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ABSTRACT

Silent Snake Springs is a small midden site located in Humboldt County, Nevada. Test excavations indicate that the major occupation at Silent Snake Springs occurred during the so-called Pinto time period. This chronology is supported by 25 obsidian hydration readings, and a single radiocarbon date of 4100 B.C. ± 380 (corrected). Nearly all the identifiable faunal remains are bighorn sheep, and the associated tool assemblage indicates that hunting and butchering were the major aboriginal activites at Silent Snake Springs. A somewhat later component is characterized by the presence of Rose Spring series projectile points and grinding stones. The settlement pattern in the Silent Snake Springs region is poorly understood, but preliminary indications suggest a shift toward spring resources during the Altithermal period, roughly 5000 to 2500 B.C.

INTRODUCTION

Silent Snake Springs is one of several sites discovered and tested by the authors during the summer of 1967. Layton was conducting a site survey of the High Rock area (Layton, 1970, 1972, 1973) and Thomas was studying the faunal materials recovered from these sites (Thomas, 1968, 1969, 1970b, 1971).

Silent Snake Springs was occupied primarily during the so-called Pinto period (Hester, 1973). Well-documented Pinto age occupations are relatively rare in the Great Basin, the most notable examples being the Stahl site (Harrington, 1957), Hidden Cave (Roust and Clewlow, 1968), King's Dog (O'Connell, 1975) and Gatecliff Shelter (Thomas, MS.). Pinto series projectile points also occur at both Danger and Hogup Caves in western Utah, but the components are not stratigraphically distinct (Aikens, 1970). A great deal of confusion exists regarding projectile point terminology for this time period (see Hester, 1973, pp. 26-28); for the purposes of the present report, we retain the term "Pinto," recognizing that a revision will be in order as more data come to light.

Some investigators, most notably Baumhoff and Heizer (1965), have argued that the scarcity of Pinto-age sites can be explained as the result of hotter and/or drier environmental conditions. This argument contends that the Altithermal period rendered the Great Basin virtually uninhabitable from about 5000 B.C. to 2500 B.C. These findings have been disputed by Jennings (1957, 1964) and Aikens (1970), who failed to find any evidence of climatic change in excavations at Danger and Hogup caves.

More recent discussion of the Altithermal issue has stressed the importance of gathering additional data, and developing regional climatic and cultural sequences (see O'Connell and Hayward, 1972; Davis and Elston, 1972; Elston, 1976). In addition, the long-term excavations by the American Museum of Natural History at Gatecliff and Triple T Shelters in Nye County, Nevada, indicate that any encompassing, basin-wide interpretation of climatic change is bound to be overgeneralized and misleading. The so-called Pinto period witnessed a number of settlement and subsistence changes in the Desert West. Fagan (1974), for instance, has suggested that Altithermal age sites will tend to be in association with spring localities. We present results from limited excavations at Silent Snake Springs because they provide comparative evidence regarding Altithermal period occupation in the northwestern Great Basin.

ACKNOWLEDGMENTS

The Silent Snake Springs excavation was jointly sponsored and financed by the Peabody Museum, Harvard University and the Nevada State Museum in Carson City. We are grateful to Mr. James C. Calhoun, Director Emeritus and Mr. Donald R. Tuohy, Curator of Anthropology, both of the Nevada State Museum.

Dr. Stephen Williams and Dr. J. O. Brew at the Peabody Museum provided good council and helped arrange financial backing for the project. Dr. Martin A. Baumhoff at the University of California, Davis assisted us in securing a three-quarter ton truck for the 1967 fieldwork.

The 1967 crew consisted of the authors, Mr. Dan Andrews, Mr. Arnold Green, Mr. Steve Hayden, Mr. Steve Lent and Mr. Marc Young. Assisting Layton in 1968 were Mr. Dwight Burnham, Mr. Michael Evans, Ms. Eileen Moffat and Ms. Anne Stephenson. The artifacts were illustrated by Ms. Sarah Bandes and the additional artwork was provided by Mr. Dennis O'Brien. Obsidian hydration measurements were made by Paul Aiello of the University of California, Los Angeles. Mr. Philip Rasch, Ms. Lisa Cook, Ms. Jane Epstein, and Ms. Susan Bierwirth assisted in the preparation of the manuscript.

THE SETTING

Silent Snake Springs (designated as site 26Hu201 in the Nevada State Museum system) is located in the rugged High Rock Country of northwestern Nevada, approximately 63 km. east of the California border and 100 km. south of the Oregon border (fig. 1).

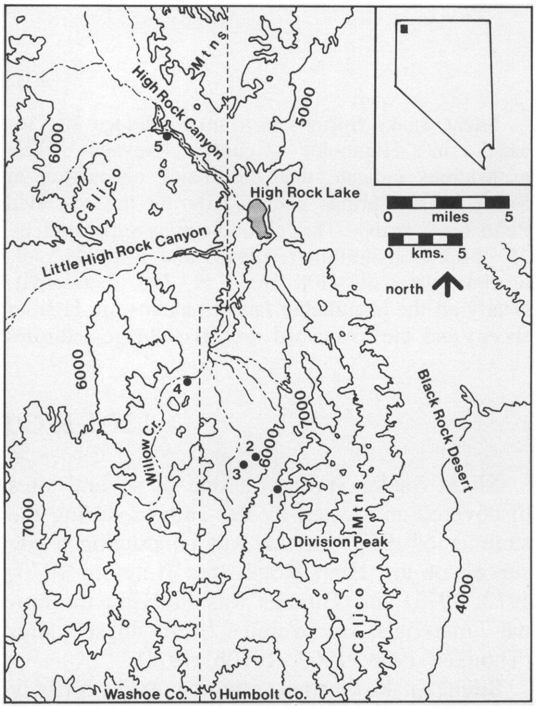

FIG. 1. Archaeological map of the High Rock Country. 1. Silent Snake Springs (26Hu201); 2. Smokey Creek Cave (26Hu46); 3. Calico surface site (26Hu202); 4. Little Smokey Shelter (26Wa1501); 5. Swallow Marsh Shelter (26Wa1503).

The High Rock Country is the most southerly extension of the Columbia Lava Plateau. It is a vast tableland of lava beds which are layered one above the other and average 1829 m. (6000 ft.) in elevation. The lava has been warped, faulted, eroded, and exposed as rimrock in the walls of canyons. The name High Rock Country refers to these vertical lava exposures. The highest elevations are Granite Peak 2760 m. (9056 ft.) and Division Peak 2588 m. (8491 ft.) at the base of which lies the Silent Snake Springs site at 1920 m. (6300 ft.).

The High Rock Country is a high desert. For January, daily mean maximum temperature ranges from 1°C. (34°F.) to 3°C. (38°F.), while the mean minimum temperature is about −9°C. (16°F.). For July, the mean maximum temperature ranges from 27°C. (80°F.) to 31°C. (88°F.), while the mean minimum temperature ranges from 7°C. (44°F.) to 11°C. (52°F.) (Brown, 1960). Low temperatures are caused primarily by radiational cooling of stagnant air rather than rapid invasion of the area by polar air masses (Aschmann, 1958, p. 25). Precipitation varies greatly from year to year. However, mean annual precipitation is about 30.5 cm. (12 in.) and occurs mainly during the winter, although local and unpredictable cloud bursts occur throughout the area in the late spring and summer (Brown, 1960). Winter and spring storms are generally due to the mid-latitude cyclone which brings moisture-laden air from the west and northwest (Aschmann, 1958, p. 27). Precipitation is closely correlated with elevation, and the rain shadow effect is pronounced to the east of major mountains. Snowmelt provides a major source of water for streamflow, but since snowfall is rarely heavy, most streams flow only during the winter and spring. Low humidity and abundant sunshine cause rapid evaporation which far exceeds precipitation. Although year-round springs may be found throughout the area, few watersheds have precipitation sufficient to maintain year-round standing water.

Most of the High Rock Country is subsumed under the Sagebrush Zone, described by Billings (1951) and Cronquist et al. (1972, pp. 122-126). But such blanket descriptions tend to ignore the presence of discrete micro-environments which, although rarely recognized and mapped by plant geographers, were certainly exploited by people throughout prehistory.

In the well-drained portions of the High Rock Country, native ground cover consisted primarily of sagebrush (usually *Artemisia tridentata*) supplemented by rabbitbrush (*Chrysothammus* spp.) and clumps of perennial bunchgrasses. Native bunchgrasses have now been reduced by overgrazing and replaced by annuals such as cheatgrass. On more saline soils, greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex* spp.), and spiny hop-sage (*Grayia spinosa*) are dominant (Pease, 1965, pp. 38-39). In those isolated situations where standing water is present, aquatic plants such as tules (*Scirpus* spp.), cattails (*Typhus latifolia*), and reeds (*Phragmites* spp.) may be found. Willows occur along streams, and areas of spring seepage produce small lush meadows of native grasses, reeds, roots, and tubers. The only broadleaf trees present are quaking aspen (*Populus tremuloides*), which grow on high mountain slopes and in well-watered canyons and cottonwood (*Populus trichopatra*) is found along the lower water courses. Western juniper (*Juniperus occidentalis*) occurs in sparse stands at somewhat higher elevations. The highest elevations of the High Rock Country support stands of mountain mahogany (*Cercocarpus ledifolius*).

It is important to note that the High Rock Country is well north of the known range of piñon pine (*Pinus monophylla*), the nuts of which provided a dietary staple to aboriginal groups south of the Humboldt River (Steward, 1938).

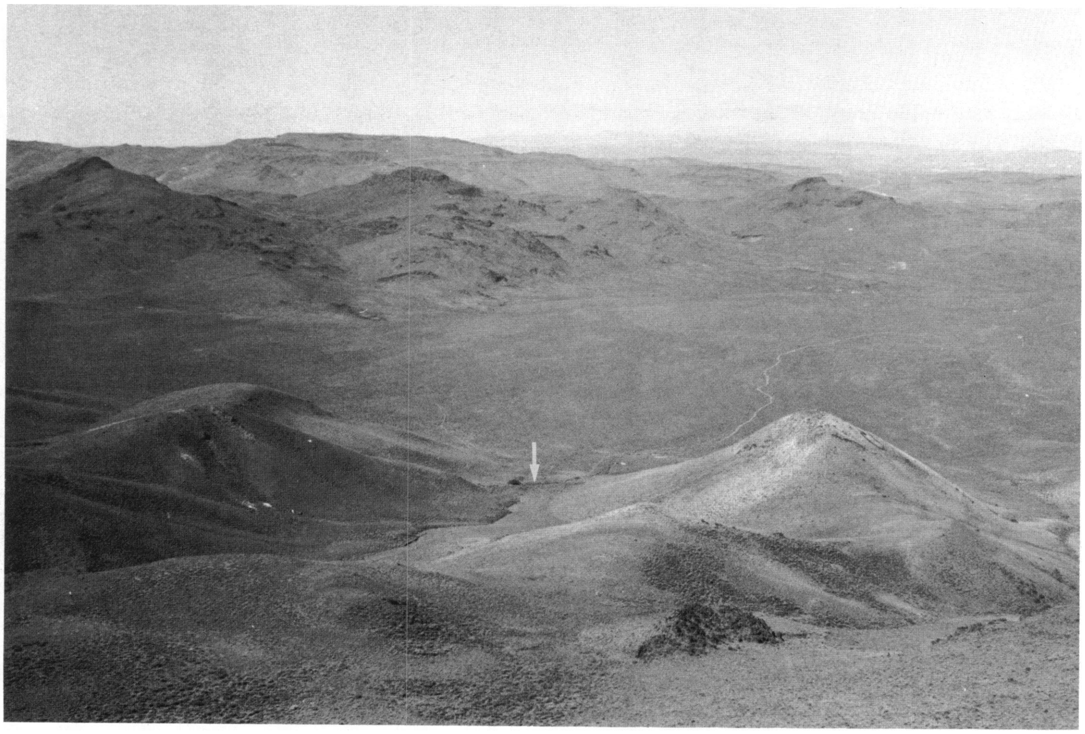

FIG. 2. The Silent Snake Springs site, facing west. Arrow points to location of the 1967-1968 excavations.

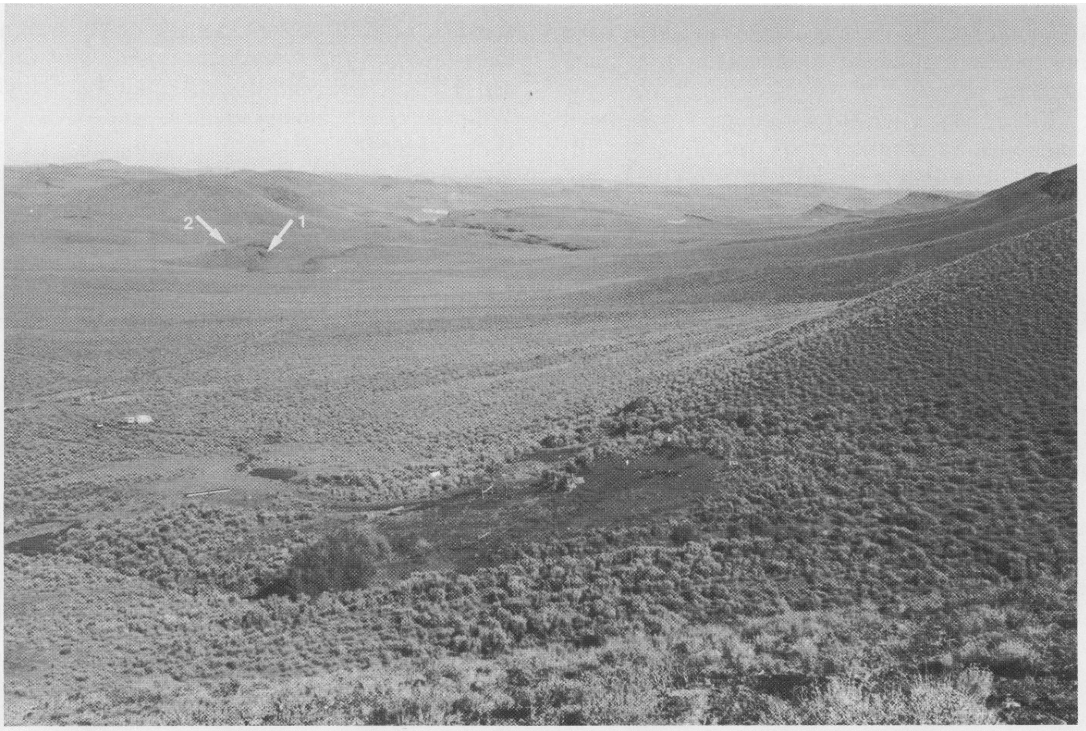

FIG. 3. View of Silent Snake Springs site and field camp, facing north. All excavations were in the dark bulldozed area in the center of the picture. The arrows point to the locations of Smokey Creek Cave (#1) and the area of the Calico surface collection (#2).

THE SILENT SNAKE SPRINGS SITE

Silent Snake Springs is a midden site located on an outwash fan at the mouth of a steep canyon near the base of Division Peak (figs. 2, 3). Several small springs discharge year-round from the western edge of the fan upon which the midden is situated. Division Peak rises to an elevation of 2588 m. (8491 ft.) and provides the drainage to keep these springs permanently supplied with clear, cold water. The Silent Snake Springs site is at an elevation of 1920 m. (6300 ft.). Along the southern boundary of the site is a steeply gullied streambed which receives winter and spring runoff. The streambed has been dry during the months from July to October when visited by the authors. Silent Snake Springs is one of the few reliable water sources in the area today.

The site was discovered and tested during the summer of 1967 and excavations were completed during the summer of 1968. The site was named by Thomas when he found himself standing on a rattlesnake which stubbornly refused to rattle.

The site itself consists of an area of black midden measuring approximately 39 by 20 m. (fig. 4). The Bureau of Land Management had bulldozed the ground cover and some of the surface deposit in an effort to create a fenced test plot, in which vegetation could be protected from grazing. Regrettably, the enthusiasm of the bulldozer operator far exceeded the area to be fenced and much of the archaeological deposits were unnecessarily exposed. The site probably extends an additional 18 m. (60 ft.) to the north and 9 m. (30 ft.) to the east of the bulldozed area.

EXCAVATION PROCEDURE

The site was first surveyed, and a grid of 5-foot squares was established across the bulldozed area (fig. 4). Consecutive letters were

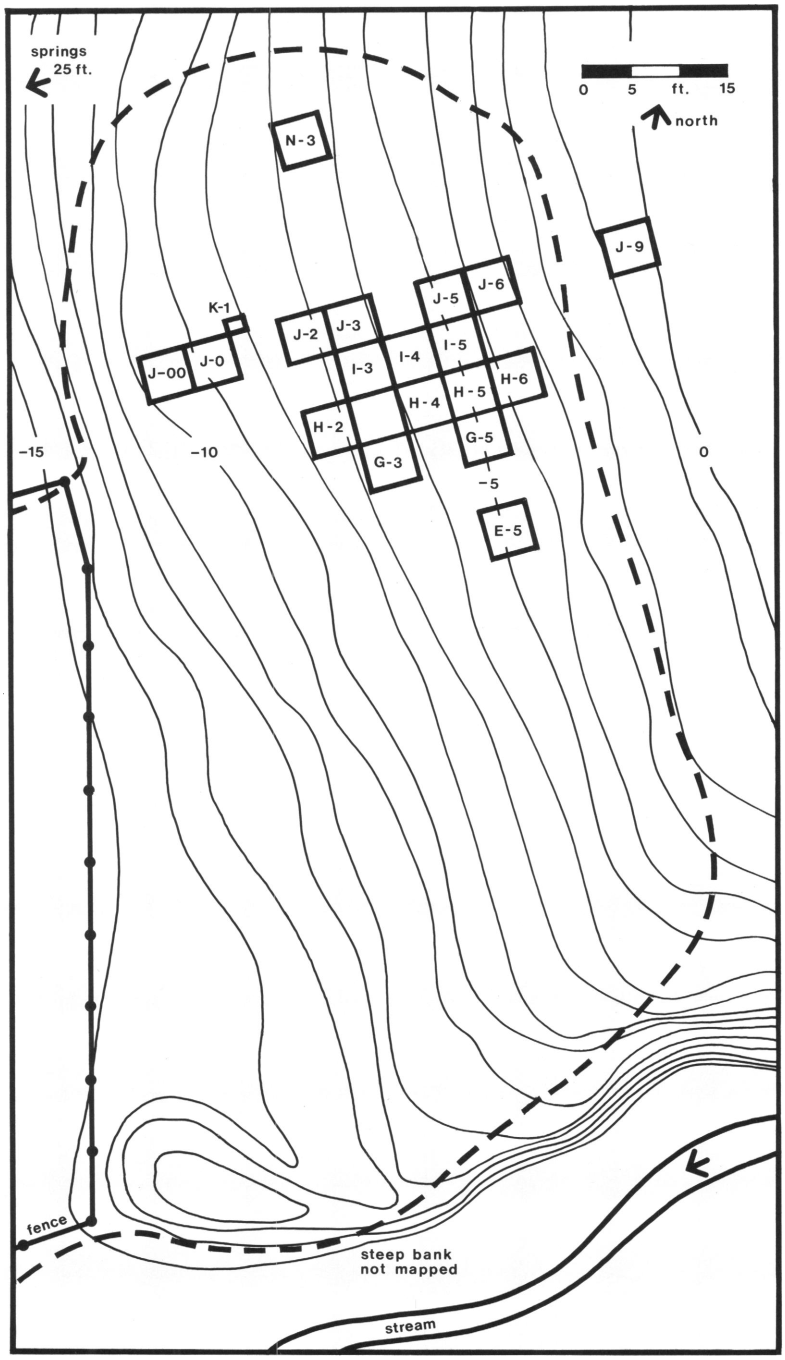

FIG. 4. Contour map of Silent Snake Springs. The contour interval is 1 foot, and the dashed line marks area disturbed by bulldozer.

assigned for south-north rows, and numbers were applied to the east-west rows, so that each excavation unit was designated by alphabetic and numerical coordinates.

The original surface configuration of the site had been badly disrupted by the bulldozer, so we attempted to reconstruct these original contours in the initial test pits of 1967. Once we determined the slope of the sub-midden sterile deposits, it was possible to project the arbitrary 6-inch excavation levels along a similar pitch.

We attempted to find all specimens *in situ* and plot their proveniences in three dimensions. Since the moist black midden often stuck to the obsidian specimens with such tenacity, only about 25 percent of the artifacts were actually found in place. All excavated deposits were sifted through ¼-in. mesh screen, and all bones and chipping debris were saved.

Stratigraphy

The stratigraphy at Silent Snake Springs was not complex (fig. 6). The uppermost unit consisted of greasy black midden which contained a dense root mat. Unit 1 occurred only on the western units at Silent Snake Springs and attained a maximum thickness of about 2.5 ft. The underlying Unit 2 was identical, except that the root mat was absent. Unit 2 was found in all excavated units and comprised the uppermost stratigraphic level in the eastern units. Within midden Unit 2 was a discontinuous thin lens of sterile yellow flood debris about 3 in. thick. This lens was recognized at a depth of about 1 ft. below the present surface, and sloped downward to the west at a rate of about 10 in. per 5 ft. The basal stratigraphic unit consisted of a sterile yellow subsoil.

MATERIAL CULTURE

Projectile Points: A total of 73 typable projectile points was excavated at Silent Snake Springs. An additional two specimens were found on the surface of the site, and four more were surface collected within 200 m. of the site. All points are illustrated on figures 7-11.

The Great Basin projectile point sequence has been discussed in detail by a number of

Fig. 5. Excavations at Silent Snake Springs, looking east.

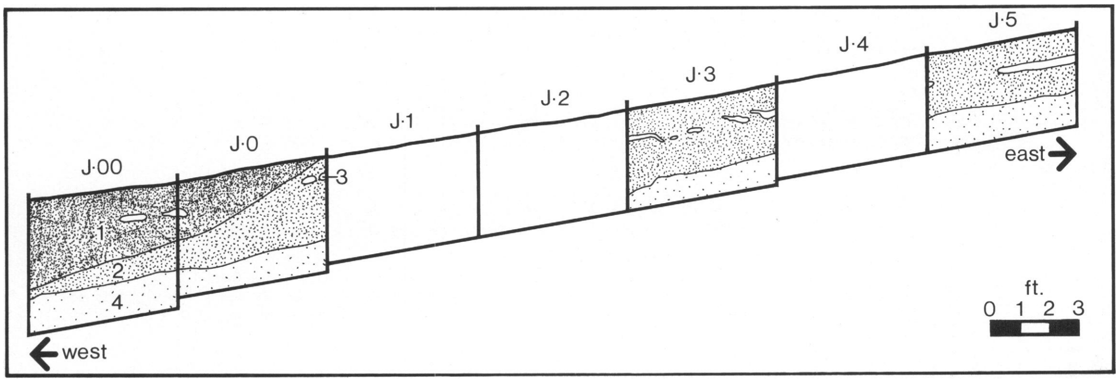

FIG. 6. Stratigraphic profile of north wall of J trench, Silent Snake Springs. Stratigraphic Unit 1 is black midden with heavy root concentration. Unit 2 is identical with Unit 1, except that roots are absent. Unit 3 is a lens of sterile yellow slopewash. Unit 4 is sterile yellow subsoil.

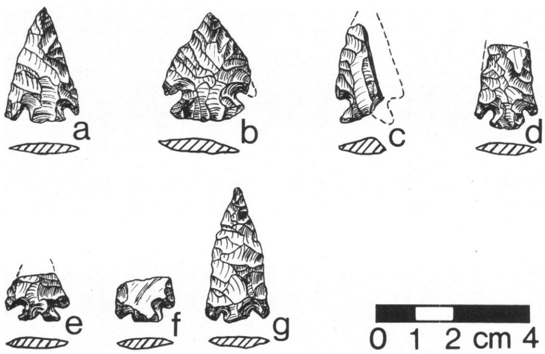

FIG. 7. Eastgate and Rose Spring series projectile points from Silent Snake Springs. a. 101-303; b. 101-328; c. 101-209; d. 101-194; e. 101-257; f. 101-201; g. 101-204.

investigators, most notably Heizer and Baumhoff (1961), Lanning (1963), O'Connell and Ambro (1968), Clewlow (1967), Gruhn (1961), Layton (1970), and Hester (1973). The points from Silent Snake Springs have been analyzed according to quantitative criteria defined elsewhere (Thomas, 1970a; Thomas and Bettinger, 1976), and detailed attribute data are provided on table 1.[1]

The proveniences of the excavated specimens are tabulated on table 2. These figures exclude specimens found in the badly disturbed unit J-00. Although a great deal of stratigraphic mixture has occurred in the deposits at Silent Snake Springs, we do note that the earlier Pinto and Humboldt series tend to be stratigraphically inferior to the later Rose Spring and Elko Series points.

BIFACES: This category includes bifacially flaked stone implements (other than projectile points) that are less than 10 cm. long. The symmetrical bifaces are either triangular or oval, and the asymmetrical bifaces have lanceolate outlines (fig. 12). The Silent Snake Springs bifaces undoubtedly represent various manufacturing stages for the production of projectile points as well as finished products. Forty-two specimens (mostly bases) were sufficiently intact for analysis, and they can be described in three morphological types. Table 3 provides the provenience of these bifaces.

Biface type 1 (19 specimens: 18 obsidian, 1 chert). Type 1 bifaces are symmetrical and triangular in form, with straight or slightly convex base (see fig. 12k). The specimens are characterized by fine peripheral secondary retouch and seem to be finished products. The base is generally thinned, suggesting that many were hafted and used as knives.

Biface type 2 (18 specimens: 16 obsidian, 2 chert). Type 2 bifaces are symmetrical and oval in form, with a markedly convex base (see fig. 12 l-o). The flaking is rough and peripheral retouch is rare. Basal thinning is generally absent. These

[1]The key published by Thomas (1970a) and Thomas and Bettinger (1976) is currently being revised on the basis of data generated at Gatecliff Shelter. For the present paper, the old designations will be followed, except that the *Bare Creek Eared* type is combined into the Pinto series.

TABLE 1
Attributes for Projectile Points from Silent Snake Springs
(Variates in parentheses are estimates for broken artifacts.)

Spec. No.	Unit	Depth	Type	Length max.	Length axial	Width max.	Width basal	Thick-ness	DSA	PSA	Neck Width	Weight	Wt. Est.	Obsidian Hydration
101-4	G-5	0-6	P	42.2	38.0	25.5	12.8	4.6	170	100	(11.7)	4.2	4.5	4.3±.2
101-6	G-5	6-12	P	44.0	39.6	25.0	13.3	5.5	180	100	12.3	5.0	5.0	4.8±.2
101-10	G-5	6-12	P	(58.0)	(53.0)	31.0	15.8	5.5	150	85	16.4	5.6	10.0	5.9±.2
101-16	N-3	6-12	ECN	29.0	27.5	(27.5)	(21.0)	4.8	150	140	13.0	2.7	3.0	4.2±.1
101-18	J-6	0-6	ECN	49.3	47.9	(27.8)	14.9	4.6	120	110	10.6	4.3	4.5	—
101-21	J-6	0-6	ECN	(40.0)	(37.8)	26.6	17.6	4.3	140	120	13.1	4.0	4.5	4.1±.1
101-27	J-6	6-12	P	(37.0)	(34.5)	(23.7)	12.0	4.6	145	95	(11.5)	2.8	3.4	—
101-29	J-9	12-18	P	39.6	37.0	23.8	11.3	4.9	150	90	10.5	2.9	2.9	—
101-36	K-1	[a]	NSN	(39.5)	(38.8)	18.2	16.4	5.2	180	165	8.7	3.6	4.5	—
101-37	Surface	—	EE	(39.3)	(37.0)	(26.3)	15.3	4.8	—	120	13.1	2.8	4.0	—
101-39	K-1	[a]	No type	54.4	54.4	19.7	11.4	5.8	—	—	—	6.2	6.2	—
101-61	J-3	3	No type	(30.0)	(29.0)	12.5	8.2	3.9	200	90	—	1.4	1.6	—
101-63	I-4	6-9	P	(47.0)	(43.5)	30.2	12.5	7.8	170	90	13.5	8.0	10.0	—
101-65	I-4	7	NSN	(45.0)	(38.5)	30.0	30.0	5.0	175	165	11.1	3.3	5.0	3.3±.1
101-66	I-4	6-12	ECN	(40.0)	(38.0)	22.5	(18.0)	5.0	180	130	(12.6)	2.7	4.5	4.8±.2
101-82	I-4	14	P	62.4	50.1	23.8	17.5	6.6	190	90	17.5	8.3	8.3	3.3±.3
101-92	I-4	18-24	HCB-B	(29.5)	(27.0)	18.0	(18.0)	4.2	—	—	—	.8	1.9	—
101-95	I-4	24-30	HBN	51.8	(46.3)	(16.8)	(16.8)	5.4	—	—	—	3.6	4.0	—
101-96	H-5	1	ECN	(37.5)	(36.8)	(26.0)	12.0	5.3	145	95	11.1	3.3	3.5	—
101-101	H-5	8	No type	(50.0)	(50.0)	14.8	12.0	4.7	—	—	—	2.9	3.1	—
101-102	H-5	0-12	ECN	(42.0)	(40.0)	(24.0)	(15.0)	4.8	160	140	10.7	3.1	3.2	—
101-110	H-5	13	P	35.8	32.8	27.3	13.1	6.0	160	100	11.7	4.4	4.4	—
101-111	H-5	13	P	39.0	35.5	30.0	13.5	4.6	175	90	13.4	3.7	3.8	—
101-112	H-5	13	P	34.2	32.0	23.4	13.3	4.9	170	100	12.0	2.6	2.6	4.8±.2
101-119	H-4	5	P	35.7	30.6	25.4	22.4	5.3	185	75	15.0	4.3	4.3	—
101-120	H-4	9	P	(41.5)	(39.5)	27.2	12.3	7.1	150	90	11.6	5.4	6.0	—
101-122	H-4	0-6	ECN	(30.0)	(28.0)	—	16.0	4.0	—	140	9.5	.5	>3.0	—
101-132	H-4	11	P	63.1	59.0	27.5	16.0	5.6	170	100	14.8	7.8	8.0	—
101-133	H-4	14	HBN	(51.0)	48.5	17.0	(17.0)	4.5	—	—	—	3.5	3.8	5.3±.2
101-140	I-3	2	NSN	40.0	38.3	25.6	25.6	4.9	160	170	9.2	3.8	3.8	4.4±.1
101-141	I-3	0-6	P	(41.0)	(38.0)	25.8	14.3	5.8	170	100	12.1	5.1	5.5	4.4±.2
101-148	I-3	6-12	P	(32.5)	(29.0)	(20.5)	11.5	4.5	165	105	10.0	1.7	3.0	—
101-149	I-3	6-12	P	(48.0)	(41.7)	(31.5)	19.6	5.6	—	80	18.8	4.0	6.0	4.4±.2
101-162	H-6	0-6	ECN	34.8	33.8	20.7	(13.1)	4.5	150	150	7.8	2.5	3.0	4.2±.1
101-163	H-6	6	[b]	28.5	28.5	(18.0)	17.0	3.6	160	150	—	.8	1.7	—
101-167	H-6	6-12	P	(47.2)	(44.5)	22.8	13.2	4.9	160	100	11.7	4.1	4.5	—
101-168	H-6	12-18	P	(37.0)	(35.5)	22.0	10.7	5.9	170	90	10.1	3.4	3.8	—

TABLE 1 — (*Continued*)

Spec. No.	Unit	Depth	Type	Length max.	Length axial	Width max.	Width basal	Thick-ness	DSA	PSA	Neck Width	Weight	Wt. Est.	Obsidian Hydration
101-175	J-OO	0-6	E/P	(45.5)	—	28.6	—	4.4	130	—	14.5	3.7	4.0	—
101-176	J-OO	0-6	P	(39.5)	(36.2)	25.3	14.5	4.3	170	100	—	3.4	5.0	—
101-178	J-OO	0-6	HCB-B	(35.5)	(30.5)	16.3	16.3	4.2	—	—	—	1.5	2.0	—
101-194	J-OO	6-12	RSCN	(33.0)	(33.0)	17.0	9.8	3.8	130	110	7.8	1.7	2.5	2.7±.2
101-199	J-OO	8	P	(45.2)	(42.0)	(25.0)	(14.5)	6.7	—	—	—	6.0	7.0	—
101-201	J-OO	12-18	RSCN	(27.2)	(27.2)	17.0	9.5	2.6	165	90	7.2	.7	2.0	—
101-204	J-OO	24-30	EsEs	36.5	36.5	16.6	7.1	3.5	130	100	6.5	1.8	1.8	—
101-205	J-OO	24-30	HCB-A	(33.5)	(32.0)	13.5	(13.5)	4.5	—	—	—	1.3	>3.0	4.3±. 2
101-207	I-5	0-6	[b]	(63.0)	(60.0)	(26.0)	14.2	7.1	—	—	—	9.4	10.5	—
101-209	I-5	0-6	RSCN	(31.5)	(30.0)	(18.5)	(16.5)	4.4	180	145	—	1.3	2.5	—
101-216	I-5	7	P	(39.5)	(37.5)	(24.0)	12.1	4.2	180	95	11.6	2.8	3.2	—
101-217	I-5	6-12	P	(37.0)	(35.5)	22.5	12.3	5.0	150	90	10.2	3.7	4.0	4.9±.1
101-218	I-5	8	P	39.3	37.0	25.2	11.9	4.3	150	90	12.2	4.5	4.5	4.4±.1
101-219	I-5	6-12	P	(32.0)	(30.1)	(28.6)	12.5	6.2	155	70	(13.7)	3.6	4.0	—
101-220	I-5	10	EE	37.5	34.2	28.8	(20.0)	5.0	175	130	13.4	3.7	3.8	—
101-224	I-5	12-18	P	(50.0)	(46.5)	32.5	14.2	7.3	150	90	14.6	5.9	7.0	—
101-231	I-5	18-24	P	(33.0)	32.0	(18.0)	10.5	4.7	180	90	(8.3)	1.9	2.3	—
101-237	J-5	6-12	P	36.0	33.6	(22.0)	11.0	5.3	180	95	10.8	3.2	3.5	—
101-247	J-5	15	HCB-A	(56.0)	(51.0)	24.0	20.0	5.9	—	—	—	7.0	10.0	4.7±.1
101-257	J-OO	6-12	RSCN	(23.5)	(21.5)	18.0	12.0	3.0	150	120	8.1	0.5	0.8	—
101-259	J-O	6-12	EE	(26.3)	(23.0)	—	15.4	2.6	—	110	(11.1)	0.3	>3.0	—
101-263	J-O	12-18	HCB-B	(25.3)	(23.3)	12.6	12.6	3.1	—	—	—	.6	3.0	—
101-264	J-O	6-9	ECN	(54.5)	(52.0)	27.4	23.0	5.9	170	145	15.1	6.4	8.0	3.8±.2
101-274	H-2	0-6	P	(40.5)	(34.3)	24.5	17.5	5.7	180	85	16.9	4.1	6.0	4.1±.2
101-295	H-2	18	HCB-A	48.0	46.3	17.7	11.0	5.6	—	—	—	3.4	3.6	5.4±.2
101-301	J-3	18-24	HCB-B	26.2	21.9	15.3	14.2	3.5	—	—	—	1.6	1.6	4.8±.2
101-302	J-2	4	P	42.4	39.0	17.8	(11.0)	4.2	170	100	(7.7)	2.3	2.7	—
101-303	J-2	0-6	RSCN	31.0	31.0	20.0	(9.6)	3.9	120	95	9.2	1.9	1.9	1.1±.1
101-307	J-2	0-6	ECN	33.0	31.0	—	17.5	3.3	—	140	(12.0)	.4	>3.0	—
101-322	J-2	12-18	HCB-B	38.5	34.9	16.6	14.3	4.1	—	—	—	2.4	2.4	—
101-323	G-3	6-9	No type	51.2	51.2	14.9	7.6	5.3	—	—	—	3.4	3.4	—
101-324	G-3	2	HBN	48.0	45.7	14.3	14.3	4.0	—	—	—	3.4	3.4	4.3±.4
101-328	I-5	0	RSCN	29.1	29.1	24.3	20.6	4.3	150	140	14.4	2.6	2.6	—
101-330	Surface	—	HCB-A	(36.5)	(35.2)	15.1	12.7	5.5	—	—	—	2.9	3.5	—
101-331	Surface	—	HCB-B	29.2	27.3	16.3	15.0	3.6	—	—	—	1.8	1.8	—
101-335	Surface	—	HBN	41.5	38.0	21.3	21.3	3.8	—	—	—	2.6	4.0	—
101-336	Surface	—	NSN	(28.8)	(28.8)	20.4	20.4	4.1	180	165	10.4	1.9	2.0	—
101-343	Surface	—	P	(29.2)	(26.4)	(20.0)	(16.0)	4.3	170	110	(10.2)	2.2	3.0	—

[a]No depths in disturbed unit; [b]Too fragmentary to type.

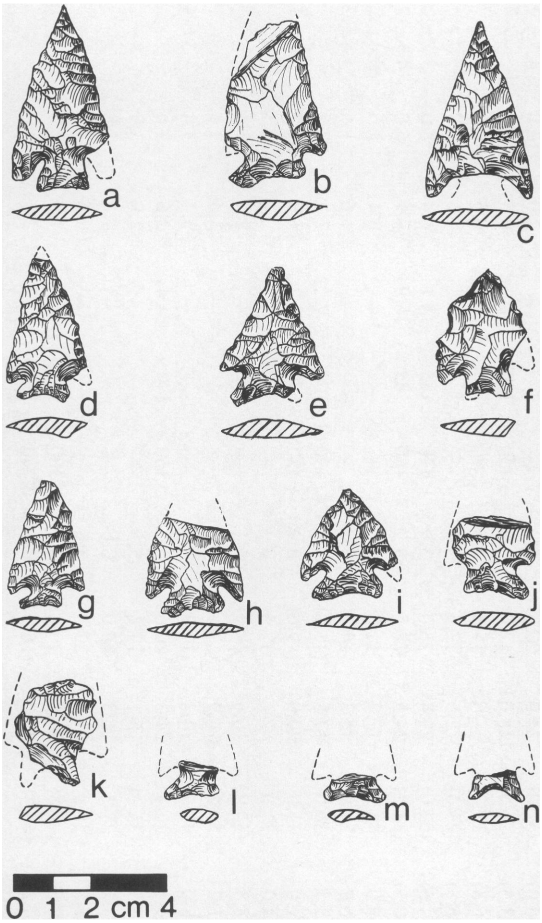

FIG. 8. Elko series projectile points from Silent Snake Springs. a. 101-18; b. 101-264; c. 101-175; d. 101-102; e. 101-220; f. 101-96; g. 101-162; h. 101-21; i. 101-16; j. 101-66; k. 101-37; l. 101-122; m. 101-307; n. 101-225.

bifaces are probably roughouts, blanks and rejects rather than finished artifacts.

Biface type 3 (5 specimens: 1 obsidian, 4 chert). Type 3 bifaces are lanceolate and sometimes bipointed in outline (see fig. 12 p-q). Primary flakes are broad, flat and invasive; all specimens exhibit fine peripheral retouch. Chert is commonly used for type 3 bifaces and workmanship is superior to the other biface types (particularly type 2). One edge of the biface—probably the primary cutting edge—is generally more convex than the other.

DRILLS: Four chipped stone drills were recovered, two of them from the surface (nos. 101-353 and 101-340; see fig. 12 e-h). The other two specimens were recovered from the disturbed Unit J-00 (nos. 101-186 and 101-187; (see fig. 12). All specimens were made of chert, except 101-187, which is of obsidian and appears to be a reworked Humboldt Series projectile point.

GRAVER: One bifacially retouched chert flake had been worked into a graver (Unit H-2, 3 in. below surface). This subcircular flake (101-278) is 3.5 cm. at maximum diameter and 0.3 cm. thick. The nipple-like graver projection is 0.6 cm. in length.

CHOPPER: One chopper (101-161) is made on a rectangular basalt flake with bifacial retouch along both long edges and one short edge (which is battered from use). The chopper was recovered in Unit H-6, in the 0.6 in. level. Its

TABLE 2
Projectile Point Provenience (Specimens from Unit J-OO and Surface Excluded)

	Type				
Depth	Rose Spring Corner-notched	Elko Series	Pinto Series	Northern Side-notched	Humboldt Series
0-6″	3	6	5	1	1
6-12″	1	6	14	1	—
12-18″	—	—	7	—	4
18-24″	—	—	1	—	3
24-30″	—	—	—	—	1
Total	4	12	27	2	9

TABLE 3
Provenience of Various Stone Tools at Silent Snake Springs

	Bifaces			Unifaces		Manos	Milling-stones
Depth	1	2	3	Scraper-planes	Retouched flakes		
0-6″	9	6	2	1	5	0	5
6-12″	5	4	1	3	8	2	1
12-18″	3	5	1	0	3	0	1
18-24″	2	2	1	0	2	0	0
24-30″	0	1	0	0	0	0	0
Total	19	18	5	4	18	2	7

dimensions are: 9.9 cm. long, 6.6 cm. wide and 2.4 cm. thick.

UNIFACIAL STONE TOOLS: Unifacial tools are made on flakes and exhibit intentional retouch modification from a single direction. The specimens with steep edge angles are termed *scraper-planes* and the remaining artifacts are called *simple retouched flakes*. Unifacial tools are quite rare at Silent Snake Springs, probably because waste flakes from the locally abundant obsidian could be used for scraping and cutting without modification.

Scraper-planes (4 specimens: all chert).

The scraper-planes are plano-convex implements characterized by a use-edge thickness of at least 0.6 cm. and a use-edge angle of greater than 60

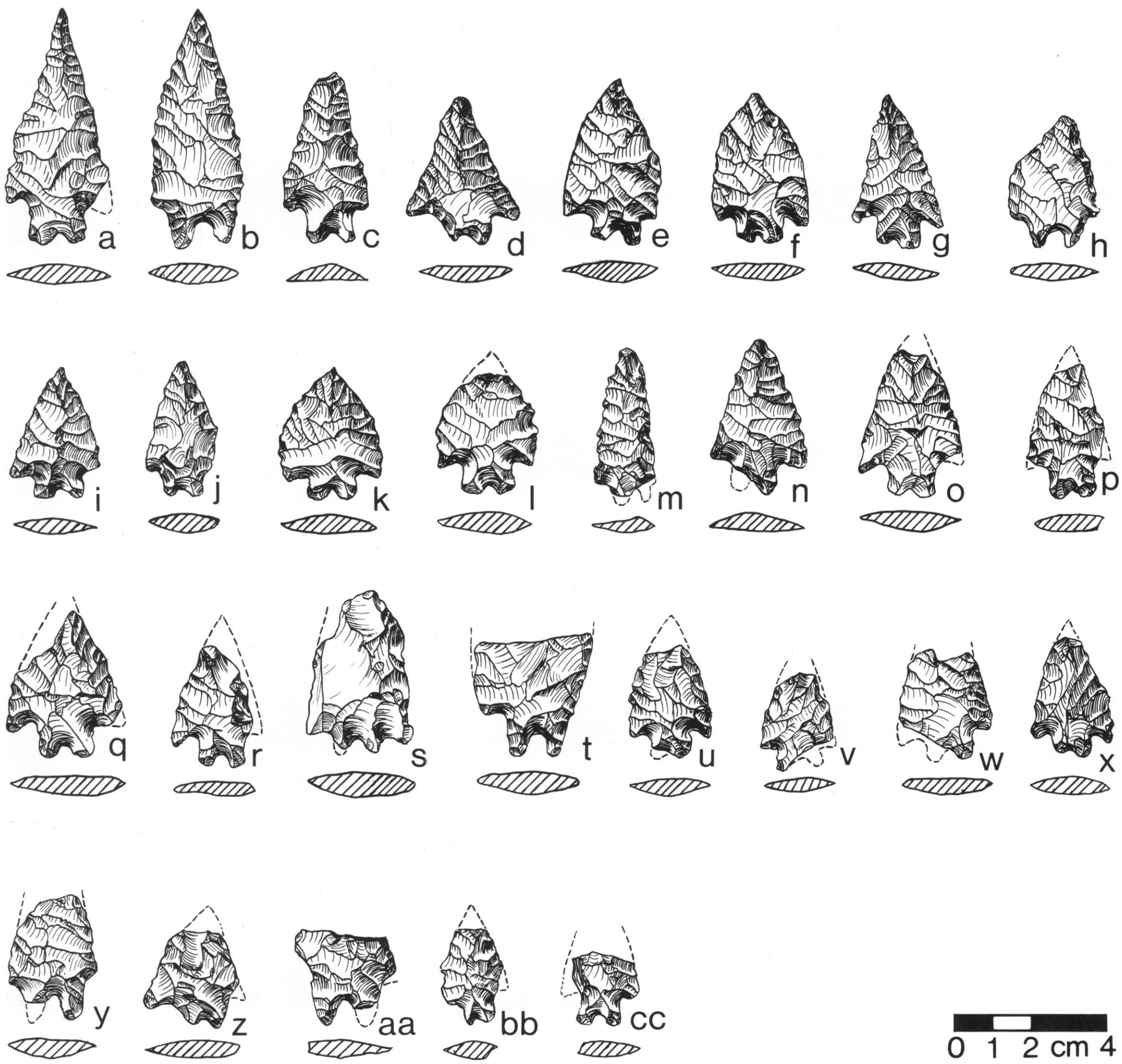

FIG. 9. Pinto series projectile points from Silent Snake Springs. a. 101-132; b. 101-82; c. 101-167; d. 101-111; e. 101-6; f. 101-218; g. 101-29; h. 101-119; i. 101-112; j. 101-237; k. 101-110; l. 101-141; m. 101-302; n. 101-4; o. 101-120; p. 101-216; q. 101-224; r. 101-27; s. 101-63; t. 101-10; u. 101-168; v. 101-343; w. 101-176; x. 101-217; y. 101-274; z. 101-219; aa. 101-149; bb. 101-231; cc. 101-148.

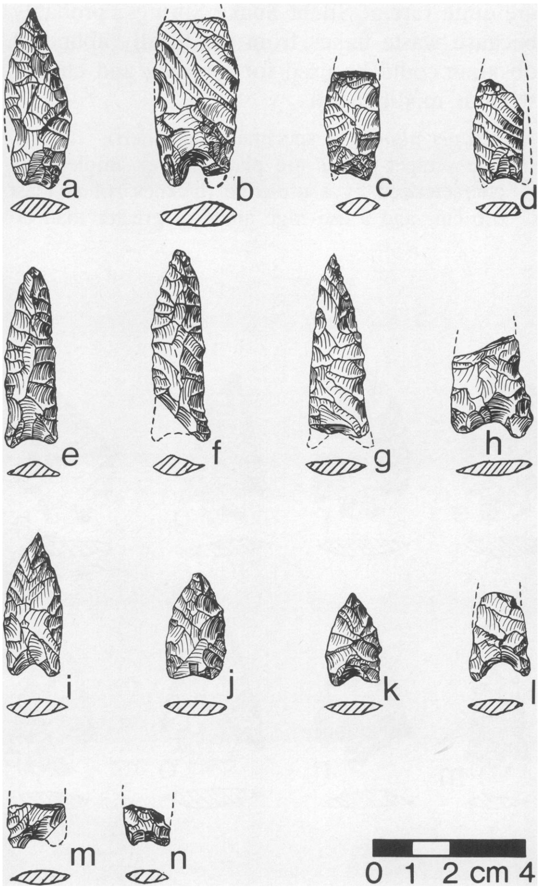

FIG. 10. Humboldt series projectile points from Silent Snake Springs. a. 101-295; b. 101-247; c. 101-330; d. 101-205; e. 101-324; f. 101-95; g. 101-133; h. 101-335; i. 101-322; j. 101-331; k. 101-301; l. 101-176; m. 101-92; n. 101-263.

degrees (after Knudsen, 1975, p. 17). The Silent Snake Springs scraper-planes range in length from 5.9 to 9.6 cm., and vary from 1.0 cm. to 2.3 cm. in thickness. The working edge is convex on all specimens.

Simple retouched flakes (18 specimens: 12 obsidian, 3 chert, 3 basalt).
Retouched flakes vary in length from 2.4 cm. to 5.6 cm. and range from 0.3 cm. to 2.3 cm. in thickness. Six of the flakes have a concave working edge; the remainder have convex or straight working edges.

OCHER PEBBLE: One pebble of red ocher (101-285) was recovered from Unit H-2 in the 0.6 in. level.

GRINDING STONES: Two manos and fragments of seven millingstones were recovered. Both manos are roughly rectangular, made of basalt, with bifacially ground working surfaces (see fig. 12 s-t). The edges are battered, especially along the ends. The millingstones are made of naturally tabular basalt slabs, roughly 2 to 14 cm. thick. The source of these slabs is probably the lava cap surmounting a hill approximately 250 m. northeast of the site. All specimens are broken, but most appear to have an elongated oval grinding surface.

OBSIDIAN COBBLES: Three unmodified obsi-

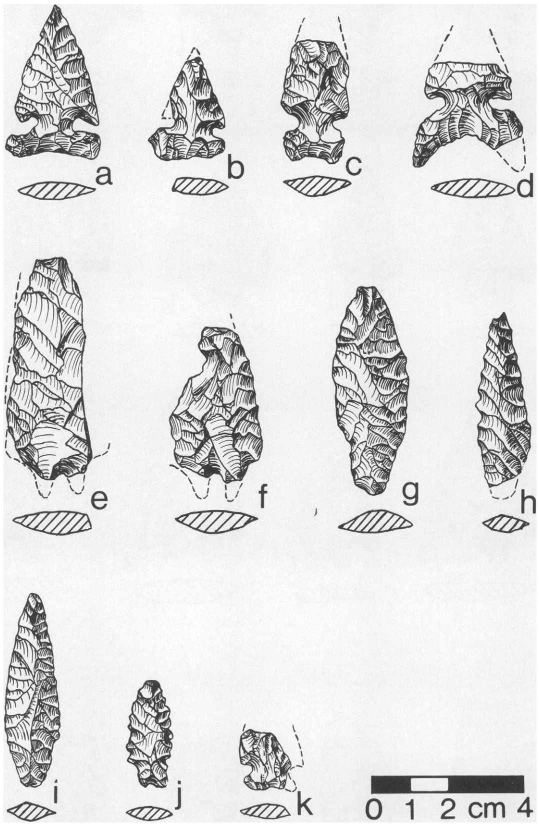

FIG. 11. Miscellaneous projectile points from Silent Snake Springs. Northern Side-notched: a. 101-140; b. 101-336; c. 101-36; d. 101-65. Untypable: e. 101-207; f. 101-199; g. 101-39; h. 101-101; i. 101-323; j. 101-61; k. 101-163.

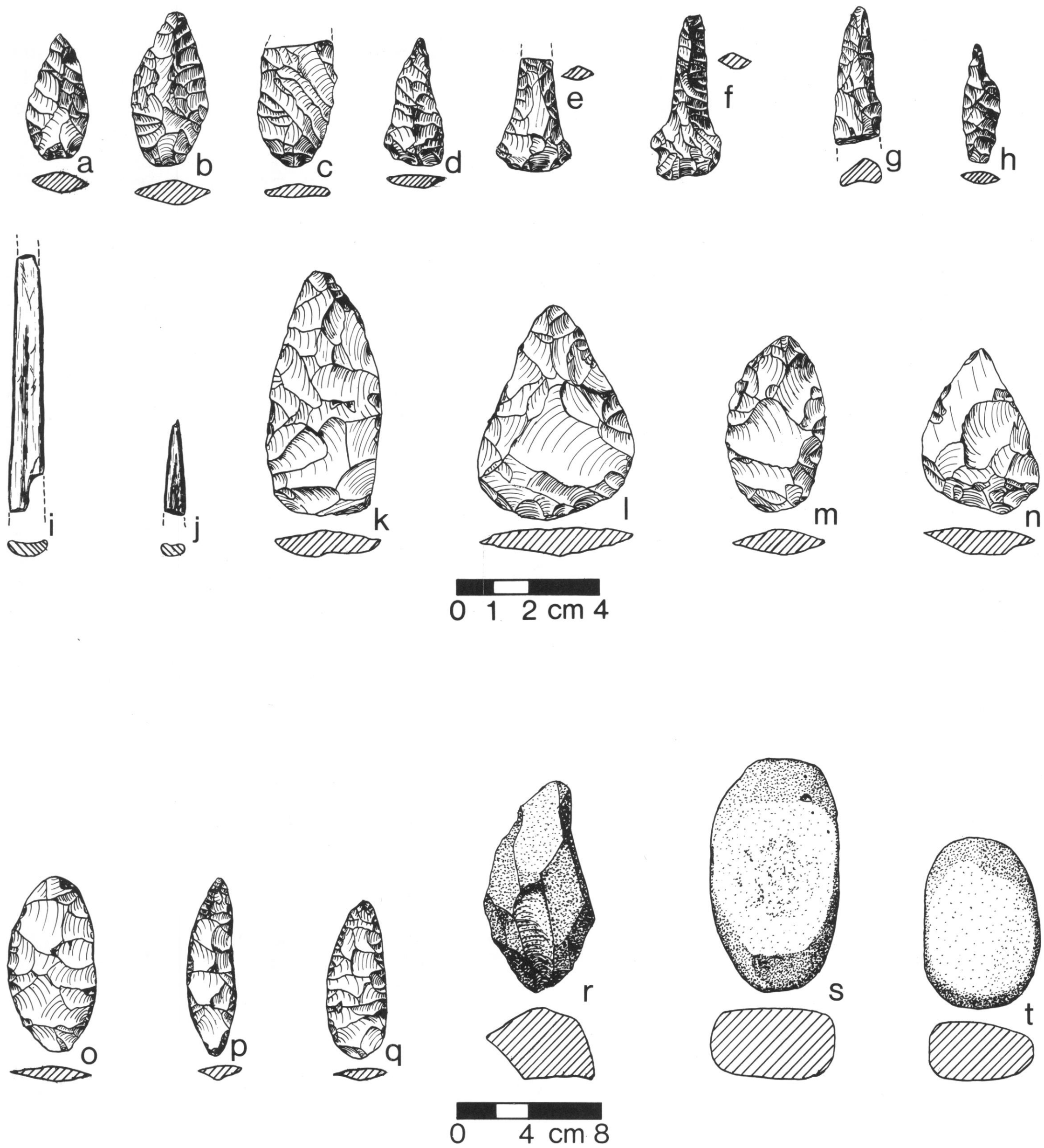

FIG. 12. Miscellaneous artifacts from Silent Snake Springs. a.-d. leaf-shaped bifaces; e-h. drills; i-j. bone awls; k. biface type 1; l-o. biface type 2; p-q. biface type 3; r. obsidian float cobble; s-t. manos.

dian cobbles were excavated, all of them in the 12-18 in. level of Unit J-5 (see fig. 12 r). Such cobbles occur as natural float through the immediate area surrounding Silent Snake Springs, and probably served as raw material for most of the obsidian artifacts found at the site. The cobbles range in weight from 158 to 310 grams.

CHIPPAGE: The chippage from Silent Snake

Springs has not been analyzed, but table 4 presents the quantitative summary of debitage recovered from excavation Unit I-5. All deposits in this unit were passed through a ¼-in. mesh screen. The heavy use of obsidian in Unit I-5 is characteristic of the entire site, probably because of the availability of float obsidian cobbles nearby. Chert was used much less frequently; basalt flakes occurred infrequently, and no basalt was found in Unit I-5.

A number of utilized flakes were noted in the chippage from Silent Snake Springs, but it is extremely difficult to distinguish between use-breakage and edge damage resulting from jumbling about in the level bags after excavation.

BONE AWLS: Two awl fragments were recovered (fig. 12 i-j). Both awls are made from splinters of long bone shaft, with the cancellous side ground smooth. Specimen 101-52 has a fire-hardened tip.

FAUNAL REMAINS

The faunal remains at Silent Snake Springs were relatively well preserved, considering the moist soil conditions which characterized the midden deposit. Table 5 lists the bones recovered from all units excavated in 1967 (with the exception of the disturbed Unit J-00).

Most of the bones were artiodactyl long bones, which had been fragmented beyond identification. Of the artiodactyl bones complete enough for identification, most were bighorn sheep (*Ovis*). Deer (*Odocoileus*) and antelope (*Antilocapra*) were also present, but quite rare. Many of the artiodactyl bones were burnt, but no butchering marks were noted. Rabbit and hare bones were nearly absent, and only occasional rodent bones were found in the midden. No bird or reptile bones were found at Silent Snake Springs.

TABLE 4
Debitage Recovered from Unit I-5 at Silent Snake Springs

	Obsidian		Chert	
Depth	frequency	weight	frequency	weight
0-6″	498	456 grams	19	30 grams
6-12″	548	757	7	4
12-18″	587	503	13	18
18-24″	134	162	2	8
24-30″	56	48	2	3
Total	1823	1926	43	63

DATING THE DEPOSITS

Seventy-five fragments of unidentifiable artiodactyl bones from the 12-18 in. level of Unit I-5 were submitted for radiocarbon dating at Washington State University. The bone collagen determination is 5250 ± 380 radiocarbon years B.P. (WSU-994). The bristlecone correction converts this raw date to a figure of 4070-4120 B.C. (Ralph, Michael and Han, 1973).

Obsidian hydration was also used to provide sequence dates for Silent Snake Springs. This method has been previously used by Layton (1970, 1972, 1973) for chronological ordering of both excavated and surface collections elsewhere in the northwestern Great Basin. The underlying theoretical basis for obsidian hydration analysis has been discussed elsewhere by Friedman and Smith (1960) and Taylor (1976).

Twenty-five typable projectile points from Silent Snake Springs were processed by the Obsidian Hydration Laboratory at the University of California, Los Angeles. The results of these measurements are presented on table 1.

No analysis of the chemical composition of these specimens has been attempted, but all the artifacts were candled and only those with identical color and translucency were submitted for hydration measurements. Because the obsidian artifacts probably were made of local float obsidian, it would seem that the chemical composition would be roughly constant.

The various projectile point categories are associated with the following obsidian hydration readings:

	$\bar{X}$	S	n
Rose Spring Series	1.90 microns	1.13	2
Northern Side-notched	3.85 microns	0.78	2
Elko Series	4.22 microns	0.36	5
Pinto Series	4.53 microns	0.78	10
Humboldt Series	4.80 microns	0.47	6

The chronological ordering obtained through obsidian hydration measurements is roughly

TABLE 5

Faunal Remains Recovered at Silent Snake Springs

		Ovis	*Odocoileus*	*Antilocapra*	Unidentified Artiodactyls	*Lepus*	*Sylvilagus*	Unidentified Lagomorphs	*Marmota*	*Citellus*	*Microtus*	Unidentified Rodents	Weight (gms.) Total
I-4	0-6″	1			58								45
	6-12″	7			163				1			1	400
	12-18″	1			31								100
	18-24″	3			17					1		1	95
	24-30″		1		5							1	30
J-5	0-6″				63		2						75
	6-12″	3	3	2	315								714
	12-18″				20								18
	18-24″				10					10		4	20
I-5	0-6″				44								20
	6-12″	3		1	95			1					280
	12-18″	2			[a]								265
	18-24″				21								15
	24-30″				14							1	20
H-6	0-6″				4								3
	6-12″				21								25
	12-18″	6		1	142		1			2			248
	18-24″	1			11				1	1			45
H-4	0-6″	1			47								70
	6-12″	2			170								205
	12-18″	2			57							1	123
I-3	0-6″				102				1				100
	6-12″	1			32				1				70
	12-18″	3			22							1	60
H-2	0-6″	5			172	4				1			318
	6-12″				16								50
	12-18″	1			2								80
G-3	0-6″	4			36				1				170
	6-12″				19								20
	12-18″				5				2				7
J-3	0-6″	1			108								130
	6-12″	1			34				1			2	50
	12-18″				52						1		32
	18-24″				14								30
	24-30″												0
	30-36″										1		1
		48	4	4	1922	4	3	1	8	15	2	12	3934

[a]Bone destroyed for C-14 date.

what one would expect to find based on previous stratigraphic studies. The Rose Spring Series is significantly younger than all the others (except the Northern Side-notched points; in this case, the small sample sizes preclude an adequate test). The Elko, Pinto, and Northern Side-notched Series' are all statistically indistinguishable in age. The Humboldt Series is statistically more ancient than all other projectile point categories.[1]

The radiocarbon evidence indicates that the initial occupation at Silent Snake Springs began somewhat before 4100 B.C., and the projectile point types suggest a significant occupation from Pinto times into the Pinto-Elko transitional period. A later occupation, represented by Rose Spring Series points, seems to postdate 500 B.C.

Our dating of the termination of the Pinto period occupation at Silent Snake Springs comes from indirect evidence. At present, reliable dates on Pinto points are available from only two sites in the northern and central Great Basin, namely Kramer Cave (26-Wa-196) situated at Falcon Hill on the west shore of Lake Winnemucca, and Gatecliff Shelter, in Monitor Valley, central Nevada. The wooden shaft of a hafted Pinto projectile point recovered from Kramer Cave has been radiocarbon dated to 2400 B.C. corrected (1880 ± 100 B.C., GaK-2387, Donald R. Tuohy, personal commun.). The on-going American Museum of Natural History excavations at Gatecliff Shelter have encountered Pinto points on living surfaces which date between about 4000 B.C. and 1600 B.C. These dates seem to be good estimates for the Pinto period occupation at Silent Snake Springs.

IMPLICATIONS AND CONCLUSIONS

Although the purpose of the present report is largely descriptive, a few conclusions and speculations seem in order. It seems that Silent Snake Springs was a temporary, seasonal camp. The artifact assemblage consists mainly of projectile points, bifaces, drills and bone awls, suggesting that hunting and butchering were the major site functions. Bone debris was abundant, consisting mainly of broken artiodactyl long bones. Thomas (1970b) has shown that over 99 percent of the faunal diet at Silent Snake Springs consisted of artiodactyls (and bighorn sheep comprised 85% of the total). Marmot was poorly represented, and both rabbit and hare were virtually absent. The few grinding stones present were restricted to the upper 13 in. of the deposit, suggesting that vegetable processing was rather late in the sequence and, even then, only of peripheral importance.

The Silent Snake Springs site does not represent the earliest occupation in the immediate area. The Calico surface site (Layton, 1970, 1973) 3 miles to the north northwest, covering an irregular area over 1 km. in diameter on a stretch of rolling sagebrush covered plateau, represents an extensive earlier occupation. No midden deposits were found here, but the scattered lithic debris may represent deflated campsites. The Pinto projectile points so abundant at Silent Snake Springs were absent in the Calico collection. Humboldt series points made up more than 50 percent of the Calico assembly. Black Rock Concave-base, Cougar Mountain and Parman types made up another 18 percent of the collection. (Layton, 1970, 1972). No seed grinding tools were recovered at the Calico site.

Evidence of intensive occupation immediately postdating the Silent Snake Springs site comes from Smokey Creek Cave, 1.6 km. to the east of the Calico surface site (Layton, 1966, 1970). The cave, measuring 11 m. long and 6 m. wide at the mouth, contained approximately 1 m. of moist midden deposit lacking visible stratification. Of the typable projectile points recovered at Smokey Creek Cave, 46 percent were of Elko Series, whereas only 8 percent were of the Pinto series common at Silent Snake Springs. Another 30 percent of the Smokey Creek Cave collection was comprised of the much more recent Eastgate, Rose Spring, Desert Side-notched and Cottonwood types that were virtually absent at Silent Snake Springs.

The major occupation at Smokey Creek Cave thus postdates that at Silent Snake

[1]These relationships have been tested using the standard t-test for significant difference between sample means.

Springs. Faunal evidence from these two sites located less than 2 km. apart demonstrates a gradual shift from hunting of artiodactyls, particularly mountain sheep, toward intensive hunting of rodents. Artiodactyls provided more than 99 percent of the meat diet at Silent Snake Springs, but at nearby Smokey Creek Cave their relative dietary importance rapidly diminished as rodents, such as ground squirrels and cottontail rabbits, were increasingly relied upon for meat. The increased dietary importance of rodents may possibly be related to the invention and use of snares as Thomas (1969, p. 399) has suggested.

In summary, it appears that the earliest intense occupation in the immediate vicinity of Silent Snake Springs was at the deflated Calico surface site where Humboldt series projectile points predominate. Some time before 4100 B.C. (corrected), occupation shifted from the Calico site to Silent Snake Springs where Pinto Series points reached a peak in popularity. Finally, some time after 2400 B.C. (corrected) occupation shifted to Smokey Creek Cave which continued to be occupied up to the protohistoric period. Following its earlier period of intense occupation *circa* 4100-2400 B.C. (corrected) the Silent Snake Springs site was never again intensely occupied. Rose Spring projectile points from the site suggest only a scanty reoccupation postdating 500 B.C.

The shift in occupation from the presently waterless (in summer) Calico site to the presently wet (year-round) Silent Snake Springs site and then to the presently waterless (in summer) Smokey Creek Cave neatly matches Antev's (1948, 1955) model of postglacial climatic change with appropriate occupational shifts. Of course, correlation is not causation, and the required settlement pattern studies to explore such a model have not been conducted.

We have recognized direct evidence of only one weather related event at Silent Snake Springs. The discontinuous lens of sterile slope wash or flood debris (fig. 6) recognized at a depth of 12 in. suggests that at least once, *circa* 4100 B.C. runoff (possibly from a cloudburst) exceeded either the absorbency of the adjacent hillside or the drainage capacity of the nearby streambed. At present, this dry (in summer) streambed is deeply entrenched and could carry a large volume of water. At our current state of knowledge it is not possible to devise a predictive model relating ground cover, precipitation, and runoff in any meaningful way; and at present no association of sparse ground cover with high runoff and resulting deposition of slope wash on the site has been demonstrated.

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