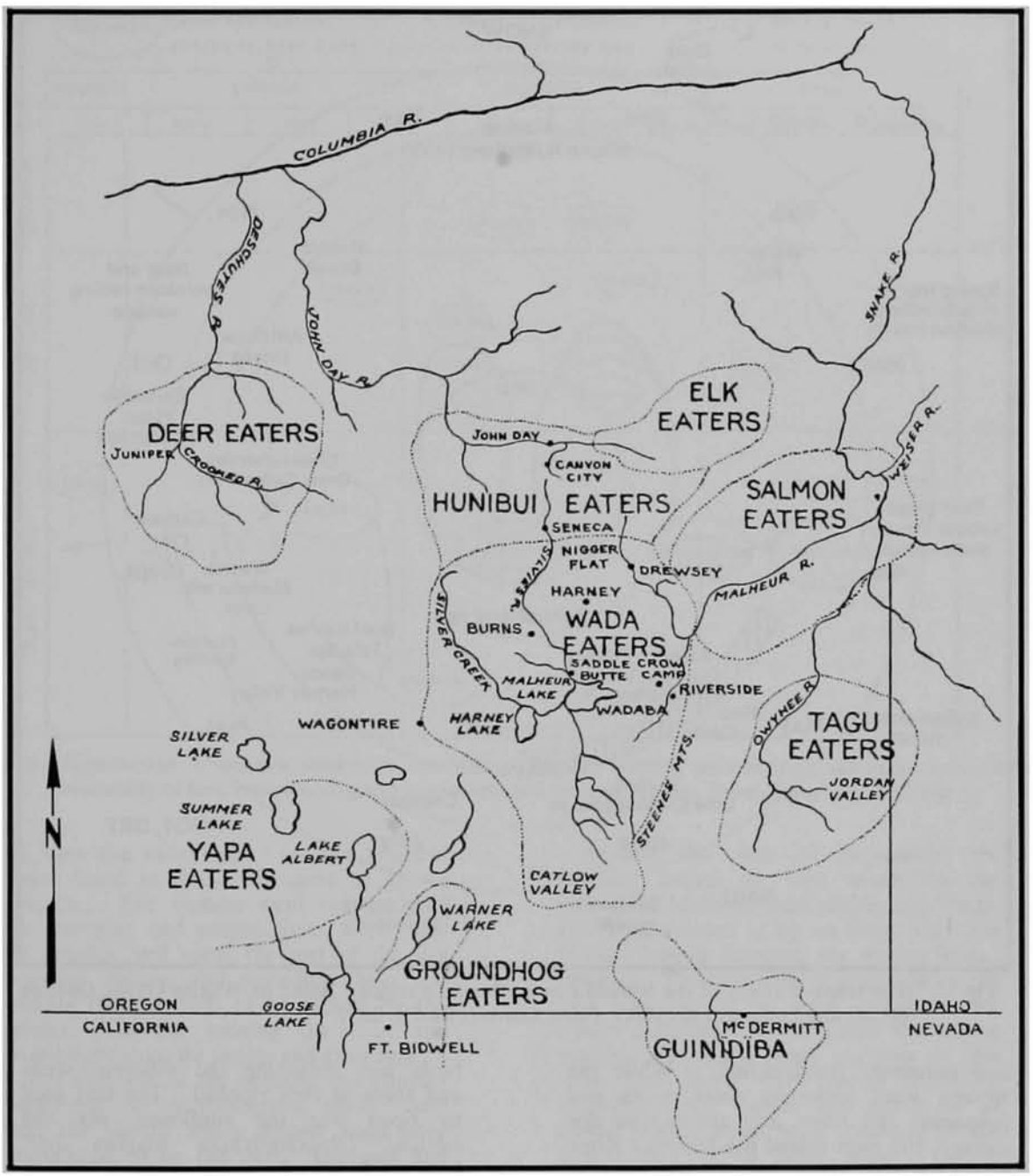

Fig. 14. Map of eastern Oregon, showing the territory of the *Wadatika* and neighboring Northern Paiute bands. Note that the *Wadatika* range is centered on Malheur Lake. From Whiting (1950:18).

Around the first of May when the first green shoots broke through the ground, they left their winter camps and went to those places where they knew the early edible roots abounded. Nigger Flat, in the northeast corner of the valley, was the most frequented place and many families camped here while the women dug *epos* (Yapa, Carum oreganum Wats), *hu nɪbui* (Lomatium macrocarpium C and R), *tsuga*

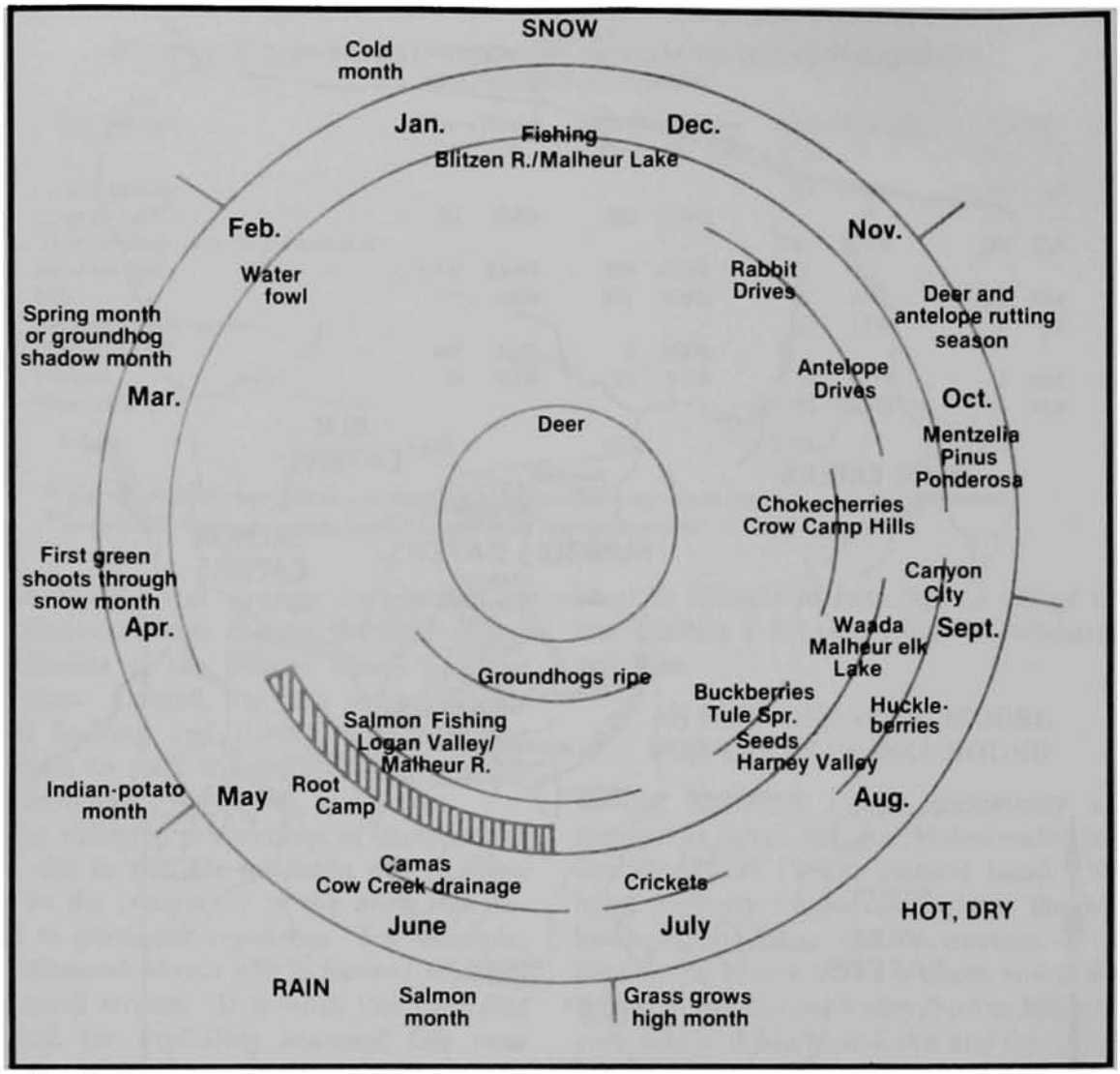

Fig. 15. The seasonal round of the *Wadatika* in the Malheur region. Based on Whiting (1950), Couture (1978), and Couture et al. (1981). From Aikens (1986:Fig. 2.23).

and *sanatsuga* (unidentified). While the women were gathering these roots and preparing the *tsuga* and some *yapa* for storage, the men visited the Drewsey River to set up and repair their salmon traps so that they would be ready for the spring run. When their work was over, the women moved down to the river with their skin sacks full of roots and helped the men dry the salmon which they caught. When the run was over, the group broke up and families wandered off by themselves, hunting deer, sagehens, and other birds and collecting the different seeds and roots as they ripened. The first seed to ripen was the sunflower, *aki* and *kusiaki* (Balsamorhiza hooken [*sic*: *hookeri*] Nutt). Later the women went to those places where *atza* (Sisymbrium sophia L.[2]) grew in large quantities. This seed was cached for winter consumption. Most of these plants grew well in the northern part of the valley.

Around the fifteenth of July, families began to congregate at Cow Creek, about five miles east of Harney. Families from

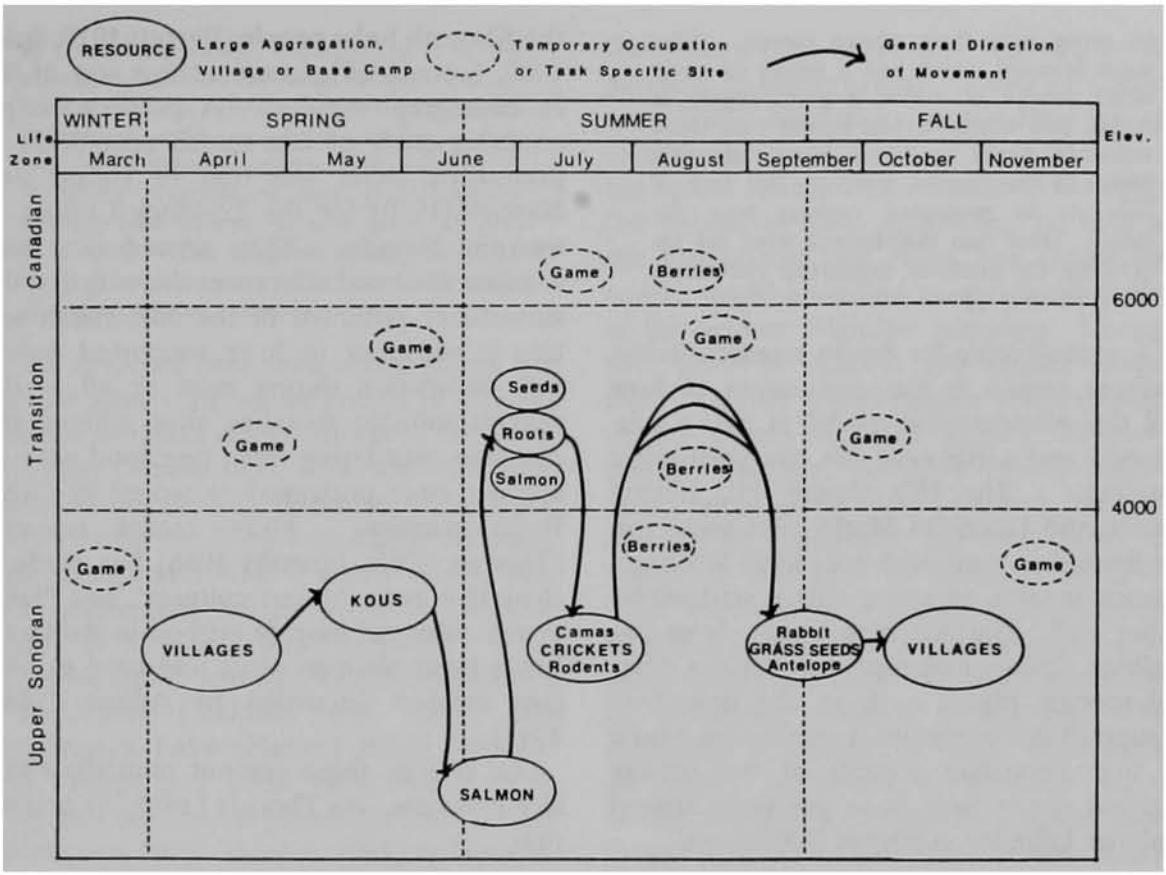

Fig. 16. Hypothetical subsistence model for the Malheur region, relating seasonal and altitudinal variation in availability of food resources to group movements and settlement types. From Zilverberg (1983:Fig. 6).

all over the valley and from the Hunibui Eater band to the north came to gather crickets. The women went out early in the morning and caught them, were back by sunrise, and spent the rest of the day roasting, drying, and pounding them and putting them in bags to be cached for the winter. In the evening the men and women gathered for gossip and gambling.

For the rest of the summer the families wandered off by themselves again. July was the month when ground hogs were considered to be the best. Currants and other berries were picked and eaten as they ripened. Fish were caught in the streams. Any game which was encountered was killed and eaten. The families often wandered up toward Seneca and John Day and hunted deer in the timber. In the fall some of the families went up to Canyon City, the men to hunt elk and the women to pick huckleberries.

Around the first of September the families began to turn south to the vicinity of Malheur Lake and Saddle Butte. Everyone wanted to be on hand when the *Wada* (Suaeda depressa var. erecta Wats.) ripened. This was one of the staple seeds and was picked in large quantities for winter consumption. Probably the largest number of people came together at this time and there were many festivities, including circle dances and games of all kinds. Other seeds were gathered at the same time or a little later: *su.nu.* saltbrush, *tomomi* (unidentified), *i'ape* (Chenopodium), and *wata* (Chenopodium album L.). From the lakes many people went to Crow Camp to pick chokecherries, which were made into cakes and sun-dried for winter. At this time there were also communal antelope and rabbit drives.

By the first of November the families started to collect their cached foods and

> to move into their winter camps. Sites were selected which had a spring or some other source of water, a good supply of wood, and where it was known that there was not likely to be a heavy snowfall. Most of the camps were at the foot of hills or in protected regions near the lakes. Here tule mat houses were set up. (During the summer sagebrush enclosures were the only type of structure used.)

A central topic for future research in the Malheur region is the exploration of how well this ethnographic model of native subsistence and settlement fits the prehistoric situation. The HQ, Squaw Pit, Blitzen Marsh, and Diamond Marsh sites seem (on the limited present evidence) to fit Whiting's characterization of winter village settlements rather well. Surface sites known from the Malheur Refuge may represent various other task-specific places such as she described. A supportable preliminary conclusion would be that important aspects of the lifeway outlined above have been practiced around Malheur Lake for as long as 7,000 years.

THE BROADER CONTEXT: PROBLEMS AND PROSPECTS

For a long time, the dominant conception of native life in the Great Basin was one of people almost continuously on the move from place to place in quest of food (Steward 1938; Jennings 1957; Aikens 1970, 1978 and references therein). These interpretations stressed the varied gathering activities of the native people, particularly in the drier uplands where food resources tend to be sparse and scattered, and emphasized the mobility that such gathering necessarily entailed (see also Aikens 1982; Aikens and Witherspoon 1986). The place of biotically rich lake-marsh settings in the native economies was accorded less attention, although many such settings exist in the Great Basin, and have seen human occupation in both historic and prehistoric times. Accounts of the Klamath Lake people (Barrett 1910; Spier 1930; Stern 1966) document this way of life in ethnographic times. A provocative pioneering study of lake-marsh adaptation in prehistoric times was that of Heizer and Napton (1970) for the Lovelock Culture of western Nevada. They argued (see also Madsen 1982 and references therein) that the subsistence potential of the lake-marsh setting is sufficient to have supported sedentary occupation during most or all of the year at suitable shoreline sites, without the ceaseless wandering from one food area to another once portrayed as typical of Great Basin peoples. More recent research (Thomas 1985; Janetski 1986) has made it clear that both "desert cultures" and "lake-marsh cultures" have flourished in the Great Basin from place to place and time to time (see related discussion by Aikens 1984b, 1985).

Of course, these are not mutually exclusive concepts. As Thomas (1985:18) pointed out:

> It is clear that an extremely wide range of mobility strategies was practiced in the protohistoric Great Basin. . . . Some Great Basin groups were predominantly foragers, following a mapping-on strategy during much of the year: high residential mobility and low reliance on stored foods create basically two kinds of sites (base camps and procurement locations). Other protohistoric Great Basin groups were nearly classic collectors, employing a strategy that minimized residential mobility while maximizing logistic deployment of specialized task groups. For much of the year such groups successfully moved key resources to a single area of consumption--the valley village.
>
> Some protohistoric Basin groups maintained a decided mixture of both strategies by following a fusion-fission settlement mode. During part of the year, such groups employed a largely logistic strategy, living in nearly sedentary base camps located near extensive caches of stored resources. Special-purpose groups moved out

> of these base camps, transporting collected resources back to the base camps. During other seasons, these larger associations commonly split up into smaller, more mobile residential groups that followed a decidedly mapping-on strategy (frequently moving base camps to new areas of procurement). This adaptive strategy adjusted throughout the year to accommodate the changing resource mosaic.

The evidence presented above places the Malheur sites with others known in Oregon from the wetlands environments of the Warner Valley (Weide 1968, 1974) and with lake-marsh villages recently documented for Lake Abert (Pettigrew 1985) and Lower Klamath Lake (Sampson 1985). Farther afield, wetlands settlements are known from Surprise Valley (O'Connell and Hayward 1972; O'Connell and Ericson 1974) and Honey Lake in California (Riddell 1956, 1960), and Winnemucca Lake (Hattori 1982), Pyramid Lake (Tuohy and Stein 1969; Tuohy 1970, 1974), and the Carson-Humboldt Sink (Heizer and Napton 1970; Thomas 1985) in Nevada. These sites define a zone of prehistoric lakeshore settlement around the entire northwestern rim of the Great Basin (Fig. 17). Across the Great Basin to the east, lacustrine subsistence patterns have been discussed for both the Great Salt Lake (Madsen and Berry 1975) and Utah Lake (Janetski 1986). South of the Great Basin, a lacustrine occupation has been compellingly documented for desert Lake Cahuilla in the Salton Trough of California (Wilke 1978).

The Malheur region is well situated to contribute to emerging research questions focused on these early lake-marsh cultures (Aikens 1985). For example, in his study of Nightfire Island at Lower Klamath Lake, Sampson (1985:17-30) employed a sophisticated model to show how climatic changes apparently affected the ancient people of Nightfire Island over their long history there. He postulated that ancient climatic fluctuations (documented by tree ring growth patterns in the bristlecone pines of California's White Mountains) would have brought about episodes of rising and falling water in the Lower Klamath Lake basin. Attending to the details of local geography, he then set out the effects that rising and falling lake waters would have had on the resource base of the ancient Nightfire Islanders. Changes over time in cultural and faunal remains from Nightfire Island suggest that fluctuating waters greatly affected human occupation there. Similarly, Pettigrew (1985) believed that human occupation at Abert Lake was affected by changes in the lake itself. He suggested that sites on different beach terraces were occupied in turn as the lake rose or fell, and that human abandonment of the place within the last 1,000 years was caused by increasing alkalinity of the lake, which drastically curtailed its biotic productivity. As pointed out above, the Malheur HQ site is well situated for geoarchaeological/paleofaunal studies of the effects of lake fluctuations on human occupance, and a highly refined paleoclimatic record based on pollen studies already exists for the region.

The problem posed by Thomas (in the passage quoted above) concerning the range of subsistence-settlement strategies practiced in the Great Basin could also be successfully addressed in the Malheur context. The four rich but minimally excavated sites around Malheur Lake give evidence of apparently varied hunting and fishing activities, and many more sites (ca. 160) are recorded in the vicinity. These present an opportunity for investigating the concept of a "limnosedentary-limnomobile" continuum of subsistence and settlement around the lake, as outlined by Thomas (1985:17-20) and Janetski (1986:161-163). At the next higher level of geographical scale, the rich body of information from previous research in the adjacent Steens Mountain area would allow

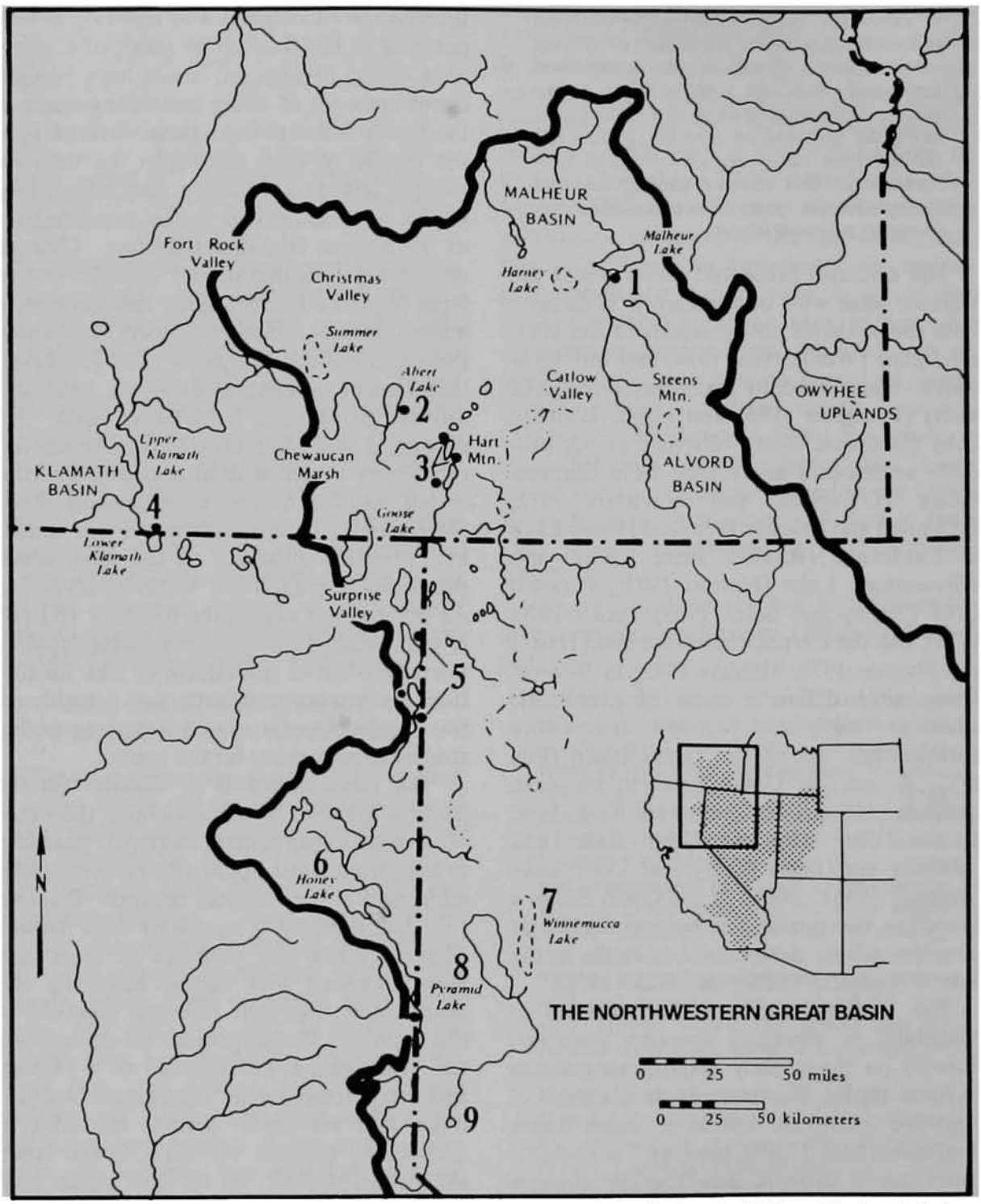

Fig. 17. Prehistoric lake-marsh occupations in the northwestern Great Basin. 1, Malheur Region; 2, Lake Abert; 3, Warner Valley; 4, Lower Klamath Lake; 5, Surprise Valley; 6, Honey Lake; 7, Winnemucca Lake; 8, Pyramid Lake; 9, Carson-Humboldt Sink (after Aikens 1982:Fig. 2).

picturing the Malheur region (the historic range of the Wadatika) as a broad universe of altitudinal, hydrographic, and biotic variation (Aikens et al. 1982; Jones et al. 1983; Beck 1984; Verosub and Mehringer 1984; Mehringer 1985; Wigand 1985; Wilde 1985; Mehringer and Wigand 1986, 1987, n.d.; Verosub et al. 1986). Moreover, a local model of native American land use is already in place, based on the testimony of the Harney Valley Paiute whose range this was (Whiting 1950; Couture 1978; Couture et al. 1986). Evidence now in hand suggests that the prehistoric as well as the historic natives of the Malheur region may have lived somewhere in the middle of the "limnosedentary-limnomobile" strategic continuum described by Thomas (1985). The hypothesis awaits systematic archaeological testing.

NOTES

1. The Northern Paiute term is *wadadikadi*. The term used in this text is that previously used by ethnographers of the Northern Paiute.

2. Editors' note: Commonly known as tansy mustard, the presently accepted name for this plant is *Descurainia sophia* (L.) Webb. It is a European introduction but was named and treated identically to the native *D. pinnata* (Walt.) Britton by the Kawaiisu of the southern Sierra Nevada of California (Zigmond 1981:26). *D. pinnata* was an important prehistoric seed crop throughout the Southwest (Ebeling 1986:487), and its range includes Oregon (Peck 1961:366).

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