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# Lake and Marsh-Edge Settlements on Malheur Lake, Harney County, Oregon

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**H**ARNEY Basin is the northernmost internally draining basin within the Great Basin and the largest in Oregon. Although the basin is semi-arid in climate, it contains a complex hydrologic system of streams, rivers, marshes, and lakes maintained by precipitation to the surrounding watershed (Fig. 1). Above average rainfall and snow in the early 1980s caused Malheur Lake to flood a substantial portion of the surrounding basin floor, inundating an area of more than 180,000 acres. The floodwaters began to recede in 1985 and continue to decline today. In doing so, water and wave action along the changing shoreline of the lake system have exposed many archaeological sites, stripping away drowned vegetation and eroding the ground surface to reveal artifacts, assorted cultural features, and human burials. Similar natural phenomena, with similar archaeological results, have recently occurred at Stillwater Marsh in Nevada (Raven and Elston 1988; Raymond and Parks 1990) and on the east shore of the Great Salt Lake (Simms et al. 1991). This flood cycle has provided an excellent opportunity for archaeologists to locate and document sites normally obscured by vegetation and shifting surface sediments. Unfortunately, relic collectors have taken advantage of the same opportunities.

In an effort to locate, document, and preserve exposed and eroded sites and human burials on lands around Malheur Lake administered by Malheur National Wildlife Refuge, the U. S. Fish and Wildlife Service provided funds in 1988 and 1989 for Heritage Research Associates, Inc. (HRA), to conduct archaeological surveys and surface collections on

islands and shorelines beginning to emerge from the lake (Oetting 1990a). Cognizant that similar processes of site erosion and exposure were occurring on privately owned lands flooded by the lake, HRA obtained a grant from the Oregon State Historic Preservation Office (SHPO) in 1989 to conduct a similar survey on 26 miles of privately owned shoreline (Oetting 1990b).

These surveys were essentially emergency measures with very limited goals. They were implemented to: (1) locate and provide basic documentation for as many newly exposed sites as possible within a limited time; (2) identify, map, and collect artifacts likely to be stolen by relic collectors; and (3) locate, document, and cover or remove exposed human remains. Removing tools and human remains evident on the surface prevented their loss to vandals and at the same time made the sites less attractive to these relic collectors. No subsurface testing was conducted at any of these sites. This paper introduces the reader to the recent hydrologic events at Malheur Lake, summarizes the results of the surveys, and presents some inferences regarding regional chronology and land use prompted by the survey data. These interpretations should be considered working hypotheses to be tested by continuing research in the region.

## MALHEUR LAKE

Malheur Lake, Mud Lake, and Harney Lake occupy the lower elevations of Harney Basin (Fig. 1). Water from the Blue Mountains flows into the basin and the north side of Malheur Lake through the Silvies River, while runoff

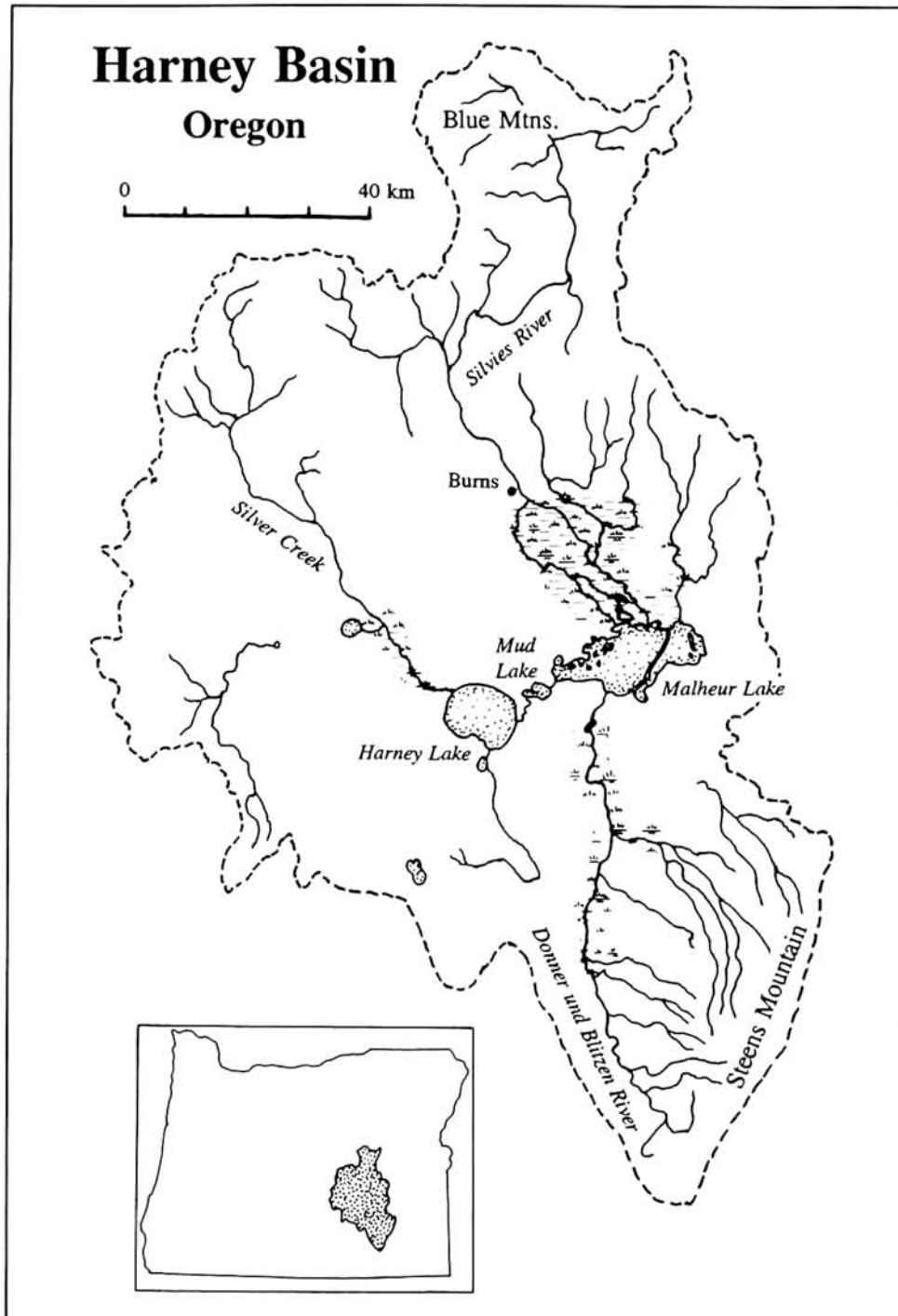


Fig. 1. The hydrologic system of Harney Basin.

from Steens Mountain provides water to the southern part of the basin through several

streams and the Donner und Blitzen River, which enters the south side of the lake. Both

rivers support extensive freshwater marshes along their lower courses. Through a series of low thresholds, water flows from Malheur Lake into Mud Lake and then into Harney Lake, the ultimate sump of the basin. Water levels in these lakes fluctuate seasonally in response to inflow from the rivers, direct precipitation, and evapotranspiration.

In general, such fluctuating conditions are beneficial and necessary for the maintenance of marsh water chemistry and productivity. Contrary to common intuition, wet years and high water levels are more destructive to the lake and its wetlands than are dry years, since high water drowns both the marshes and the adjacent terrestrial areas, while periods of low water only constrict marsh extent and allow a variety of plants to gain temporary footholds on the exposed recessional mudflats. Oxygen exchanges and replenishment of certain other elements necessary to maintain the soils essential to the growth of marsh plants can only occur when marsh bottoms are periodically dry (Duebber 1969:20).

In times of low to moderate water levels, Malheur Lake forms a complex series of freshwater-to-alkaline marsh habitats, supporting a wide variety of plant and animal life (Duebber 1969). Three distinct ecological units can be identified (Fig. 2). The westernmost unit generally has very shallow water and often consists of many small ponds separated by low undulations in the topography. Water is usually less alkaline than in the lake to the east. Emergent vegetation is primarily hardstem bulrush (*Scirpus acutus*), burreed (*Sparganium eurycarpum*), cattail (*Typha latifolia*), and Baltic rush (*Juncus balticus*) (Duebber 1969:8). Submergent plants, especially pondweeds (*Potamogeton pectinatus* and *P. pusillus*), are common in the water. The central ecological unit occupies the lowest part of the basin and receives the flow of both the Donner und Blitzen and Silvies rivers (Duebber 1969:9). The water is deeper and more permanent than

elsewhere and, except in very dry periods, there are generally areas of open water. Hardstem bulrush marshes predominate, except in the deeper open water zones. The eastern ecological region is the most alkaline portion of the lake and contains the most open water (Duebber 1969:10). Sago pondweed thrives in this unit. The edges are marshy, but are composed of salt-tolerant plants common to shallow water, such as Baltic rush.

Abnormally high precipitation and heavy snowpacks from 1981 to 1984 provided increased water to this closed-basin system. Water levels rose and flooded all of the Malheur Lake ecological units. Water continued to flow in and the three lakes (Malheur, Mud, and Harney) coalesced, forming a single body of water 33 miles (53 km.) long and as much as 12 miles (19.5 km.) wide. The level of Malheur Lake peaked at a historic record high of 4,102.68 ft. in 1985, having risen about eight feet. Since the basin floor is very flat, the lake more than doubled in surface area, drowning most of the land near the lake within Malheur National Wildlife Refuge and flooding thousands of acres of private land beyond the Refuge boundaries. During the surveys the surface of the lake was about 4,097 ft. and water still covered large areas of land on the northern and eastern shores.

It must be remembered that the configurations of the islands and shorelines of the lake change as the water level changes. Despite the extent of the lake in 1988 and 1989, its depth was no greater than 2.45 m. and, in many areas, was less than 60 cm. This shallowness makes the position of the shoreline dynamic, since small changes in lake level may result in extensive shoreline shifts. During periods of low water many of the sites presently located on "islands" will become "mainland" sites situated on low topographic rises surrounded by shallow ponds and extensive marshes. Figures 2 and 3 depict the configuration of Malheur

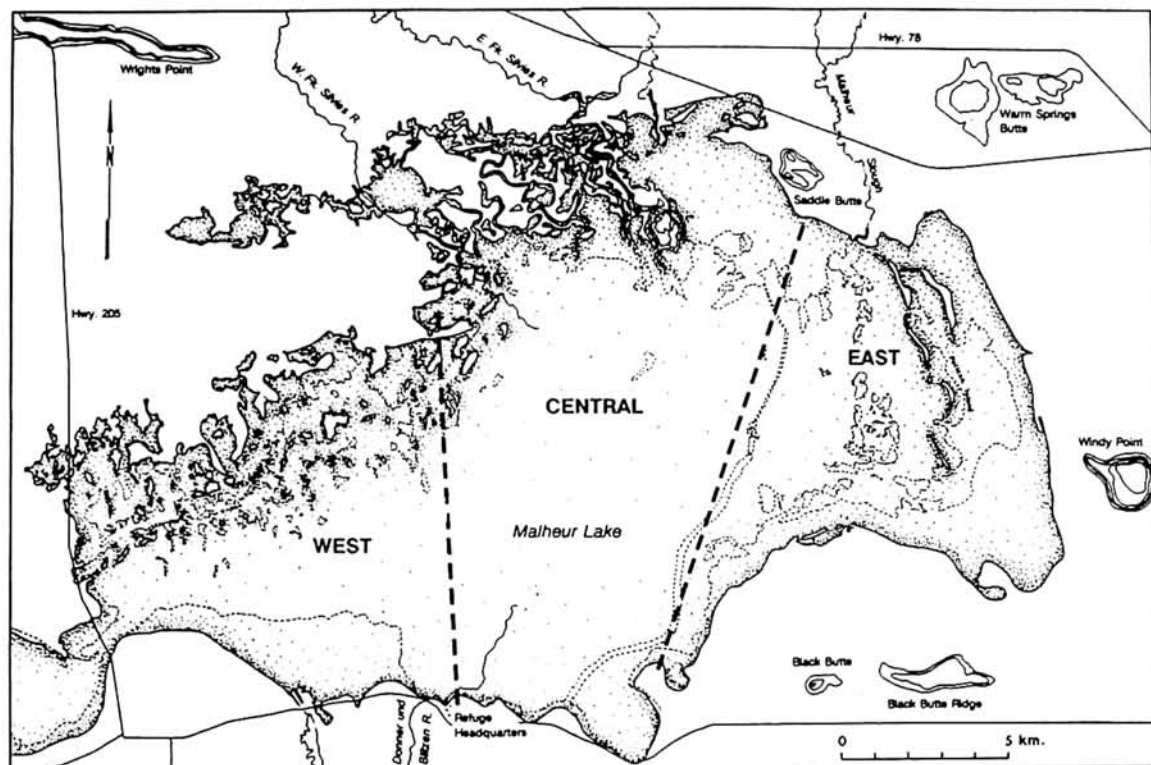


Fig. 2. Ecological units of Malheur Lake (after Duebber 1969).

Lake during the summers of 1988 and 1989. The lake has continued to decline since that time.

### THE SURVEYS AND THEIR FINDINGS

The surveys conducted for Malheur National Wildlife Refuge in 1988 and 1989 inspected 28 islands and two small sections of the southern shoreline. Most of the new islands had been completely submerged and were simply low rises with eroded ground surfaces just above the lake level. Three islands had elevated central terraces that had remained above the floodwaters, set off by 1 to 3-m. high eroded cutbanks. Twenty-four of the islands were along the northwest shore of Malheur Lake and the others were in the eastern part of the lake. The SHPO-funded survey of private lands examined 26 miles of the 1989 main shoreline, divided into three tracts on the south shore and two on the north shore. Each mainland survey

tract consisted of a 200 m. corridor along the existing water's edge. The shorelines and islands were completely examined by archaeologists maintaining transect intervals of 15 m.

In all, 73 archaeological sites were visited and recorded (Fig. 3) (Oetting 1990a, 1990b). Only four of these localities had been previously recorded during widespread archaeological reconnaissances conducted on the refuge in the 1970s (Newman et al. 1974). Twenty-five sites were located on islands. The other 48 sites were recorded on the mainland, 15 on the south shore and 33 on the north shore.

The recorded sites range in size from less than 200 m.<sup>2</sup> to as much as 80,000 m.<sup>2</sup>. Differences in size and artifact density suggest that some functional differences may distinguish the various sites. Many of the smaller sites (< 10,000 m.<sup>2</sup>) had low density artifact scatters (averaging less than 5-10 items/m.<sup>2</sup>) and relatively few formed tools (10-100), suggesting

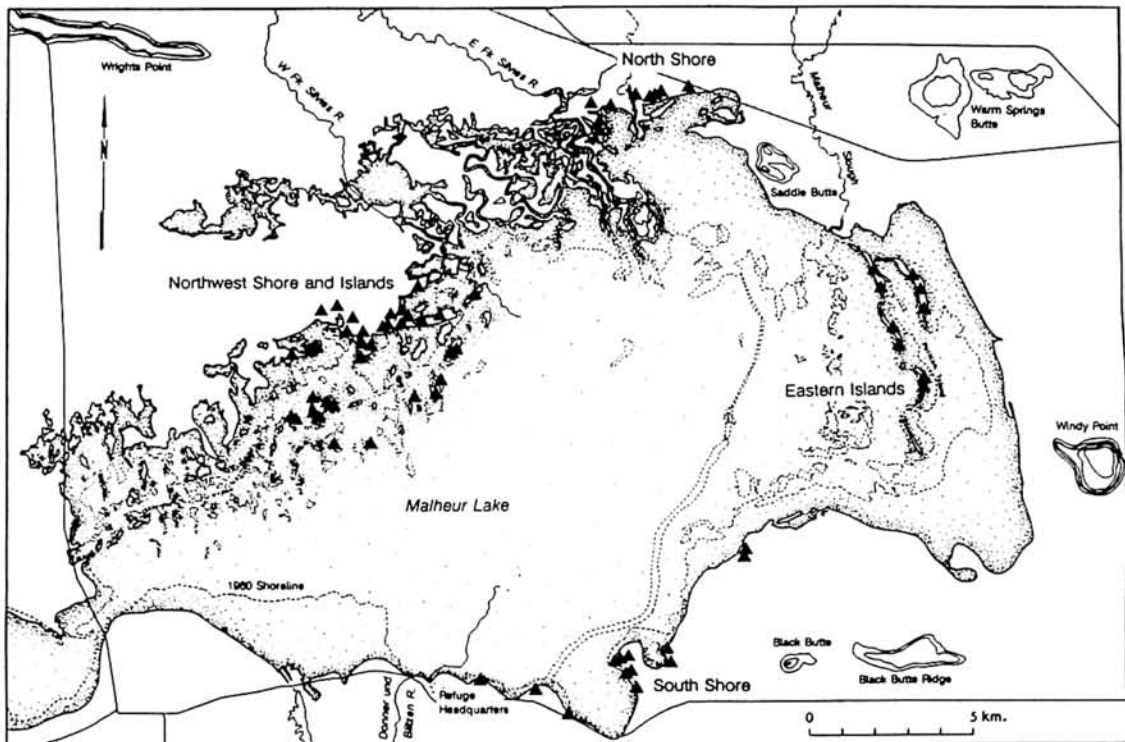


Fig. 3. Archaeological sites recorded (triangles) during the 1988 and 1989 shoreline and island surveys.

short-term limited activity locales. Several of the moderate-to-large sites (especially those  $>30,000 \text{ m}^2$ ) had very dense artifact scatters (peak densities in excess of  $100 \text{ items/m}^2$ ) and hundreds to thousands of tools from a wide range of artifact classes, suggesting longer term use and occupation.

Three probable house floors were observed in a high cutbank at an island site near the northwest shore. Each floor was 4 m. to 5 m. long and between 30 cm. and 1 m. below the top of the cutbank. A charcoal-filled hearth, with an associated activity surface, was found in the cutbank at a site off the east shore. Charcoal samples were collected from each of these features but the Fish and Wildlife Service has not allocated funds for radiocarbon analysis. A badly eroded circular depression, possibly the remains of a housepit, was observed at one site on an island off the northwest shore. Several house depressions were recorded in the 1970s at

another site nearby (Newman et al. 1974). Three artifact features were found on northwest shore islands, two containing 30 or more notched net weights and a third consisting of a tool cache of bone tools and several finely flaked projectile points, possibly the bundled contents of a flintknapper's kit.

Many of the sites had been exposed and eroded by the receding waters within the preceding year and spectacular arrays of artifacts were recovered at several of these localities. The density and variety of artifacts at newly exposed and undisturbed sites was amazing and beyond the collective experience of the archaeologists on the survey. The differences between these sites and those also recently exposed, but already vandalized by relic collectors, were equally amazing and extremely disheartening, demonstrating the speed with which valuable scientific and contextual evidence could be destroyed. The 1988 survey

team recorded three sites vandalized earlier in the year on the easternmost island in the lake. Only six tools meeting the criteria for collection were found at these sites. In contrast, two undisturbed sites of similar size were found on a newly exposed island nearby and 211 tools were collected.

Twenty-seven partially exposed, but intact, Native American burials were located and documented during the survey. Through an agreement with the Burns Paiute Tribe, these remains were later collected, along with another 20 burials subsequently exposed by the lake, and extensive osteological analyses were conducted on these individuals (Hemphill 1992a, 1992b, 1992c). All of the remains have been reinterred on the refuge.

A total of 2,131 artifacts was collected during the combined surveys (Oetting 1990a, 1990b). This total included 695 projectile points, 43 finely finished bifacial blades, 640 other bifacial tools, 135 notched net weights, two girdled net weights, 181 manos, 62 pestle/mauls, 27 bone implements, three pipe bowls, and several beads and other ornaments (selected artifacts are illustrated in Figs. 4-7). An additional 32 points were observed and classified, but were not collected by request of the property owner (Oetting 1990b:120). Over 75% of the flaked stone tools were made of obsidian, 12.5% were chert, and 11.5% were basalt. The ground stone tools were generally coarse-grained or vesicular basalt, but a few specimens were made from coarse granitic stones.

It should be reiterated that the collected artifacts were recovered from the surface and are not representative samples of the overall tool assemblages observed at these sites. One goal of the surveys was to selectively remove artifacts considered particularly desirable by relic collectors, preempting their loss and reducing the appeal of these sites. All projectile points were collected, along with most of the complete and some partial specimens of bifacial blades,

drills, and other formed bifaces. Rare or "unusual" artifacts, including net weights, bone tools, and ornaments, were also collected when encountered. Most of the complete and fragmentary pestle/mauls were collected, but in general, only complete manos were retrieved. Large implements, such as metates and hopper mortar bases, were located and mapped, but were not collected. Thus, the proportions of collected specimens do not reflect the proportions of tool classes actually present in the field.

Some of the collected artifacts are uncommon in the Great Basin, but have analogues around the periphery of this region. The bifacial blades are exceptionally large and finely finished formed bifaces, ranging in length from 11 cm. to over 36 cm. (Fig. 4). Thirty-six of these bifaces are made of obsidian, five are chert, and two are basalt. Large obsidian blades were considered wealth or treasure by ethnographic northwest California groups such as the Yurok and Karok (Rust 1905; Kroeber 1925). Similar large blades have been found associated with burials in southwestern Oregon (Cressman 1933; Hughes 1990) and occasionally have been found in archaeological contexts along the Columbia River (Strong 1960) and in the Klamath area (Sampson 1985). Some of the Malheur Lake bifacial blades were found at sites containing burials, but none were found in association with human remains.

The ground stone milling tools found at the Malheur Lake sites, particularly the manos and pestle/mauls, were well-finished, shaped tools that required time, skill, and effort to manufacture (Fig. 5). One of the collected pestle/mauls (Fig. 5a) was decorated with incised lines. Decorations on milling implements have not been reported for traditional prehistoric or ethnographic Great Basin groups, but have been documented among the Klamath and from sites along the Columbia River (Barrett 1910; Strong et al. 1930; Carlson 1959).

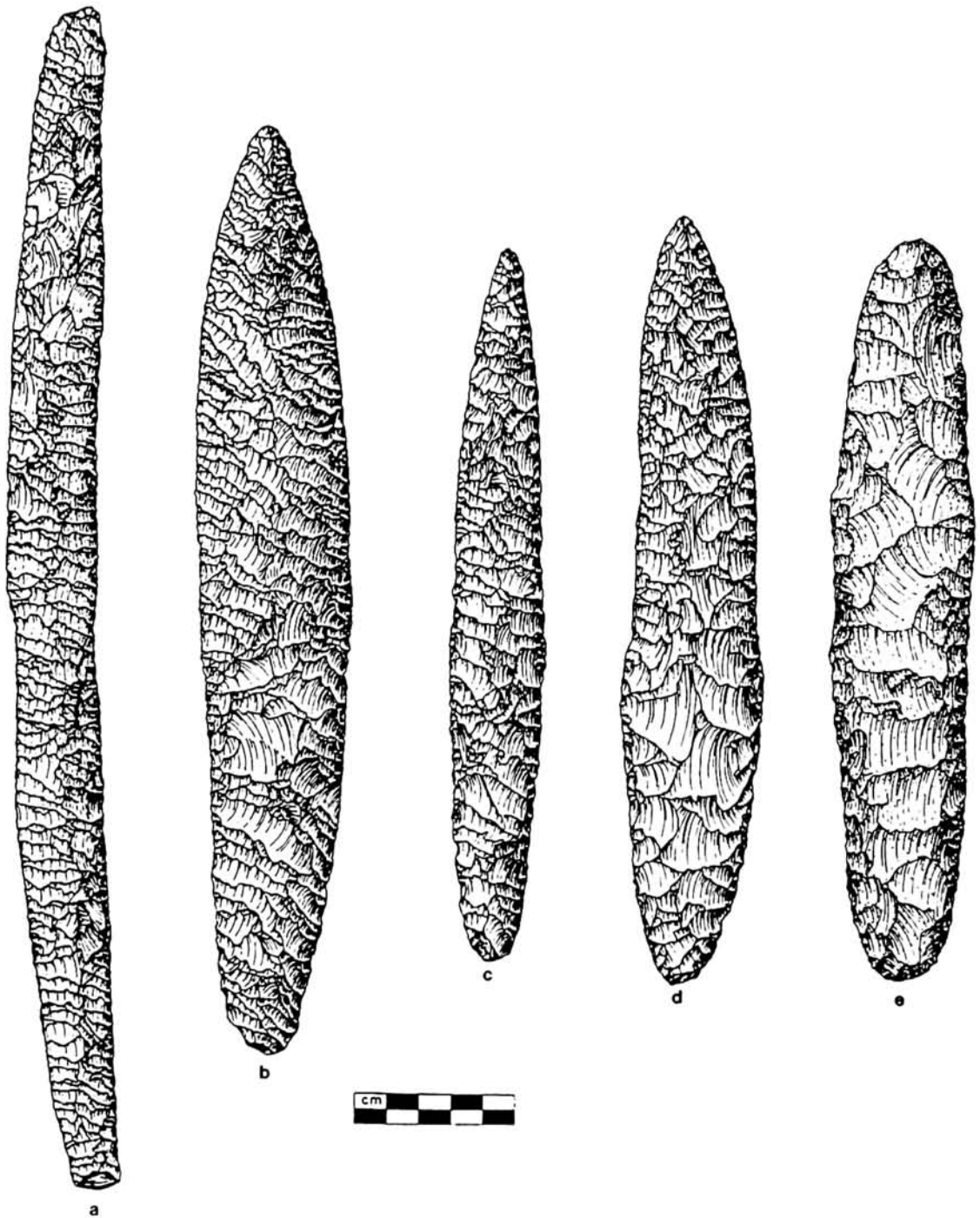


Fig. 4. Bifacial blades collected at Malheur Lake (a is 36.05 cm. in length; a-d are obsidian, e is basalt).



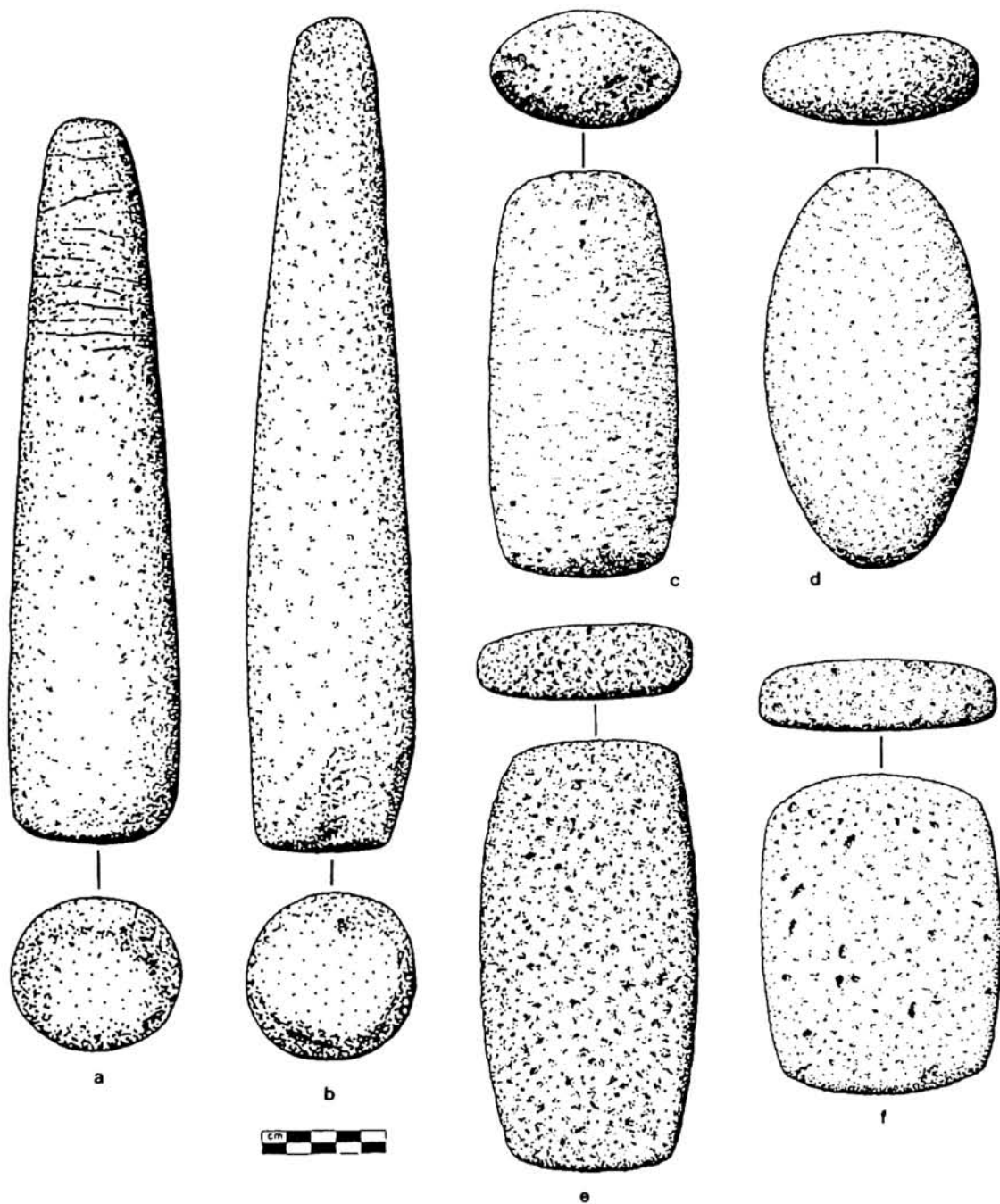


Fig. 5. Pestle-mauls (a, b) and manos (c-f) (all are vesicular basalt).

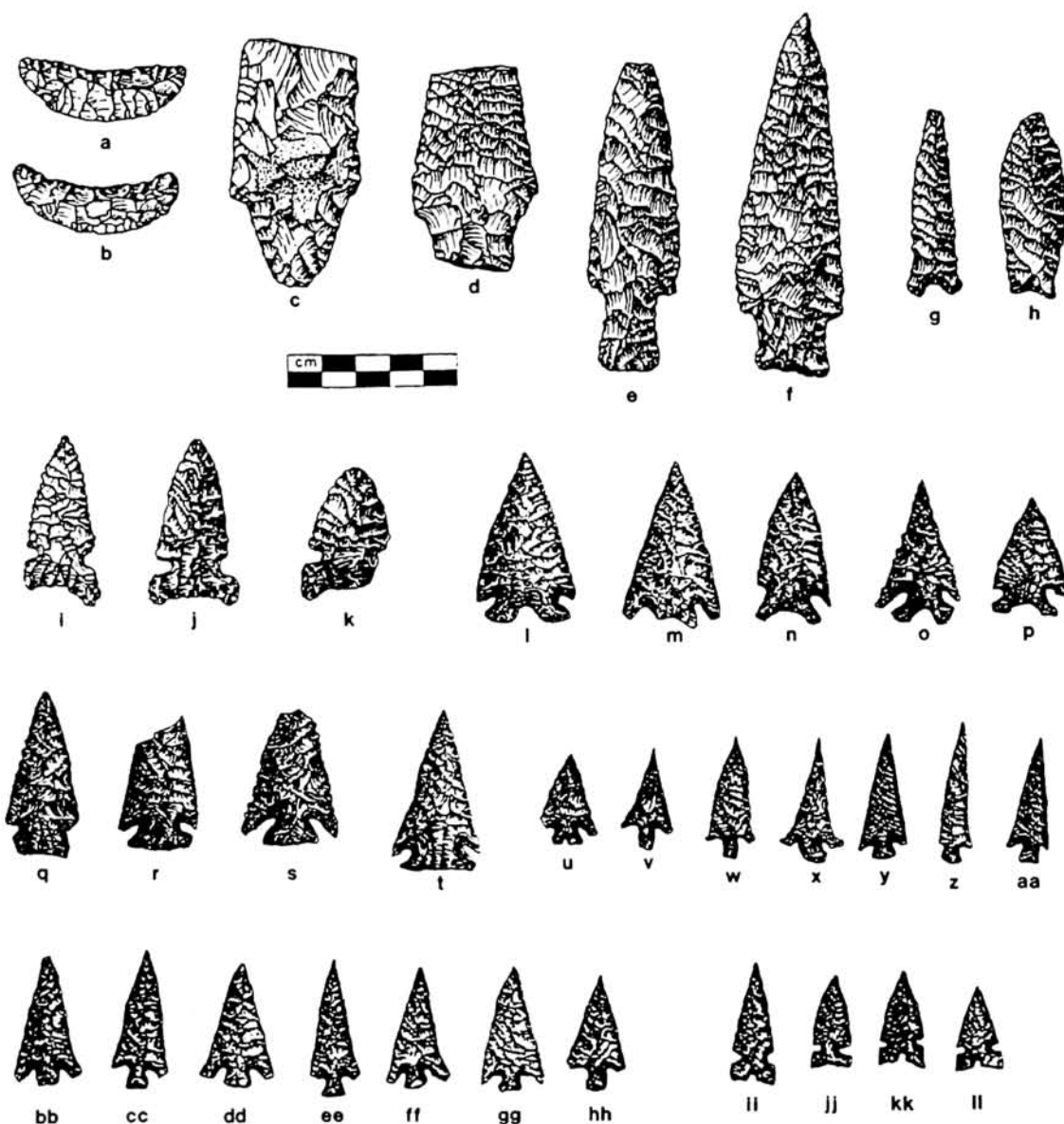


Fig. 6. Selection of projectile points: a-b, crescents; c-d, Great Basin Stemmed; e-f, Malheur Stemmed; g-h, Humboldt series; i-k, Northern Side-notched; l-t, Elko series; u-hh, Rosegate series; ii-ll, Desert Side-notched (a, c, and y are chert, all others obsidian).

A shaped bone artifact decorated with incised triangular designs (Fig. 7j) was also collected. It is very similar in size, shape, and

decoration to ethnographic "head scratchers" or "sweat scrapers" used by the Klamath (Spier 1930:69-70; Sampson 1985:397) and north-

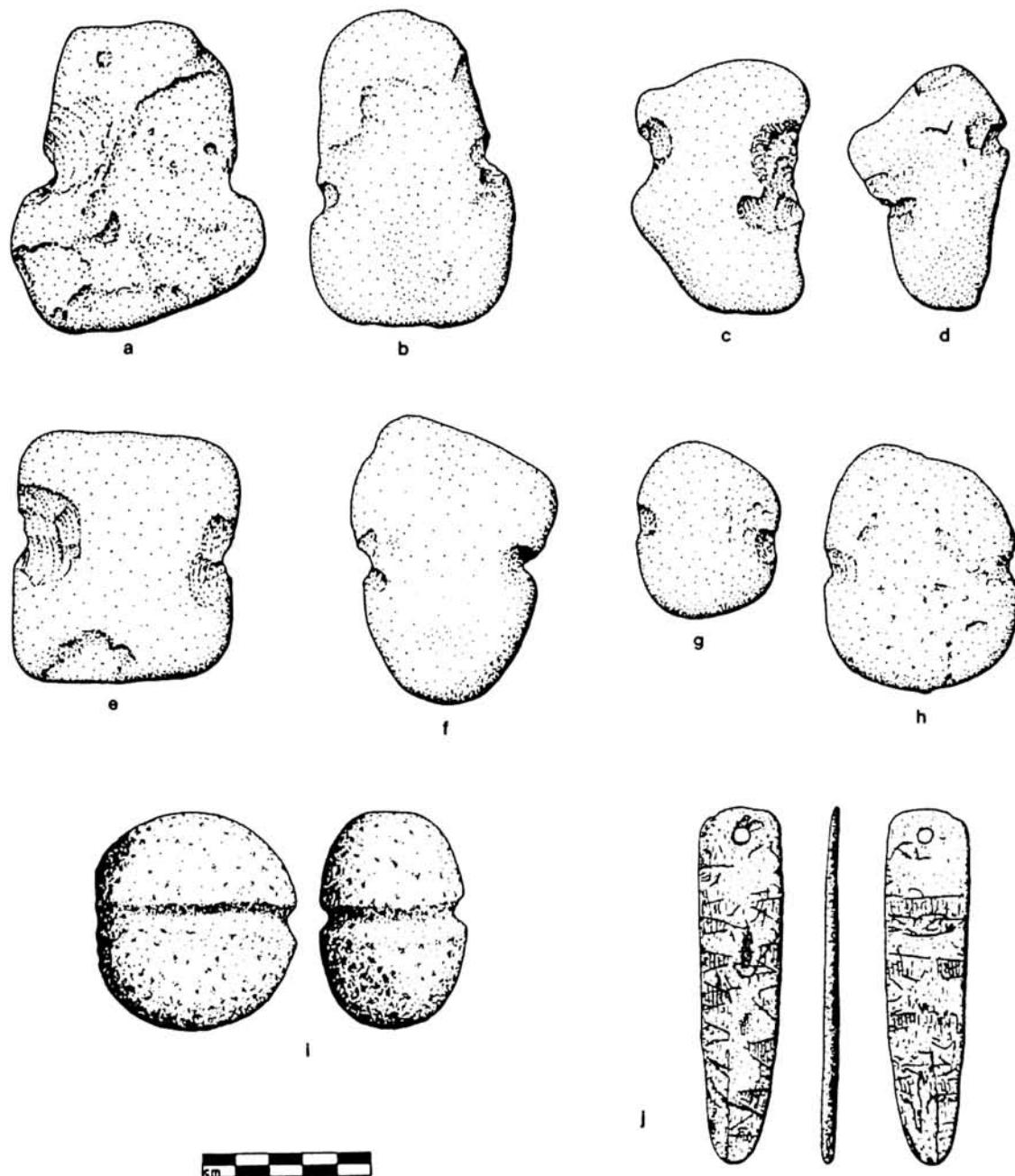


Fig. 7. Basalt notched net weights (a-h), basalt girdled net weight (i), and bone head scratcher (j).

western California groups (Loud 1918:383). Head scratchers used by the Northern Paiute in the northern Great Basin were generally made of wood and were not decorated (Kelly 1932:162; Stewart 1941:410-411).

## CHRONOLOGY

Chronology in the Malheur Lake area has been based primarily on the analysis of time-sensitive projectile point types, but 10 radiocar-

bon ages obtained from the recovered burials now provide better documentation of the last 2,000 years. Six hundred forty-three points (Fig. 6) were assigned to commonly defined classes in the typological system used in the central, western, and northern Great Basin (Thomas 1981; Wilde 1985; Holmer 1986; Oetting 1989, 1990a). Many of these point types can be used as time markers. The remaining 84 points did not fit in this typology and were better identified with point types defined for the Columbia River Plateau (Dumond and Minor 1983) or defined strictly for Harney Basin (e.g., Fig. 6e and f; Oetting 1990a).

The efficacy of using projectile point types as time markers has been much debated in recent literature (Flenniken and Raymond 1986; Thomas 1986a, 1986b; Flenniken and Wilke 1989; Bettinger et al. 1991; Wilke and Flenniken 1991; Inoway and O'Connell 1992; Oetting 1992). The use of broad-necked, corner-notched Elko series points has been a particular issue, since they appear by 7,000 B.P. in some areas and continue until 1,000 B.P. (Thomas 1981). In the northern Great Basin, Elko points have been stratigraphically associated with pre-Mazama deposits and 7,000-year-old radiocarbon ages at caves in Fort Rock Valley (Bedwell 1973; Aikens 1982; Flenniken and Wilke 1989; Oetting 1992), Dirty Shame Rockshelter in southeastern Oregon (Aikens et al. 1977; Hanes 1988), and Skull Creek Dunes in Catlow Valley (Wilde 1985). A cultural chronology developed several years ago for the region restricted Elko series points to the period from 7,000 to 5,000 B.P. (Fagan 1974:97), but it is clear that this is incorrect.

Research in the region and elsewhere in the Great Basin, however, indicates that the *majority* of Elko series points were in use after 5,000 B.P. Wilde's (1985:141-148; see also Aikens and Greenspan 1988:41) synthesis of radiocarbon-dated occurrences of point types clearly shows that the vast majority of dated Elko

points occur between 4,500 B.P. and 1,400 B.P. Beck's (1984) chronology for the Steens Mountain region demonstrated a very similar pattern. A reexamination of dated Elko points in the Fort Rock Valley caves found that 80% of the Elko specimens occurred in levels dated to 4,550 B.P. or younger (Oetting 1992). All Elko points associated with radiocarbon ages in Harney Basin are less than 3,300 years old (Jenkins and Connolly 1990; Musil 1992). When considering the *population* of Elko series points in the region, it seems reasonable to assume that the *majority* of those points were produced and used after 5,000 B.P.

Previous archaeological research in Harney Basin (Aikens and Greenspan 1988:39-40) has suggested that, while projectile points characteristic of all temporal periods in the Holocene have been found, the majority of human activity (based on point frequencies) appears to have been in the later Holocene—the Late Archaic of the last 1,500 or 2,000 years. Analysis of the relative numbers of temporally diagnostic projectile points found in various portions of Harney Basin and nearby areas suggested to Aikens (1988:20-21) that the Malheur Lake area and the Donner und Blitzen river/marsh system to the south had supported only sparse occupation prior to 1,500 years ago, but these areas witnessed much greater use and occupation after that time, during the Late Archaic period.

The projectile points observed and collected during the Malheur Lake surveys support this general impression of chronological duration and occupational intensity. However, this interpretation must be approached with some caution, since extraneous taphonomic factors affecting the surface distribution of projectile points may be involved. The classified points included specimens from time-sensitive classes that span the Holocene (Table 1 and Fig. 6). However, Early and Middle Holocene point types (Great Basin Stemmed [11,000 B.P. to 8,000 B.P.] and

Table 1  
FREQUENCIES OF PROJECTILE POINTS IN SURVEYED AREAS AROUND MALHEUR LAKE

Area	Projectile Point Type <sup>a</sup>													Totals
	DSN	SSN	CT	RGS	ECN	EE	ESN	GSS	HCB	WL	NSN	GBS	GBT	
Northwest	7	7	6	241	42	62	14	5	7	9	17	16	2	435
North	1	-	1	18	4	5	-	-	-	-	-	-	-	29
South	2	3	1	59	5	11	-	2	3	3	4	2	-	95
East	15	6	9	41	4	1	-	1	1	1	2	3	-	84
Totals	25	16	17	359	55	79	14	8	11	13	23	21	2	643

<sup>a</sup> Types: DSN = Desert Side-notched; SSN = Small Side-notched; CT = Cottonwood Triangular; RGS = Rosegate series; ECN = Elko Corner-notched; EE = Elko Eared; ESN = Elko Side-notched; GSS = Gatecliff Split Stem; HCB = Humboldt Concave Base; WL = Willow Leaf; NSN = Northern Side-notched; GBS = Great Basin Stemmed; GBT = Great Basin Transverse.

Northern Side-notched [7,000 B.P. to 4,000 B.P.]) constitute less than 12% of the collection. Broad-necked Elko series points account for about 23% of the total assemblage. While some of these specimens may predate 5,000 B.P., the majority probably were used between about 5,000 and 1,000 B.P. They were found at most of the sites recorded during the surveys, and this distribution suggests that general use of the region began during this period. Over half (359; 55.8%) of the collected points are narrow-necked Rosegate series specimens, common after 2,000 B.P. Finally, small triangular Desert series point styles, present in the Great Basin only in the last 800 to 1,000 years, comprise about 9% of the collection.

Rosegate specimens were found at nearly every site recorded and most of the sites had point assemblages dominated by Rosegate series points. Their predominance in the Malheur Lake collections indicates intensive and widespread use of the lake region in the last 2,000 years, as suggested by Aikens and Greenspan (1988). Ten radiocarbon ages obtained from the burials reinforce this view. Nine are less than 1,100 years old, ranging from 160 B.P. to 1,070 B.P., the tenth is 1,830 B.P. (Hemphill 1992a, 1992b, 1992c). However, since all of

the collections were made on eroded surface contexts, both the high numbers of Rosegate series points and the radiocarbon ages may be misleading; the result of erosion affecting and exposing only the upper levels of buried sites. No subsurface investigations have been conducted at these sites, so it is possible that earlier cultural components remain buried. Therefore, the full extent of Early and Middle Holocene occupation of the region may be understated at present. It is also possible that the configurations of the lake and marshes in these earlier periods were so different that earlier shorelines were not encountered during the present surveys.

The apparent increase in human use of the region after 5,000 B.P., however, may be correlated with the re-expansion, or re-establishment, of the Harney Basin wetlands systems at the beginning of the Medithermal. Paleo-environmental research at Diamond Pond, about 20 km. south of Malheur Lake, has reconstructed local climatic trends for the last 6,000 years (Wigand 1985, 1987). The period between 6,000 and 5,400 B.P. was warm and dry, correlating well with Antev's (1948) Altithermal and indicating a very dry climate with a low water table and severe constriction of regional marsh

zones. By 5,400 B.P., however, conditions were beginning to change, becoming more moist, and by 3,750 B.P. the pond was at its deepest, reflecting the onset of the Medithermal and wetter conditions than those of the present. These wet conditions, punctuated with distinct drought episodes, continued until approximately 2,600 B.P., when a drying trend began. Since 2,000 B.P. there have been fluctuations in the amount of effective moisture, with episodes of increased effective moisture and periodic droughts. The projectile point assemblages and the radiocarbon ages indicate substantial occupation of the region since 2,000 B.P., but the data are too coarse-grained at present to determine what effect individual droughts and wet periods had on local populations.

#### LAND USE PATTERNS

Several researchers have argued that wetlands resources, in the form of marsh plants, waterfowl, and fish, were a central part of the subsistence system of Harney Basin populations and that these resources may have fostered a relatively sedentary existence during the later Holocene (Toepel et al. 1984; Greenspan 1985; Minor and Greenspan 1985; Aikens and Greenspan 1988; Musil 1992). Faunal remains analyzed by Greenspan from the Headquarters site (35HA403) on the south shore of the lake (Aikens and Greenspan 1988), and from marsh-edge sites elsewhere in the region (Toepel et al. 1984; Minor and Greenspan 1985; Greenspan 1990, 1991; Musil 1992) indicate that a variety of terrestrial and aquatic resources were used. Large and small mammals and fish were well represented, and birds were present in low numbers at several of the sites (Aikens and Greenspan 1988:48). Hunting equipment, in the form of projectile points, was abundant, but examples of fishing gear were limited to three notched net weights at the Headquarters site (Minor and Toepel 1988:28). Plant foods were important aspects of the aboriginal diet as well,

evidenced by the numerous metates, manos, and other processing implements (Aikens and Greenspan 1988:45; Musil 1992:259-260).

No direct faunal or botanical evidence was collected during the surveys, although small, fragmentary unburned and burned bones were noted on the surface at several sites. In addition, small mammal and fish bones were observed and collected from a large hearth on the eastern side of the lake. Despite the lack of direct evidence, the abundance of milling tools and the presence of 137 notched and girdled net weights indicate a lacustrine subsistence focus for many, if not most, of these sites. Milling tools were found at all but one of the recorded sites and net weights were found at 14 of the sites. The two artifact features containing notched net weights may be the remains of now-decomposed nets with attached weights, presumably used to catch fish or, possibly, waterfowl.

The locations of the recorded sites also suggest that marsh and lacustrine resources were important aspects of the local economy. Many of these sites would have been uninhabitable during periods of high water (similar to that of the recent flooding) but, as mentioned, a variety of marsh habitats prosper in various parts of the "lake" area during lower water intervals. The sites in the northwest portion of the lake are located within the western ecological unit, an area of small ponds, low rises, and a mosaic of freshwater marsh habitats in periods of low or moderate water levels (Fig. 2). The water in this area is generally less alkaline than in other parts of the lake and would support fish and birds as well as a wide variety of emergent marsh vegetation and nearby terrestrial plants. Forty, or over half, of the sites recorded during the surveys were found in this area, primarily on low rises, locations presently islands and mainshore high spots (Fig. 3). The size and variety of artifacts found at many of these sites, along with several possible house features, sug-

gest that they were well-established, intensively used locales.

The north and south shore survey areas were in the central ecological unit, containing freshwater marsh habitats but more open water. The position of the lakeshore fluctuates slightly on portions of the south shore of the lake since the ground rises rapidly into low hills. Fifteen sites were found in that area (Fig. 3), including two very large, artifact-dense sites. Both of these sites are situated on rises along the shore and are ideally located in relation to permanent fresh water (springs), varied nearby wetland and terrestrial resources, and high dry ground. Additionally, these sites are sheltered by the nearby hills from the prevailing winds and weather that blow across the lake from west to east. The Headquarters site, a large probable village underlying the headquarters compound of the refuge, is just west of these two sites in a very similar setting. This combination of natural factors, not found elsewhere around the lake, suggests that the occurrence of three large dense sites in this area is not coincidental. The span and intensity of occupation at these sites also appear rather similar, with each having large assemblages of Rosegate series points, and smaller numbers of Elko series and Northern Side-notched specimens (Aikens and Greenspan 1988; Oetting 1990a, 1990b).

The north shore of Malheur Lake is very flat, in contrast with the northwest and south shores, making the north shore survey area the most variable in terms of shoreline location and the location of attendant wetlands resources. Even if the lake level declined to the 4,093 ft. elevation, the 1960 elevation of the lake (the dashed line in Fig. 3), most of the sites on the northwest and south shores would remain near the water's edge. The sites in the north shore survey tract, however, would be nearly 4 km. from the lake margin. Frequent fluctuation in lake level may have made this region less predictable in terms of resources and resource

availability. Nine sites were found in the north shore tract, all relatively small, low density artifact scatters with few milling tools (Fig. 3). Most of these sites probably functioned as occasional short-term limited use areas for acquiring terrestrial animal and plant resources. The largest sites in this area, significantly, are those closest to the more reliable riverine resources of the Silvies River.

The paleoenvironmental record suggests that the size and configuration of the lake and associated marshlands have varied during the Holocene, so people living near and using these resources would have used different parts of the landscape at different periods. The rising topography of the southern shore limits the amount of shoreline fluctuation that would accompany changing water levels, thus the sites on this shore are more likely to be multi-component, since these areas are likely to have been inhabited again and again throughout the Holocene. This situation may be partially reflected in the range of point types found at these south shore sites (Table 1). The temporal range of points present at sites on the northwest shore suggests that this area also was a favorable location throughout much of the Holocene, since nearly 75% of the collected Great Basin Stemmed, Northern Side-notched, and Elko series points, as well as large assemblages of late Holocene points, were found in this area (Table 1). This distribution may indicate that water levels were low enough to utilize this area for extended periods of time. Shoreline fluctuation would be most pronounced on the northern and eastern edges of the lake. In these areas, single component sites may be more common.

In particular, the nine sites on the eastern islands (Fig. 3), in the more alkaline eastern ecological unit, were dominated by late Holocene point types—small triangular points and narrow-necked, corner-notched points (Table 1). Overall, few earlier styles were represented, and, in particular, few Elko series broad-necked

points were recovered. These assemblages indicate that this portion of the lake region, and its resources, were a favored location in the late prehistoric period. This is reinforced by ethnohistoric information from the ethnographic residents of the region, the *Wada'tika* Northern Paiute, who assembled annually on the north-eastern shore of Malheur Lake to harvest *waada* seeds (Couture 1978:30). *Waada* (*Suaeda depressa*) is a seed-bearing chenopod that was of great economic importance to the *Wada'tika* people. The survey archaeologists noted that *waada* plants were more abundant in the eastern part of the lake than elsewhere, and two-thirds of the collected late prehistoric Desert Side-notched and Cottonwood Triangular points were recovered from this survey area. While the casual association of these small triangular point styles with Numic groups has been justly disputed (Kehoe 1966; Butler 1978; Baxter et al. 1983; Lohse 1985), this does not preclude the possibility that in the Harney Basin these points are indicative of Numic people. The differential presence of such points in an area known to have been a focus of ethnographic Northern Paiute activity may be significant.

The foregoing discussion has suggested that several of the large, artifact-dense sites recorded during the surveys may have functioned as annually reoccupied villages, or possibly perennially occupied villages. This inference is based on the observed cultural assemblages and features, and on ethnographic analogy. Probable house features were found at three of these sites, suggesting long-term and/or recurrent occupation. Numerous burials were encountered. These sites have large quantities and varieties of flaked stone tools, finely formed and finished milling equipment, numerous notched net weights, and a variety of bone/antler/shell tools and ornaments. In addition to the diversity of finished tools found, the large cores, tool blanks, preforms, and quantities of debitage provide further evidence that some of these sites

were well-used locations, rather than temporary camps or task locations. The quantity of lithic raw materials and the size of many unused waste flakes indicate that the local prehistoric residents had plentiful local sources for these materials and little need to economize on their use or transport.

The distinctive bifacial blades suggest another avenue for considering sedentism (Fig. 4). Similar large bipointed and sometimes waisted obsidian blades have been found in ethnographic contexts in northwestern California and in archaeological contexts in southwestern Oregon (Cressman 1933; Hughes 1990), the Klamath/Modoc region (Sampson 1985:357), and on the Columbia River (Strong 1960), but have rarely been found in the Great Basin. Such blades were considered wealth or treasure in northwestern California and displayed only during special dances (Rust 1905; Kroeber 1925:26-27). The possibility that the Malheur Lake bifacial blades were related to wealth or social status may reflect the operation of a relatively sedentary and complex social system in this area. This hypothesis cannot be adequately addressed with the data currently available, but it certainly suggests interesting avenues for continuing research.

Such semisedentary, wetlands-oriented groups have been likened to the ethnographic Klamath/Modoc elsewhere in the northern Great Basin—in Warner Valley (Weide 1968) and in the Lake Abert-Chewaucan Marsh Basin (Oetting 1989). In Harney Basin both the Klamath/Modoc (Minor and Toepel 1988) and the local ethnographic inhabitants, the *Wada'tika* Northern Paiute (Aikens and Greenspan 1988), have been considered as analogues for examining the local prehistoric settlement-subsistence patterns. Regardless of ethnic affiliation, however, the evidence from both of these Oregon groups indicates that villages such as these at Malheur Lake were occupied during the winter months (Spier 1930:10; Couture 1978:



31) and perhaps for longer periods (Stern 1966: 11).

### SUMMARY

The archaeological surveys conducted on the recently flooded islands and shores of Malheur Lake resulted in the location and recordation of 73 archaeological sites. Cultural remains were found in virtually every part of the lake inspected, but the majority of sites and artifacts were found on the islands and mainland shores in the northwest portion of the lake. The recorded sites ranged widely in size and artifact density. Limited surface collections resulted in the recovery of 2,131 artifacts. The density and diversity of assemblages at some of the sites have, at present, few parallels in the northern Great Basin. Artifacts such as the large bifacial blades and the well finished ground stone implements have rarely been found in the region and never in the numbers seen at these sites.

The recovered projectile points provide evidence for prehistoric use of the Malheur Lake area throughout the Holocene. Widespread use and occupation of the lake and marsh shores appears to have begun after 5,000 B.P., probably corresponding to the ameliorating Medithermal climate and re-expansion of the region's wetlands systems. However, the surface-collected temporal data may not fully reflect the extent of earlier occupations, which may remain buried. The numbers and wide distribution of narrow-necked projectile points suggest that human occupation was most intensive after 2,000 B.P.

A lacustrine subsistence focus can be inferred for many of the recorded sites, based on the location of sites and the presence of particular tool types. The variety and density of artifacts, along with the presence of possible house features, suggest that some of the sites were seasonally reoccupied villages. The site locations and inferred land use patterns can be correlated to some extent with the ecological con-

ditions affecting various parts of the lake, with large diverse sites found in the rich marshland mosaic of the northwest shore and the stable shoreline of the south shore, but smaller, less diverse sites on the fluctuating north shore. In general, the data collected during the Malheur Lake surveys reinforce the view that Harney Basin was one of several well-watered basins in the northern Great Basin that supported prehistoric populations residing in relatively stable settlements and making intensive use of wetlands resources (Aikens 1985; Aikens and Greenspan 1988; Oetting 1989; Musil 1992). These surveys have demonstrated the rich potential of the Malheur Lake archaeological record and the vulnerability of this record to both natural and human disturbances.

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