

**A SYSTEMATIC SURVEY FOR
CULTURAL RESOURCES AT
CRATERS OF THE MOON NATIONAL MONUMENT**

**A Report to the
National Park Service
Pacific Northwest Region
Cooperative Agreement CA-9000-0-0013
Subagreement No. 1**

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1. INTRODUCTION

Craters of the Moon National Monument has been the subject of several scientific studies, most notably of the geology and biology of the area (see Blakesley and Wright 1988 for a summary of these studies). However, the archaeological resources of the Monument have never been systematically researched or surveyed, with the exception of limited investigations in 1966 (Sneed 1967). In order to obtain a sample survey of the Monument's cultural resources, the National Park Service's Pacific Northwest Region entered into a cooperative agreement (#CA-9000-0-0013, Subagreement No. 1) with Idaho State University to conduct a systematic archaeological survey for prehistoric and historic archaeological sites within the Craters of the Moon National Monument.

According to the agreement, a sampling design would be developed which would allow for the survey of 2,000 acres within the Monument and Wilderness boundaries. This design (see below) was developed and submitted in May 1992. The actual survey took place during May, June, and July 1992, by a two-person survey crew, under conditions that varied from cold and wet at the beginning of the project, to 100+ degree temperatures which are common to the Monument in mid-summer. James McLaughlin, an MA candidate in Anthropology at Idaho State University, was the survey crew chief, assisted by Brock Jones. Dorothy Sammons administered the project for the Northern Intermountain Quaternary Institute, Idaho Museum of Natural History, ISU, and wrote, with Mr. McLaughlin, the final report.

2. SETTING

Environment

The Craters of the Moon National Monument is a complex of volcanic features covering more than 200 square kilometers at the north edge of the Snake River Plain and at the southeast end of the Pioneer Mountains. Lava flows, cinder cones, and craters dating from more than 15,000 years ago to as recently as 2,000 years ago cover most of the Monument. While limber pine and Douglas fir grow in limited stands or as isolated specimens on cinder cones and cinder gardens, most of the lava flows are barren of vegetation. Large expanses of low or big sagebrush communities can be found on the prairies and in the kipukas where aeolian soils have accumulated atop older lava flows or where younger lava flows have surrounded topographically higher aeolian and alluvial deposits. Barren lava flows cover nearly 60% of the Monument, while the sagebrush-dominated communities cover another 30% of the area (Blakesley and Wright 1988:1).

The foothills of the Pioneer Mountains intrude into the northwest corner of the Monument. Here, unlike the rest of the Monument, are steep, alluvial slopes eroded by permanent and intermittent streams, springs, and gullies. Thick groves of low shrubs and stands of quaking aspen dominate these slopes. At the base of the foothills runs Goodale's Cut-off, the northernmost route of the Oregon Trail. This trail route took emigrants in the 1840s and 1850s from Fort Hall on the Snake River, north past Webb Springs on Big Southern Butte, to the mountain ranges which abut the north side of the Snake River Plain. This way emigrants were able to find water and forage while skirting the lava fields which cover a great deal of the Plain.

Water and grasses are also available to the south of the Monument in areas such as Laidlaw Park, but the lack of both water and appropriate feed has limited use of the area by domestic livestock (Day and Wright 1985:1) and even limits the range of wild game within the Monument (Griffith 1983). Rugged lava flows and the difficulty of traversing them has apparently channeled most animal life into regularly-used areas, with the result that pristine plant communities have developed in isolated areas of the Monument (Day and Wright 1985:1).

Culture Historical Overview

The cultural materials observed during the current and previous surveys at Craters of the Moon National Monument consist of an assortment of non-diagnostic and diagnostic artifacts suggesting a Late Archaic (ca. 2000-250 B.P.) affiliation. The Late Archaic Period is better known than any of the preceding periods in regional prehistory, and may, in part, represent prehistoric Shoshonean occupation of the Upper Snake and Salmon River country. Two cultural hallmarks are indicative of this period: Intermountain Ware pottery and small side-notched projectile points thought to represent use of the bow and arrow. Several reports provide overviews of this period in southeastern Idaho (Lohse and Sammons 1991; Henrikson 1990; Reed et al. 1987; Holmer 1986, 1990; Butler 1978).

The Late Archaic Period is marked by a range of small triangular projectile point types. Corner-notched Rosegate series points extend throughout the period, as do Desert Side-notched and Cottonwood triangular points (Lohse 1992; Holmer 1986; Reed 1985). Intermountain Ware pottery is also known from several Late Archaic sites on the Snake River Plain, including the Wahmuza site near Fort Hall (Holmer 1986) where Intermountain Ware dates as far back as 1200 B.P., and a surface assemblage two miles east of Big Southern Butte (Sammons and Furniss 1992). Intermountain Ware is distinguished by coiled flower-pot-shaped vessels or simple globular jars, using local clays with a variety of tempers (Steward 1943; Lowie 1909). Recent excavations at Dagger Falls (Torgler 1993) on the Middle Fork of the Salmon River produced fragments of Intermountain Ware pottery dated to 2010 B.P. Holmer (1990), using the information from Dagger Falls and the Wahmuza site, postulates Shoshonean occupation of southern Idaho from 2,000 to 3,000 years ago.

Assuming that the ethnographically documented Shoshonean economic system can be projected into the past, then the following seasonal pattern would be expected. Multiple family groups would winter together at repeatedly-occupied winter "village" sites. The winter villages would be situated in well-watered, sheltered locations such as along major drainages and tributaries; the Fort Hall bottoms is recorded by Steward (1938) as one such winter village location. With the coming of spring and into summer, the multi-family groups would break up and travel to different locations on the landscape in order to exploit specific resources. Hunting areas, quarries, or stands of nuts, seeds, or berries may have been visited by small special purpose task groups. Often these groups would come together for communal activities -- rabbit drives, salmon fishing, camas harvests, bison hunts or trading fairs -- over the course of the warmer months before gathering again in the winter villages (Lowie 1909; Steward 1938; Murphy and Murphy 1986).

The natural setting of Craters of the Moon does not match ethnographic descriptions of important resource areas targeted by historic Shoshone, yet it is apparent that Shoshoneans, and possibly earlier indigenous groups, did indeed exploit resources within the Monument boundaries. Previous research and the 1992 survey document small lithic scatters and possible hunting blinds located near water sources and game trails. These prehistoric site types are indicative of sporadic, seasonal, task-specific use of the area within a generalized, broad-based collector strategy like that described for the historic Shoshone.

3. HISTORY OF RESEARCH

Prior to the 1992 survey, only one other survey made an attempt to locate and characterize archaeological resources within the Monument systematically. This survey was conducted by Paul Sneed in 1966 (Sneed 1967). Sneed and an assistant conducted a 15-day reconnaissance of the Monument, focusing on known waterholes, major geologic features, and reported archaeological site locations. Sneed's (1967:37) approach was explicitly ecological, based on geographic and environmental zones which enabled him "to predict, with some certainty, the types and distribution of archaeological sites [they] expected to find" (see Figure 3.A). However, unlike the 1992 survey, Sneed made little attempt to explore or characterize areas in which he did not expect to find archaeological sites. This gap in his research design precluded development of a model or management plan that would adequately predict site encounter.

Sneed divided the Monument area into four sections -- northwest, central, southeast, and southwest. He and his assistant spent two to eight days in each section. Some areas were examined from the air, but most of the Monument was covered on foot. Intensive examination was confined to areas with "climax vegetation and around water supplies" (p.38).

The northwest section of the Monument corresponds roughly with Area 1, as defined by the 1992 sampling design (see Figure 4.A). It included the area northwest of the highway, extending into the Pioneer Mountains, and is characterized by mountain valleys, large cinder cones, intermittent streams, and some recent lava flows. Archaeological sites (Sneed 1967:39) were relatively large and numerous, mostly open campsites in sheltered areas. This section also contains the Goodale Cutoff of the Oregon Trail.

The central section was the largest within the Monument, corresponding roughly with our Areas 2, 3, and 4 (see Figure 4.A). Sneed sites in this area were small lithic scatters, quarries, and hunting blinds associated with water holes and kipukas.

The southeastern section (1992's Area 6) contains numerous volcanic features, nearly inaccessible water holes, and large expanses of extremely rugged and broken lava flows. Only a single archaeological site, 10-BN-10, was recorded by Sneed in this area; it was a small lithic scatter outside the Monument boundaries.

The southwestern section (1992's Area 5) contains the Carey Kipuka, surrounded by fields of rough lava. Only one archaeological site, 10-BN-11, was recorded. It was a small open campsite within the Carey Kipuka.

In total, Sneed recorded 28 sites during the course of the survey (Figure 3.A), which he sorted into five basic site types: open sites, cave sites, rock structures, hunting blinds, and quarry sites. Some of these site types co-occurred with others. For example, rock structures often were found at the mouths of caves, with evidence of occupation extending into the cave itself. Hunting blinds were rock structures, but not all rock structures appeared to be hunting blinds. We have not maintained Sneed's site typology to characterize our results because of the biased correlations of artifact assemblages and site structure with possible functions.

Another aspect of Sneed's survey was his collection of diagnostic artifacts. Projectile points, pottery sherds, and stone tools were all removed from the sites Sneed recorded. This collection currently resides at the Craters of the Moon National Monument Headquarters. Unfortunately, Sneed's collection policy made it difficult for the 1992 crew to relocate many of the 1966 sites. There was no longer any material in situ to confirm that the crew was at the same location. Therefore, the 1992 crew's identification of a 1966 site tended to be based on locational descriptions and sketch maps rather than on Sneed's characterization of site assemblages. Unfortunately, there was the additional problem of a lack of detailed topographic maps for the Craters of the Moon National Monument in 1966; Sneed could only plot his sites in general locations on small-scale maps and on detailed field sketch maps. These plots and sketch maps were occasionally incorrect, adding to the 1992 crew's difficulty.

Projectile point types and Intermountain Ware pottery suggested a relatively late occupation of the Monument. Desert side-notched points, a small triangular projectile point, and the pottery collected by Sneed date to within the last 2,000 years and perhaps later. Sneed also recovered some lanceolate points from just outside the Monument's northern boundary which may date much earlier, but his earliest projectile point type from inside the Monument were Bitterroot side-notched points (Sneed 1967, Fig. 4:a-c), dated by Sneed (1967:47) to after 3,500 years ago. The lack of early projectile point types in the Monument is not surprising, given the relatively recent age of many of the lava flows, most of which date between 10,000 and 2,000 years ago. Sneed (1967:42) concluded that the Craters of the Moon, "when occupied or utilized, was occupied by the peoples represented historically as the Northern Shoshoni."

Aside from his conclusions on the age of the occupation of the Monument, Sneed also correlated specific aboriginal activity within the Monument with certain environmental zones. He felt that the large lava flows, being difficult to traverse and containing few resources, were mostly avoided by human groups crossing the Snake River Plain. Human utilization seemed to focus on the northwestern section which served as a east-west route along the base of the mountains, much as it did in historic times for the emigrants on the

Oregon Trail. Small groups penetrated the central section of the Monument, but less frequently and less intensively, leaving only hunting blinds and small lithic scatters, rather than large open campsites. The site at Carey Kipuka, characterized as a large campsite, "suggests that this area could have been occupied by several families of hunters and gatherers or by a large hunting party" (1967:46).

Prior to Sneed's work, archaeological "survey" in the Monument consisted of amateur exploration and collecting. Harold Stearns was responsible for many of the early geologic and general studies of the Craters area (Stearns 1928, 1930, for example), but his interest in the cultural resources of the Monument was mostly anecdotal. Stearns (1930:41-43) cites historical accounts which "document" Shoshone use. Stearns (1930:43) also describes "Indian mounds" to the east of what is now the Visitor's Center; these mounds are also noted on earlier USGS and Monument maps, but they are no longer marked on current maps. Sneed apparently did not visit them, nor did the 1992 crew. As early as 1928, they were already "nearly destroyed" (Stearns 1930:41), but may have been trail markers. The rock semicircles recorded by both Sneed and the 1992 crew are assumed by Stearns (1930:41) to have been hunting blinds or tipi rings; this conclusion was reiterated by Sneed. Stearns (1930:43) also discusses small cairns which may be aboriginal, but states that "large, conspicuous monuments have all been erected by white persons."

Since the Sneed survey, the Park Service has contracted for archaeological survey in advance of specific projects to meet the requirements of historic preservation legislation; a recent letter report from Chance and Associates (1991) is an example of this kind of survey.

4. SURVEY METHOD

Sampling Design

The National Park Service specified a need for a cultural resources survey which was constrained by budgetary and time considerations to approximately 2,000 acres of the total acreage of the Monument and Wilderness. Prior work by Sneed (1967) had located more than twenty sites in and around the Monument, but was non-standardized and of limited coverage. Therefore, NPS directed us to create a systematic survey design, crucial to construction of a management document for the Monument. We were also to relocate and update information on the sites recorded by Sneed.

We chose to stratify the Monument area into six subdivisions (see Figure 4.A), using a 1:24,000 NPS Map as our base map. A sheet of drafting paper was laid over this base map, and each section and quarter section traced out. Each quarter section became a sampling cell and the cells were numbered consecutively in rows from west to east, beginning with the upper northwest sampling cell. Any quarter section less than 75% complete was not included in the sample; a total of 329 sampling cells were defined in this way.

Each of the 329 sampling cells or units was a quarter-section ($1/2 \times 1/2$ miles), or 160 acres. In order to meet the requisite 2,000 acre survey with the widest possible areal and environmental coverage, we decided to limit the survey unit to 80 acres. That is, once a 160-acre sampling cell had been chosen, the survey team would survey only half of that cell (80 acres) and they would be free to choose which half of the cell to survey -- north, south, east, or west. In this way, eighty acres within twenty-five sampling units (totalling 2,000 acres) would be surveyed within a nested, stratified, systematic survey design based on random sampling of major environmental variables.

A set of five variables was encoded for each cell: water, vegetation type, geologic episode, caves, and "Sneed sites." Table 4.1 lists the possible options for each variable.

Water: This variable recorded whether or not a water source was located within the sampling cell. This was encoded as a presence/absence of water. Six cells were chosen because of the presence of water.

Vegetation type: NPS vegetation maps listed several different vegetation communities within the Monument. These vegetation types are also listed by Day and Wright (1985) who identified twenty-six different vegetation

communities. For the purposes of the sample, these twenty-six were collapsed into seven major vegetation zones, with two other options recording the complete absence of vegetation or the presence of three or more vegetation zones in the same sampling cell. Six sampling cells were chosen to investigate areas with mixed vegetation zones.

Geologic type: NPS brochures and maps record a sequence of volcanic eruptions and lava flows of different ages within the Monument. The location of specific lava flows is recorded on NPS geologic maps. Lava flows of a similar time period were grouped together into eight Eruptive Periods (Blakesley and Wright 1988:6). For example, Eruptive Period A contains lava flows less than 3,000 years old, while Eruptive Period H includes flows greater than 15,000 years old. Encoding options also included bedrock, alluvium, and three or more geologic types within one cell. Six sampling cells were chosen to randomly sample the geologic types.

Caves: This variable recorded whether a cave was located within the sampling cell. There was no distinction made based on the size of the caves, some of which were small lava blisters. Cave locations were provided by NPS based on an informal spelunkers' survey of the caves of the Monument. Six cells were chosen that contained caves.

Sneed sites: This variable recorded whether an archaeological site previously recorded by Sneed (1967) was located within the sampling cell. A requirement of the project was to revisit and record all the Sneed sites to determine their current condition. This variable alerted us to the presence of a Sneed site in a sampling cell already chosen for some other reason. Only a single quadrat was chosen specifically to sample a Sneed site and its surrounding terrain.

Table 4.1. Values Encoded for Each Sampling Variable

1. Water Resource	0	Absent
	1	Present
2. Cave	0	Absent
	1	Present
3. Vegetation	0	None
	1	Big Sagebrush*
	2	Low Sagebrush
	3	Bitterbrush
	4	Grasses
	5	Limber Pine
	6	Douglas Fir/Aspen
	7	Riparian
	8	3 or more communities
4. Geologic Types	0	3 or more periods
	1	Eruptive Period A**
	2	Eruptive Period B
	3	Eruptive Period C
	4	Eruptive Period D
	5	Eruptive Period E
	6	Eruptive Period F
	7	Eruptive Period G
	8	Eruptive Period H
	9	Bedrock
	10	Alluvium/Colluvium
	11	Cinder cones
5. Sneed Sites	0	Absent
	1	Present

* Vegetation communities are grouped into seven major types from the twenty-six identified by Day and Wright (1985).

** Eruptive Periods were identified by Blakesley and Wright (1988).

Each of these variables form sampling strata within which cells might be randomly chosen to achieve sufficient variable coverage. In order to ensure sufficient areal coverage, the monument was divided into six sampling areas, each with 50-55 cells (see Figure 4.A), so that the total of 329 sampling cells was distributed fairly evenly among the six areas.

The next step in the sampling design was to enter all 329 sampling cells into a D-Base IV software program and to encode each sampling cell according to each variable. For example, Sampling Unit #227 was encoded as: Area - 4; Vegetation - 1; Lava - 3; Water - 0; Cave - 0; Sneed - 0. A print-out was then generated of all sampling units and their encoded values.

The manual selection of the sampling units was the next phase of the sampling design. The number of each sampling cell was drawn out of a hat and plotted on a large wall map. A sample unit was selected if it fulfilled one of the criterion for each of the six areas of the Monument. Sample units were drawn without replacement from the pool.

Six cells each were to be selected because of the presence of water or caves. Another six units were to be selected because of the presence of three or more vegetation zones within the unit; we felt that such intersections of environmental zones would be most likely to have been visited prehistorically. Six units were to be selected because of the presence of three or more geologic types; however, this proved to be unpractical because there were not six cells with three or more geologic types. Therefore, in some areas, a randomly selected sampling unit was included, whatever its geologic type.

If the sampling variable for a cell was redundant, it was discounted; for example, if we already had a unit chosen for water within Area 5, then another sampling cell with water in Area 5 would be discarded unless it met some other, unfulfilled criterion -- such as a cave. This worked very well until we encountered sampling areas without certain criteria. For example, there is no cell with mixed vegetation in Area 2, water source in Area 3, or cave in Area 5. Because the focus of the survey is on the correlation of resources with archaeological sites rather than on the simple areal distribution of archaeological sites, additional sampling units were chosen until the desired variables were covered. Thus, two units from Area 4 chosen for water resources in order to complete the sampling frame of six units chosen for water resources.

The survey team chose which half of the sampling unit would be surveyed. The decision to survey a particular 80-acre quadrat was based on the variable responsible for selection of that sampling cell. For example, if a sampling unit was chosen because of the presence of a water source, then the 80-acre quadrat was placed to include the water source. Similarly, if the presence of a cave was the primary variable, the quadrat included the cave. If there was no overriding variable, then such factors as ease of access, likely terrain, and personal safety influenced the survey crew's decision.

Because of the emphasis on resource variables rather than on even areal coverage, the chosen sampling units tended to cluster along the Great Rift where such variables occur (compare Figures 3.A and 4.A). However, many quadrats necessitated hiking one, two or more miles over a variety of terrain. The access route into each quadrat was treated as an informal transect. The ground was examined each way, although the route was not mapped. No archaeological sites were discovered on transit corridors to sampling units, although one archaeological site was recorded as the survey team hiked in to revisit sites recorded by Sneed in 1966.

Table 4.2 lists the critical variables and the units which were selected to sample for them. The accompanying Table 4.3 is a sampling unit summary, indicating the values for each of the six sampling criteria for the twenty-five sampling units selected.

The Sneed Survey: The other goal of the 1992 survey was to revisit and update information on the sites recorded by Paul Sneed (1967). The basic method here was to locate the Sneed sites on USGS topographic maps and revisit each site individually. This proved to be somewhat difficult as detailed maps were not available to Sneed and most of his locational information was on his own sketch maps. In almost all cases, the survey crew was able to find the location but was not always able to document the site. We attribute this to Sneed's collection of diagnostic material from the sites he recorded.

Table 4.2. Craters of the Moon Sample Survey Variables

<u>Sample Variable (# of units)</u>	<u>Sample Unit #</u>	<u>Monument Area</u>
Mixed VEGETATION (6)	6	1
	23	1
	146	3
	150	4
	221	5
	284	6
LAVA FLOWS (6)	44	2
	87	3
	105	1
	227	4
	260	6
	326	5
CAVES (6)	39	1
	74	1
	83	2
	130	3
	223	4
	298	6
WATER SOURCE (6)	18	2
	24	1
	167	4
	187	4
	281	5
	311	6
SNEED (1)	205	4
=====		
Coverage by Area		
Area 1	6 sampling units	
Area 2	3	
Area 3	3	
Area 4	6	
Area 5	3	
Area 6	4	
Total sampling units	25	

Each sampling unit is one quarter section (.5x.5 miles). One half (80 acres) of each unit was surveyed, with the placement of the 80-acre quadrat at the discretion of the survey crew.
 TOTAL QUADRATS = 25 @ 80 ACRES EACH = 2,000 ACRES

The Survey

The survey of the Craters of the Moon National Monument took place in May, June and July 1992. Survey methodology was consistent from quadrat to quadrat. For each sampling unit, the 80-acre quadrat to be surveyed was identified, sometimes prior to entering the field, sometimes in the field when a judgement of terrain and degree of difficulty could be made. With very remote sampling cells, the quadrat chosen was often the one first encountered by the crew or the one which could be surveyed most effectively and efficiently. Access to the quadrats often required hikes of up to nine miles; then, the quadrats would be surveyed, and the crew hike the five, seven, or nine miles back. This required a great deal of time and effort under very difficult conditions -- rough terrain, summer sun, and high temperatures.

Once the quadrat had been determined and the general area accessed, the corner of the quadrat was located by reference to major landmarks or, where possible, to actual section markers. Landmarks were also used to align the crew on north-south or east-west axes; the Brunton compass did not function in the lava fields. Once the line of march was established, the two-man crew walked parallel transects along the long

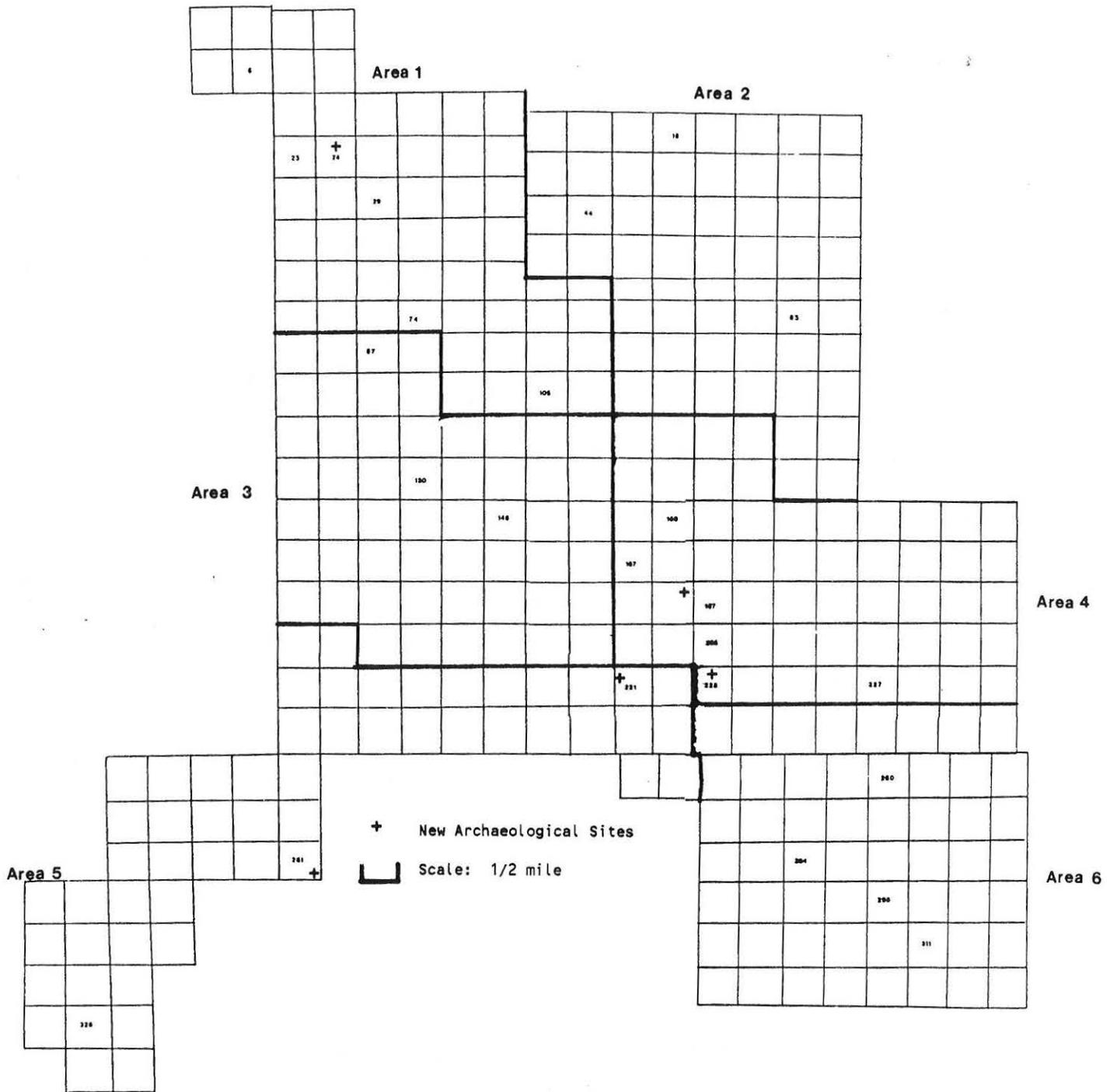


Figure 4.A. Sampling Units within Craters of the Moon National Monument, with General Locations of New Archaeological Sites

axis of the quadrat until the entire quadrat had been covered. Transects were 10 to 15 m apart; the interval was difficult to maintain in dissected lava fields when the crew members could not see each other, but was checked visually whenever possible.

The following is a quadrat-by-quadrat summary of the rationale, methods, and results of the Craters survey. The quadrats are presented in numerical order.

Sample Unit #6 (SE 1/4, Section 21, T2N, R24E): This unit, located in the extreme northern corner of the Monument, was selected for mixed vegetation. The survey crew selected the northern half of this cell, because of the steep terrain and, even so, covered one thousand feet of elevational change in one half mile of horizontal distance. As already indicated, the survey area is located on a steep hillside (45 degrees or more) with a dirt road running through the northeast corner. The vegetation in this unit ranges from low sagebrush and other small grasses and bushes on the windswept upper slopes to a riparian zone at the lowest elevations where Little Cottonwood Creek flows through the area. Also encountered were stands of fir trees along the road and groves of quaking aspen above the fir. As might be expected, the work in this unit was extremely difficult especially considering that the unit did not line up evenly across the hillside. In addition, much of the area surveyed was covered by dense vegetation which, although scenic, was very hard to push through. This unit was devoid of any cultural resources even along the lower reaches by the road and the creek. This is not too surprising as the whole of the area is situated on steep terrain and is not very suitable for anything but short-term use.

Sample Unit #18 (NE 1/4, Section 29, T2N, R25E): This unit is located along the northern boundary of the Monument among the lava. It was selected as a water resource quadrat. The survey crew selected the northern half of this unit as it was closest to the edge of the lava flow in addition to containing the water resource, Surprise Waterhole. The terrain here was very broken and dangerous. It consisted entirely of broken pahoehoe and aa lava and easily deserved the name, Serrate Flow. This area is not accessible by road and required some walking to get to the sample unit. This rugged flow had only a few signs of life on it, mainly in the form of lichen and other hardy low plants, and an occasional limber pine. The Surprise Waterhole was relatively easy to locate, although there was no water in it. There were no cultural resources found by the survey crew in this area. The lack of cultural materials in this flow is to be expected as there are few, if any, resources to exploit. Other water sources, such as springs and creek, are more readily available in the nearby Pioneer Mountains.

Sample Unit #23 (SW 1/4, Section 27, T2N, R24E): This unit was selected as a mixed vegetation quadrat. It is located on the flanks of the Pioneer Mountains in the northern corner of the Monument. The survey crew selected the eastern half of the unit as it was the most easily accessible and included the required vegetation types. This unit was situated on very steep slopes which were difficult to survey and included over 500 feet in elevational change. The vegetation consisted mainly of a low sagebrush community with other types of low grasses and brush. In addition, there were stands of quaking aspen. The crew encountered no cultural resources during their survey of this area. On the upper slopes of the survey area, there are few resources that would attract human activity. The area is very windswept and some parts are devoid of vegetation. No cultural materials were seen in the lower areas in and around the aspen, but this can possibly be explained by the lack of a spring or other water source in this grove.

Sample Unit #24 (SE 1/4, Section 27, T2N, R24E): Selected as a water resource quadrat, this unit is adjacent on the east to Unit #23. The northern half of the unit was selected to include the small portion of a seasonal creek that flows through the unit. Also, this half contained the margin between alluvial flats in the north and lava flows and outcrops to the south. The area surveyed was relatively flat and uniform on the alluvial deposits and the vegetation in this area consisted of sagebrush, low grasses and more reed-like grasses in the ephemeral wetlands. On the lava flows to the south was sagebrush. These flows had been eroded and filled up with aeolian sediment which allowed the sagebrush to grow abundantly. The terrain was relatively easy to survey due to the generally flat topography. Goodale's Cutoff of the Oregon Trail passed through this quadrat. Although the cutoff itself was easy to locate, the crew found no actual material evidence on the trail, either historic or prehistoric. In addition to the Oregon Trail route, the crew

Table 4.3 Sampling Unit Summary (Asterisk denotes variable determining choice of unit)

Sampling Unit: 6	Sampling Unit: 18	Sampling Unit: 23
Area: 1	Area: 2	Area: 1
Veg: 8*	Veg: 0	Veg: 8*
Lava: 10	Lava: 1	Lava: 10
Water: 1	Water: 1*	Water: 0
Cave: 0	Cave: 0	Cave: 0
Sneed: 0	Sneed: 0	Sneed: 0
Sampling Unit: 24	Sampling Unit: 39	Sampling Unit: 44
Area: 1	Area: 1	Area: 2
Veg: 1	Veg: 1/0	Veg: 0
Lava: 7	Lava: 1	Lava: 1*
Water: 1*	Water: 0	Water: 0
Cave: 0	Cave: 1*	Cave: 0
Sneed: 1	Sneed: 1	Sneed: 0
Sampling Unit: 74	Sampling Unit: 83	Sampling Unit: 87
Area: 1	Area: 2	Area: 3
Veg: 0	Veg: 0	Veg: 0
Lava: 1	Lava: 1	Lava: 1*
Water: 0	Water: 0	Water: 0
Cave: 1*	Cave: 1*	Cave: 0
Sneed: 0	Sneed: 0	Sneed: 0
Sampling Unit: 105	Sampling Unit: 130	Sampling Unit: 146
Area: 1	Area: 3	Area: 3
Veg: 0	Veg: 0	Veg: 8*
Lava: 1*	Lava: 1	Lava: 3
Water: 0	Water: 0	Water: 0
Cave: 1	Cave: 1*	Cave: 0
Sneed: 0	Sneed: 0	Sneed: 0
Sampling Unit: 150	Sampling Unit: 167	Sampling Unit: 187
Area: 4	Area: 4	Area: 4
Veg: 8*	Veg: 0	Veg: 0
Lava: 8	Lava: 1	Lava: 1
Water: 0	Water: 1*	Water: 1*
Cave: 0	Cave: 0	Cave: 0
Sneed: 0	Sneed: 1	Sneed: 0
Sampling Unit: 205	Sampling Unit: 221	Sampling Unit: 223
Area: 4	Area: 5	Area: 4
Veg: 0/1	Veg: 8*	Veg: 1
Lava: 1	Lava: 3	Lava: 3
Water: 0	Water: 0	Water: 0
Cave: 0	Cave: 0	Cave: 1*
Sneed: 1*	Sneed: 0	Sneed: 1
Sampling Unit: 227	Sampling Unit: 260	Sampling Unit: 281
Area: 4	Area: 6	Area: 5
Veg: 1	Veg: 0	Veg: 0
Lava: 3*	Lava: 0*	Lava: 3
Water: 0	Water: 0	Water: 1*
Cave: 0	Cave: 0	Cave: 0
Sneed: 0	Sneed: 0	Sneed: 0
Sampling Unit: 284	Sampling Unit: 298	Sampling Unit: 311
Area: 6	Area: 6	Area: 6
Veg: 8*	Veg: 0	Veg: 0
Lava: 3	Lava: 3	Lava: 3
Water: 0	Water: 0	Water: 1*
Cave: 0	Cave: 1*	Cave: 1
Sneed: 0	Sneed: 0	Sneed: 0
Sampling Unit: 326	Veg: 8	
Area: 5	Water: 0	
Lava: 4*	Sneed: 1	
Cave: 0		

encountered an isolated find on a lava outcrop overlooking the flat open area to the north. This isolated find (10-BT-1824) consisted of a small cryptocrystalline core and two flakes within a 1x3m area. These artifacts are near no resources other than the large open grassy area to the north and the route of the Oregon Trail.

Sample Unit #39 (NW 1/4, Section 35, T2N, R24E): This unit was selected as a cave resource quadrat. It is northeast of the highway, nearly opposite to the entrance to the Monument. The western half of the unit was surveyed in order to include the cave and previously recorded archaeological sites. Although the area looks flat and featureless on the 7.5' topographic maps, it is in reality an area of eroded and filled-in lava flows, with rough and broken terrain. The aeolian soil that has filled in these flows has provided a good base for the sagebrush as well as for an occasional limber pine. The other part of the quadrat is situated on the North Crater Aa Flow. This flow is typical of aa flows -- rugged, with chasms and trenches ten or more meters in depth, and also unstable, with chunks of lava breaking off easily as a crew member tried to climb over it. The cave in this quadrat was approximately 15 meters long and one to one and a half meters in height. It was a collapsed lava tube and the entrance had a fair amount of aeolian deposit built up. The cave, however, was empty of any cultural resources or evidence of use. No cultural material was encountered in any other portion of the quadrat. This seems unusual in the sagebrush community as there are previously recorded sites in this same context in the Monument; however, the lack of cultural resources in the extremely rough aa flow seems predictable.

In addition, the crew was to relocate Sneed sites in this quadrat. Two of these sites, 10-BT-83 and 10-BT-85, were relocated, but another (10-BT-87) was not. The crew was certain that they were in the recorded location, but it is not clear whether the site has been covered by aeolian deposits in the last twenty-five years or if the original survey collected all cultural material.

Sample Unit #44 (NE 1/4, Sections 31, T2N, R25E): This unit was selected to randomly sample the lava flows of the Monument. It is located less than two miles east of the Visitors' Center. The eastern half of the unit was surveyed as it appeared to be the easier in terms of access and terrain. However, the terrain consisted of aa lava, pahoehoe lava, and cinder slopes. It is on the Serrate Flow and contained large holes and chasms throughout. There were also areas of smoother pahoehoe that formed long straight "highways", both in the sampling unit proper and on the way to it. There were cinder hills that afforded a break in the tortuous terrain as well as an excellent vantage point to judge position on the lava flows. Vegetation in this area was mainly an occasional limber pine, low grasses, and lichen. In addition, there were a few small areas where low sagebrush had taken hold. The crew surveyed a slightly larger area than required, by virtue of the fact that it was difficult to determine their exact location. There were no cultural resource encountered in this area and there are no previously recorded sites in or around the survey area. This quadrat sits entirely on rugged lava flows with no obvious resources, such as water, shelter or raw material sources, that would make it attractive for human use.

Sample Unit #74 (SE 1/4, Section 2, T1N, R24E): Located just west of the Spatter Cones parking lot, this sampling unit was selected because it contained a cave. The southern half of the unit was surveyed in order to include two unmarked and unnamed caves and to avoid the top and interior of Big Craters Butte. To survey through the crater itself was deemed dangerous to the personal safety of the crew, as it involved unstable surfaces, cliff faces, and long drops onto jagged rocks. The area surveyed did include a variety of terrain. There were pahoehoe and lava flows as well as cinder slopes and fields. The vegetation in the area was primarily confined to limber pine and the plants associated with cinder gardens. The two caves in this area were both small, collapsed lava tubes with no natural resources around them. They are too small to have provided shelter on a long-term basis. No cultural resources were encountered in any part of the sampling unit. There are trails, a parking lot, and part of the loop road within the quadrat. The construction of these features could have destroyed archaeological resources as well as facilitated amateur collecting of any existing archaeological remains. However, since the quadrat contained no natural resources which would have encouraged significant aboriginal use of the area, the existence of cultural material is highly problematic.

Sample Unit #83 (SW 1/4, Section 3, T1N, R25E): This sample unit is nearly three miles east of the Caves Trail parking lot and was selected because of the presence of a cave. The southern half of the sampling unit was chosen to be surveyed as it contained both the cave and passable terrain. The terrain was a mix of different types of broken lava flows (almost exclusively pahoehoe) with little or no vegetation. There was a trail leading out past several caves and other interesting geologic features almost to the survey area. This made access to the survey area fairly easy but the survey itself was typical of other lava flow quadrats -- long, hot and difficult. No cultural material was encountered within or around the unnamed cave located with this quadrat. The cave itself was fairly typical of collapsed lava tubes found elsewhere in the area. It did not appear to be very large; however, the survey crew was not equipped for extensive caving. The cave did not have any water in it nor did it appear to have had any in the past.

The survey of the remainder of the quadrat yielded no cultural material. Nor was any cultural material encountered along the trail into the survey area and the caves along the route. Trail construction crews and hikers may have collected archaeological material, but our survey from off-trail indicates that, more likely, it was not there to collect.

Sample Unit #87 (NW 1/4, Section 11, T1N, R24E): A random unit within the lava, this sampling cell is located a half mile south of Silent Cone. The northern half of the unit was surveyed primarily because a section marker in the northeast corner assured a high degree of accuracy in orienting the crew than was possible in other quadrats. The terrain was fairly consistent throughout the sample unit with no distinguishing features in any of the four possible 80-acre quadrats; therefore, choosing the northern quadrat on the basis of logistics seemed reasonable.

The unit consisted almost entirely of rugged aa flows, but also had areas of pahoehoe and cinders. The terrain was very difficult to survey; the crew actually sustained injuries from the ragged lava. Vegetation was very sparse consisting of an occasional limber pine and small cinder gardens. The crew found no evidence of cultural activity. The lack of any natural resources limits the potential for significant prehistoric occupation of the area.

Sample Unit #105 (SW 1/4 of Section 7, T1N, R25E): This sampling unit lies between Broken Top and Half Cone, east of Buffalo Caves. It was selected to sample the lava flows. The southern half of the unit was surveyed due to ease of access and the presence of a section marker on the southwest corner. The quadrat was a zone of rolling pahoehoe flows punctuated by fairly large sinks or depressions which made survey a little more difficult. There also was a small amount of aa lava in the northwest corner of the area surveyed. The plant life in the area consisted mainly of limber pine and lichen. The area was riddled with lava tubes, typical of pahoehoe flows. Some were completely enclosed, but could be distinguished by the hollow booming echoes as the crew walked over them. Several of the lava tubes had collapsed. Some of these were completely collapsed, forming large depressions; others were only partially collapsed leaving small shelters, and one had formed a cave. Unfortunately, none of these possible shelters contained any cultural material, and no cultural material was encountered anywhere in the quadrat, despite its proximity to the resources along the Great Rift.

Sample Unit #130 (SE 1/4, Section 14, T1N, R24E): Located just west of the southern end of the Tree Molds Trail, the sample unit was chosen to sample cave resources of the Monument. The southern half of the unit, which includes the unnamed cave, was surveyed. The terrain in this area derives from two pahoehoe flows, the Blue Dragon Flow and the Crystal Fissure Flow. Both of these flows are relatively smooth, and there were only minor difficulties in traversing them. There was also a small area of cinders in the southeast corner of the quadrat on the slope of a low unnamed peak southwest of Big Cinder Butte. Most of the lava flows were barren of vegetation, with occasional limber pine and lichen, while on the cinders there was enough soil development to support sagebrush and pine as well as cinder gardens. The cave in this quadrat is actually a series of collapsed sections of lava tubes. The cave had no water or ice in it. As with the rest of the quadrat, it contained no cultural materials.

Sample Unit #146 (NW 1/4, Section 24, T1N, R24E): This sampling unit was selected because of the intersection of more than three major plant communities within it. The unit lies on slopes to the south of Big Cinder Butte, approximately one mile east of the Tree Molds Trail. The northern half of the unit was surveyed in order to catch the desired environmental zones; the southern half of the unit consisted primarily of aa lava.

The terrain in this area was mainly cinders, primarily on a low unnamed cinder cone to the southwest of Big Cinder Butte. Also encountered was the aa lava of the Derelict Flow. The terrain on the cinders was sloping but relatively easy to walk, while the terrain of the Derelict Flow was the typically difficult aa climbing. The vegetation in the area was mainly limber pine with sections of low sagebrush and cinder gardens. The aa was far more barren with only an occasional limber pine. Once again, this quadrat did not yield any archaeological resources from either the cinder slopes or the aa flow. The quadrat does not contain resources conducive to shelter or hunting, as it is exposed, open, and windy, lacking grass and water.

Sample Unit #150 (NE 1/4 of Section 20, T1N, R25E): This unit also contained a mixture of vegetation zones. The crew chose to survey the southern half of the unit in order to ensure completing the quadrat in a timely manner. Any other half of the sampling unit would have necessitated surveying over the top of Crescent Butte. This butte is steep and bare on top, being a large cinder cone with very little vegetation. The actual area of the survey was to the south and southeast of Crescent Butte. This area was largely one of cinders and primarily smooth and flat. Parts of the quadrat included the lower slopes of the butte and an unnamed hill to the south. Additionally, on the east side of the quadrat, there was an area of very old pahoehoe lava that was heavily eroded and largely filled in with aeolian deposits. The vegetation in the area was a thick low sagebrush community. The vegetation thinned out on the lava flows and was not much more than an occasional limber pine and a few other low grasses and plant types. The crew encountered a lone mule deer in this quadrat, which seemed unconcerned by its encounter. This area was located at the end of the east branch of the wilderness trail. No cultural material was encountered in the quadrat, even though natural resources -- in the form of good grazing for wild game and a water hole -- occur within or near the quadrat. Apparently, these resources were not sufficient to promote significant, long-term occupation.

Sample Unit #167 (SW 1/4, Section 20, T1N, R25E): This unit was selected to sample the water resources of the Monument. It is located along the Wilderness Trail in the Great Rift area, and contains Yellowjacket Waterhole. The northern half of the unit was surveyed in order to include the water hole. The terrain in the quadrat was largely flat cinders and cinder slopes with most of the vegetation being low sagebrush, cinder gardens, and occasional limber pine. The southern part of the quadrat contained the Little Prairie aa flow. This flow is typically rough; however, there were also areas that were fairly smooth.

A previously recorded site (10-BT-71) at Yellowjacket Waterhole was relocated without difficulty. Its condition appeared to be unchanged since originally recorded twenty-five years ago (see Sneed Sites: Results, below). No cultural material was seen in any other portion of the quadrat, however.

Sample Unit #187 (NW 1/4, Section 28, T1N, R25E): Also selected because of the presence of a water resource, this quadrat is located along the Great Rift, to the east of the end of the Wilderness Trail. It contains the Little Prairie Waterhole on the extreme western margin of the quadrat; therefore, the western half of the sample unit was surveyed. The terrain in this area was mainly pahoehoe lava with some aa flows. The vegetation was low grasses and lichen with the occasional limber pine. On the eastern side of the quadrat lies the Little Prairie. Interesting, this open area is not really free of lava flows. It is an area of very old lava flows that are by and large eroded smooth and filled in. This provides an excellent base for a thriving sagebrush community. Despite the likelihood of the terrain and environmental conditions, no archaeological material was recorded in the quadrat with the exception of previously recorded site 10-BT-73, which lies near the waterhole.

Sample Unit #205 (SW 1/4, Section 28, T1N, R25E): This unit was selected in order to sample the environment around a known archaeological site. In this case, Site 10-BT-74, recorded by Sneed (1967), was purposefully included within a sampling quadrat. The western half of the sampling unit was surveyed in order

to cover both the known archaeological site and the widest variety of terrain. The quadrat lies directly west of the peak of The Watchman.

Aa lava, pahoehoe flows, cinder gardens, and areas of aeolian deposition were all encountered within the quadrat. The terrain was mainly sloping hillsides and some open, flat ground as well. The lava flows were barren with no vegetation, but the cinders and soil were supporting large quantities of low sagebrush and various associated plants such as buckwheat and cheatgrass. The survey crew was able to relocate the previously recorded site, although it was mis-located in the original recording. The 1992 crew re-recorded it in its proper location (see Sneed Sites: Results, below). In addition, the original site forms failed to mention the presence of a historical component at this site. The 1992 crew corrected this oversight in the updated survey forms. The remainder of the quadrat was found to be without any other cultural resources.

Sample Unit #221 (NW 1/4, Section 32, T1N, R25E): This unit was selected as a mixed vegetation sample. It is located one half mile west of The Sentinel. The eastern half of the unit was chosen to survey as it contained the requisite plant communities; the western half was primarily barren lava flows. The terrain in this area was very much like many of the open areas and kipukas in the Monument. The area is actually old lava flows that largely filled in and overgrown. In this particular area, the ground was very broken and much more difficult than anticipated. The vegetation was largely a low sagebrush community with an occasional limber pine.

One archaeological site was recorded (10-BT-1820; see Results, below). The site was on a low hill overlooking more open area. The artifact assemblage consisted of fifty flakes of volcanic glass, cryptocrystalline silicates, and quartzite. Tertiary flakes, a few secondary flakes, and a quartzite core were recorded. There were no diagnostic tools. Given the lack of water and shelter at the site, its most likely function was a hunting station. The site sits in a perfect location to ambush game, and the survey crew felt it would have been interesting to continue the survey in the open sagebrush plain to the south.

Sample Unit #223 (NW 1/4, Section 33, T1N, R25E): The western half of this sample unit was surveyed in order to include the cave resource and the slopes of Sentinel Butte. The survey included the top and most of Sentinel Butte, which was quite difficult terrain, but the rest of the quadrat was relatively easy to survey. Vegetation in this quadrat was mainly sagebrush, other low shrubs, and an occasional limber pine. Two buck and one doe mule deer were seen in this quadrat. Site 10-BT-75, recorded by Sneed (1967), was relocated here, its condition as described on original site forms. This site is associated with the cave which prompted selection of this sampling unit. It consists of seven volcanic glass and cryptocrystalline flakes and one piece of pottery just outside and to the north of a collapsed lava tube. At the south end of the collapsed area was the cave. The floor of the cave was bare rock, with no artifacts. There was no water or ice within the cave, or other resources other than the shelter of the cave itself. A second, new archaeological site (10-BT-1822) was recorded within the quadrat. It is located within a collapsed lava tube with a great deal of soil deposition approximately 300 meters north of 10-BT-75. At the north end of the collapsed area is a rock structure, roughly oval in shape. The crew found only one flake in association with this architectural feature in the soil at the bottom of the collapsed area. The location of the site would seem to support the idea that these rings were hunting blinds, but the lack of other material evidence precludes definite identification.

Sample Unit #227 (NW 1/4, Section 35, T1N, R25E): This sample unit, located two miles east of The Sentinel, was selected to sample lava flows within the Monument. The western half of the unit was chosen primarily to facilitate access. Terrain was essentially uniform across the entire sampling unit. The quadrat chosen was located in the Little Prairie which is an area of older, overgrown lava flows surrounded by younger flows with less vegetation. The terrain here was fairly flat, but also somewhat broken. Vegetation was a low sagebrush community, with little rabbitbrush, buckwheat, cheat grass, and other low plants. No cultural resources were encountered in the quadrat. The lack of sites or isolated finds is not surprising considering the extent of the Little Prairie and the low density of archaeological sites within the Monument generally. Further investigation of the Little Prairie would most likely yield new sites, as it is a large area that would appear to have the potential for hunting stations.

Sample Unit #260 (SW 1/4, Section 3, T1S, R25E): This unit sampled the lava flows of the Monument; it is located approximately one half mile east of Split Butte on the northern edge of Blaine County. The northern half of the unit was surveyed because there were little distinction between the different halves of the units and the crew approached from the north side. The terrain in this area was composed entirely of lava flows of various types and ages. These flows were mainly pahoehoe lava with occasional areas of either aa or very broken pahoehoe. The terrain was fairly even, but difficult to survey because of the broken, rugged nature of the lava flows. The difficulty increased to the eastern end of the quadrat. It appeared that conditions would have continued to degrade in that direction. Vegetation in this quadrat was essentially non-existent, although there were isolated limber pines. No natural resources -- water, shade, or lithic sources -- nor cultural resources were encountered in this quadrat.

Sample Unit #281 (SW 1/4, Section 10, T1S, R24E): This unit contained a water resource, the North End Indian Well. The southern half of the unit was surveyed. Aside from the land immediately adjacent to the well, this quadrat had very rugged terrain, composed entirely of aa lava flows. The topography included drops and climbs of more than thirty feet which are not indicated on topographic maps. Vegetation was very sparse, being confined to the occasional limber pine or low bush. No cultural material was recorded within the quadrat with the exception of an historic scatter around the North End Indian Well (10-BN-353). Fuel cans, food cans and tobacco tins were recorded in addition to unidentifiable pieces of metal and wood. Once again, a site is located in close proximity to or in association with a definable natural resource.

Sample Unit #284 (SW 1/4, Section 10, T1S, R25E): A mixed vegetation sampling unit, this quarter-section runs from the peak of Fissure Butte, south. However, only the southern half of the unit contained the requisite mix of vegetation communities. The terrain in this quadrat was diverse and ranged from barren cinder slopes to old, overgrown lava flows to younger flows with little or no vegetation on them. The cinder slopes were relatively smooth whereas the lava areas were broken and rugged. No cultural resources were seen during the survey of this quadrat.

Sample Unit #298 (NW 1/4, Section 14, T1S, R25E): This sampling unit was selected because of the presence of a cave within the unit. It is located to the southeast of Sheep Trail Butte and west of Vermilion Chasm. The northern half of the unit contained the unnamed cave and was chosen for the survey. The terrain this area was primarily smooth pahoehoe lava; vegetation was limited to a few limber pines, some lichen, and other low plants. Survey of the quadrat proceeded relatively quickly once the area was accessed (access was by road into Little Laidlaw Park, and then hiking the two miles across extremely rough aa lava flows into the sampling unit). No cultural material was encountered during the hike into the quadrat, in the quadrat, or in the unnamed cave. The cave was quite small with no water and offered little shelter. The difficulty of access into and lack of resources in this area make it highly unlikely to yield any archaeological sites.

Sample Unit #311 (SE 1/4, Section 14, T1S, R25E): This unit was selected because of the presence of a water source; the northern half of the unit was selected for survey. The terrain in the quadrat was pahoehoe lava and, though rugged, presented no major difficulties in survey. Vegetation was extremely limited, with almost no limber pine and only a few low plants. Access to both this and unit #298 was facilitated by the landowner in Little Laidlaw Park who unlocked the gate and allowed the survey crew to drive to the southeastern corner of the Monument. This saved the crew three miles or more of hiking each way during the visits to these quadrats.

The water resource located in this quad was an ice cave, marked on USGS topographic maps. This cave appeared quite fragile and, as the crew was not trained or equipped for caving, remained unexplored in its further reaches. There were no cultural resources present in or about the cave. No ice or water was seen in the examined portion of the cave. In addition, there were no cultural resources encountered within the remainder of the survey area. The difficulty of access coupled with a limited water supply make this area an unlikely target for human use.

Sample Unit #326 (SE 1/4, Section 19, T1S, R24E): This unit was selected to randomly sample lava flows in this section of the Monument. Fortuitously, the sample unit also contained portions of Carey Kipuka, as well as Site 10-BN-11, previously recorded by Sneed (1967). The western half of the sampling unit was

chosen because it intersected the site, the kipuka, and a variety of volcanic terrain. Access into the quadrat was over rough aa flows from the southwestern boundary of the Monument.

Basically, two types of terrain were encountered in the quadrat. The first is the kipuka in which aeolian soils have accumulated. The second was rugged aa lava. The lava flows had very little vegetation with the exception of isolated limber pine and low plants. Sagebrush communities dominated the kipuka.

The archaeological site recorded by Sneed was easily relocated by the 1992 crew. It consisted of several dozen flakes spread over a wide area within the confines of the kipuka. The rest of the quadrat, as well as the trail into the area, contained no cultural resources.

5. RESULTS

Only five new archaeological sites were discovered as a result of the survey of 2,000+ acres within the Craters of the Moon Archaeological Monument. Archaeological site forms with specific locational information have been forwarded to the Idaho State Archaeologist's Office, the Idaho Archaeological Survey Southeastern Repository in Pocatello, and Craters of the Moon National Monument Headquarters, along with updated site forms for the sites recorded in 1966 by Paul Sneed. These new sites occur either near the Pioneer Mountains or along the resources of the Great Rift, a pattern also noted by Sneed. Only one site did not fit this pattern -- a historic scatter located at the North End Indian Well. Quadrats which fell outside the Great Rift, and many inside the Rift, were devoid of cultural material, despite the presence of natural resources such as water sources or shelter (caves). IMACS forms and locational information on these sites are being forwarded to NPS under separate cover.

New Sites

10-BN-353: This site is a scatter of cans, metal and glass around the North End Indian Well. Tobacco tins, a paint can, a fuel can, and several unidentifiable pieces of broken metal and glass were scattered over a 20 x 20 m area. The waterhole lies at the bottom of a steeply sloping depression. The site should be considered significant, as it is one of the few historic sites occurring within the Monument and documents use of the resources by AngloAmerican populations. No evidence of prehistoric material was seen at the site.

This site was recorded in Sample Unit #281, a unit picked because of the presence of the water source. The site was found in immediate association with the water.

10-BT-1820: This site was a scatter of approximately 50 flakes, one half mile west of Sentinel Butte. Both tertiary and secondary flakes of volcanic glass, quartzite, and cryptocrystalline silicates were distributed over a 700 square meter area. There was no apparent patterning to their distribution. This site was located in Sample Unit #221, chosen to sample the intersection of three or more vegetation communities. Although there is no shelter or water source nearby, the site does sit on the edge of a sagebrush plain to the south and may have served as a hunting station for ambushing game which moved through the area.

10-BT-1822: This is a rock structure at the north end of a collapsed lava blister. One secondary volcanic glass flake was found inside the blister eight meters south of the structure. The rock structure itself is three meters long, one meter wide, and 2 meters deep. The site is southwest of Sentinel Butte. This site lies in Sample Unit #223, which was chosen because of the presence of a cave. This cave, marked on the USGS and NPS maps, is the locus of 10-BT-75, recorded by Sneed in 1966. The crew postulated that the rock structure is a hunting blind, rather than a dwelling structure, because of the paucity of cultural material associated with it. Game could have been ambushed from the structure. The big sagebrush community in which this sampling unit lies is apparently home to game animals today, as the crew saw three mule deer during its survey.

10-BT-1823: This site is an isolated find of a single tertiary flake of volcanic glass and one potsherd approximately 100 m west of Bearsden Waterhole. It does not occur within any of the selected sampling units, but falls into Unit #186, which contains a water resource, no cave, a Sneed site, big sagebrush vegetation, and cinder cones (Water = 1; Cave = 0; Sneed = 1; Vegetation = 1; Lava = 11). The site was discovered while the crew was hiking to 10-BT-72, a site recorded by Sneed in 1966.

10-BT-1824: This site overlooks a flat sagebrush plain to the northwest. It is a small lithic scatter containing one core, one probable flake tool, and one flake, all cryptocrystalline. It is located on the edge of a lava flow northwest of Sunset Cone and adjacent to the Oregon Trail. Lying in Sampling Unit #24, this site is close to the intermittent stream which is the water resource recorded for this sampling unit.

Sneed Sites

10-BN-10: This site lies just north of Sheep Trail Butte, outside of the boundaries of the Monument or Wilderness today. It was revisited in 1992; the survey crew recorded nine quartzite, tertiary flakes.

10-BN-11: This site, located within the Carey Kipuka, was a thin scatter of lithics on top of what appeared to be considerable accumulation of soil and sediment. It was revisited by the 1992 crew as part of the survey of Sampling Unit #326. Several dozen flakes of various material were spread over a wide area within the confines of the kipuka, as Sneed had described it. There had apparently been no impact to the site in the intervening decades, although there was evidence of recent visitors (the tents of a biology research camp were set up in the sagebrush). Although no caves or water resources occur within this sampling unit, it is a mixed vegetation unit (Variable #3-8), while most of the flow within the unit dates to Eruptive Period D (Variable #4-4).

10-BT-65: This site consists of several rock structures lying on either side of the paved trail to Indian Tunnel, within our Sampling Unit #77. Sneed reported that early explorers had collected debitage and tools from the semicircular structure, but they found only "numerous chips" (10-BT-65 site form). In 1992, no artifacts of any sort were seen by the survey crew, suggesting that decades of collecting have completely destroyed the artifact assemblage of this site. To what extent it may have affected the stone structures themselves is unknown. No water source is currently recorded in this sampling unit, although personal experience indicates that ice and/or water is present in one or more of the caves along the paved trail. The lava dates primarily from Eruptive Period A (see Blakesley and Wright 1988), which includes the latest of the Craters lava flows; there is no vegetation to speak of. Apparently, the caves themselves (Indian Tunnel or one of the other caves) and any water sources they contained may have been the resource utilized.

10-BT-66: This was a small scatter of flakes on a bench approximately 90 m north of a small, unnamed waterhole on the southwest side of North Crater. The waterhole and site lie just within our Sampling Unit #68, which seems to be devoid of any other resources (Water = 1; Caves = 0; Vegetation = 0; Lava = 1; Sneed = 1). The survey crew in 1992 revisited the site and found both the site and the waterhole to be completely absent. The lack of water in the waterhole is easily explained by six years of drought, but the lack of artifacts is probably due to collecting, either by Sneed himself or by later amateur collectors.

10-BT-67: Sneed recorded this site as a probable quarry located within the remnants of an old cinder cone. He indicated that the veins of "basaltic glass" had been quarried. The 1992 crew relocated the site with difficulty, but were unable to find any evidence of tool production or quarry debris. Much of "glassy basaltic material" was of a poor quality and resembled broken pieces seen elsewhere as natural. It may be that definitely cultural material has been collected from the site or, alternatively, that Sneed misidentified the site's function. Even Sneed admits that "little artifactual material was found by the survey team" (10-BT-67 site form), although isolated finds had been made by Park Service personnel and amateur collectors from within the Devils' Orchard area. This site occurs within our Sample Unit #56, which is not correlated with any other resources except the possible quarry stone.

10-BT-68: Sneed describes this site as a small lithic scatter located on a five square acre kipuka due east of the loop road. Although he gives no absolute numbers, he states that "only a few chips were found, along with several pieces of burnt bone" (10-BT-68 site form), and postulates a one-time use of the area. Using directions from Sneed's map, the 1992 survey crew located both the small kipuka and the game trail in Sample Unit #77; however, they saw no artifacts of any sort and only some pieces of unburnt bone. Apparently, the site recorded by Sneed was small enough that it has been covered or destroyed by natural or human activity.

10-BT-69: This site lies on the southern flanks of the Pioneer mountains and was recorded as an open campsite. Sneed gives measurements (50 x 25 m) for the extent of cultural material, but does not mention what kind of material he saw. The 1992 survey crew recorded two large flake tools and three tertiary flakes and plotted the site more accurately along the north side of the abandoned jeep tracks that are indicated on the USGS topographic sheet. This site lies within our Sample Unit #11, which is correlated with a nearby water source and a big sagebrush plant community (Water = 1; Cave = 0; Vegetation = 1; Lava = 10, Sneed = 1).

10-BT-70: This is a rock structure and small rock shelter within a lava sink at the mouth of Buffalo Caves. Sneed records "large numbers of artifactual material and chipping detritus [which] indicate that this site was occupied for a considerable length of time" (10-BT-70 site form). He does not describe the artifacts in detail, however. Upon revisiting the site in 1992, the crew found the cave, rock shelter, and rock structures as Sneed described them, but no artifacts of any sort. Buffalo Caves is well-marked on USGS and CRMO maps and is easily accessed from the parking lot for the Tree Molds and Wilderness Trails. It is likely that whatever material was not collected by the Sneed survey has been removed by unauthorized collectors over the last twenty-five years. This site lies within our Sampling Unit #104 which contained the cave, lava flows from Eruptive Period A, bitterbrush plant community, and possibly water if the caves held ice or a seasonal water source.

10-BT-71: Two small lithic scatters on the benches at either end of Yellowjacket Waterhole (Sample Unit #167) were recorded in 1966, although Sneed does not record the extent or number of the debitage. In 1992, low levels of water were present at the waterhole, as were yellowjackets and doves. The site still existed as described by Sneed; apparently its location several miles from the nearest road and the mundane nature of the material protects it from casual collecting. Each of the scatters contained about fifteen flakes of cryptocrystalline and volcanic material, almost exclusively tertiary. This would suggest that the material was not quarried in the vicinity, but perhaps was knapped from preforms or prepared cores as people rested at the waterhole or waited in ambush for game.

10-BT-72: Three or four circular rock structures, postulated by Sneed to be hunting blinds, were recorded approximately 200 m north of Bearsden Waterhole. They averaged 1.5 m in diameter and 60 cm high and were situated on a lava pressure ridge, apparently near a game trail leading to the waterhole. Neither Sneed nor the 1992 crew recorded any artifacts or debitage associated with the rock structures; the 1992 crew found the structures to be unchanged since Sneed's visit in 1966. Situated within our Sampling Unit #186, this site is correlated both with a water source and with a big sagebrush community.

10-BT-73: Another site with possible hunting blinds, 10-BT-73 consisted of two circular features approximately two meters in diameter and one meter high, situated upon "monoliths" or high points 10-12 m above the valley floor. Game trails were observed in and around these features, with the Little Prairie waterhole a short distance to the east. Again, Sneed recorded no artifacts. The 1992 crew found all as Sneed had described it, including the structures, the game trails, and the lack of debitage, tools, or other artifacts, in Sample Unit #187.

10-BT-74: This was a thin, but large scatter of "cultural material" (Sneed does not elaborate on what kind), situated on the northeast slope of the Sentinel. Sneed's sketch map places the site on the northeast slope of the Watchman, but this must be an error since he clearly states that the site is between the Watchman and the Sentinel. This made it more difficult for the 1992 to relocate the site, which they discovered in a stand of limber pine on a ridge extending northwest from the Sentinel. Sneed collected large quantities of cultural material from this open site, but when the 1992 crew located it, it still contained 40-

50 flakes and a small volcanic glass side-notched projectile point. A historic scatter of twelve metal cans, not mentioned by Sneed, was also on the site. Aside from the 1966 collection, there appears to have been little disturbance of the site. This site lies in our Sample Unit #205, approximately 3/4 mile south of the Little Prairie Waterhole; the sample unit is partially covered by a big sagebrush community.

10-BT-75: Another open camp on the south side of the Sentinel, this site is 20 m northeast of a lava blister "which stores water in the spring" (10-BT-75 site form). Pottery and scraping tools were noted (and presumably collected) by Sneed. The 1992 crew found seven flakes of volcanic glass and cryptocrystalline, and one small piece of pottery. Otherwise, the site was as described by Sneed. No material was seen in the cave itself. This site lies in Sample Unit #223, which contains both the cave and a big sagebrush vegetation community.

10-BT-76: This site consisted of two cleared areas on the southeast end of Moonshine Cave. One hearth was recorded, as well as lithic debris. According to Sneed, "water is available in the northwest end of Moonshine Cave." In addition to the prehistoric material, evidence of the historic moonshining activity was present when Sneed visited the cave. The 1992 crew saw no archaeological material or the hearth which Sneed described, although the cleared areas could be defined. They did not go far enough into the cave to confirm the existence of ice and/or water, being cautioned by a CRMO cave report which indicated dangerous and unstable conditions. Site 10-BT-76 occurs within Sample Unit #102.

10-BT-77: Two rock structures located at the mouth of an unnamed cave make up this site. One circular and the other semi-circular, they were not associated with any artifacts or cultural debris. Indeed, there was "no material evidence to substantiate the inference that they were used by" prehistoric peoples (10-BT-77 site form), aside from their resemblance to other rock structures with such associations. Water was found in the cave in 1966. The 1992 crew found the cave without problem, as described by Sneed. There was no indication of disturbance or even visitation of the site. They describe the rock rings as inside the cave, rather than being clearly outside of it as is the case with other rock structure/cave sites. This site is in Sample Unit #103.

10-BT-78: This site is a single outcrop of volcanic glass, identified by Sneed as tachylyte, which was "probably" used as a quarry. Sneed inferred that this was a quarry from the presence of artifacts elsewhere in the Monument of this material. The site lies on the northern slope of Big Cinder Butte. The survey crew in 1992 also found no direct evidence for aboriginal use of this possible source. In strictest terms, it is not an archaeological site, since there is no cultural material present nor indications of quarrying. Lying in Sample Unit #117, this "site" is not associated with any other natural resources.

10-BT-79: This site is another semi-circular rock structure with a diameter of 1.5 meters and height of 60 centimeters. The feature adjoins a basaltic rock overhang in the northeast end of the cinder floor of Echo Crater. The only cultural material noted (and collected) by Sneed were tin cans and pieces of porcelain, indicating early Anglo occupation. With this material gone, there was nothing at the site for the 1992 survey crew to record. Even the rock structure did not seem to be necessarily purposefully constructed; it could have been a natural occurrence. However, with a waterhole less than a half mile to the east and a mixture of plant communities within the sampling unit (#185), the structure may represent a windbreak constructed or used by recent explorers.

10-BT-80: This small flake scatter is located in the middle of an older lava flow and is sheltered by the remnant of a pahoehoe pressure ridge. Sneed postulated a single, short-term occupation of this site given the paucity of artifacts. The 1992 crew recorded only five volcanic flakes in the area; apparently neither Sneed nor later visitors (if any) disturbed the site to any extent. The site may be associated with the occupation of 10-BT-75 which lies one half mile to the north. There are no caves or water sources recorded for this sampling unit (#240), although most of the unit does lie within a big sagebrush zone.

10-BT-81: This is another possible quarry site which consists of a series of volcanic glass outcrops in the mouth of an open, extinct vent on the south side of Big Cinders Butte. Again, Sneed based his assumption that this was used as a quarry on the presence of artifacts made from this material elsewhere in the Monument. However, the 1992 survey crew found several flakes that could have resulted from quarrying

or knapping activity. The presence of a game trail in the middle of the site leading to a pass around Big Cinders Butte is indirect evidence of potential for human use of the site. This site is in Sample Unit #132.

10-BT-82: This is an open site on the extreme southern slopes of the Pioneer Mountains, just off the Oregon Trail. Cultural material was confined to "artifacts" and debitage of local volcanic glass. The 1992 crew revisited it and found its location and condition as described by Sneed; seventeen volcanic glass flakes were observed. In addition, there was very recent garbage nearby, but no historical artifacts relating to the Trail. This site is located in Sample Unit #9.

10-BT-83: A small open site, 10-BT-83 lies on the west side of the North Crater Aa Flow (called the Highway Aa Flow by Sneed). Some cultural material was recorded but what kind and in what quantity is not indicated by Sneed. The 1992 crew was able to relocate the site from locational information and found eight small tertiary flakes of various material types. The site appears to have been undisturbed since the time of Sneed's visit; what material Sneed collected is currently unknown. Sample Unit #39, in which the site lies, contains cave and water resources as well as a big sagebrush community, although none of these resources are in immediate proximity to the site.

10-BT-84: Lying on the north side of Grassy Cone, this was an open site covering approximately 300 square meters. Presumably there were artifacts on this site, but the 1966 site form does not describe them. The 1992 survey presumes they found the site, despite the poor site description and locational information. Approximately 400 m east of the location indicated on the map, they happened upon a scatter of over 100 flakes of various materials squarely astride a game trail. Assuming that this is indeed 10-BT-84, the site is in Sampling Unit #52 which, although it has no water or cave resources, does occur within a big sagebrush plant community. The correlation between the big sagebrush and game trails was remarked upon several times in field notes from both 1966 and 1992.

10-BT-85: This site lies just east of 10-BT-83, among lava pressure ridges near Grassy Cone. Sneed recommended testing of this site because of the presence of one meter or more of soil deposits in the cave which is in the middle of the site. According to Sneed, the cave was a water source, although there was no indication of water in 1992. This was a large open site extending more than 500 square meters, with a high density of cultural material outside the cave and some inside the cave. The 1992 crew confirmed Sneed's findings. Even at the time of their visit, there were well over 250 flakes ("before we lost count"), of volcanic glass, cryptocrystalline, and quartzite. Most were tertiary flakes, although all stages of reduction were represented. A small quartzite Desert side-notched point and two pot sherds were also observed. Apparently, this site has not been disturbed since Sneed's initial visit in 1966. This site is in Sample Unit #39.

10-BT-86: Measuring approximately 10 x 12 meters, this site lies on the east side of an eroded lava outcrop to the west of Sunset Cone and just northwest of 10-BT-85. The number of artifacts noted at this flake scatter in 1966 was small and apparently collected by Sneed. The 1992 crew was unable to relocate any debitage or artifacts at the location indicated on the original site forms. It appears that this site no longer exists. It was in Sample Unit #38.

10-BT-87: A small flake scatter on the southwest side of Sunset cone, this site may have been entirely collected by Sneed. He does not elaborate on the material found there other than to say it was "thinly scattered" and postulating a short-term, perhaps single, use. The 1992 crew was unable to relocate any artifacts or flakes in the location indicated by Sneed's maps. Either the maps are in error, or the entire site assemblage has been collected. This site was in Sample Unit #39.

10-BT-88: This was a large open camp site scattered over a 300 x 500 meter area at the mouth of Little Cottonwood Creek (Sample Unit #9). The alluvial matrix for this site indicates that considerable depth may be present and Sneed suggested testing of the deposits. He did not detail the kinds of artifacts or material recovered in the site form. Despite the extent and potential of the site, the 1992 crew was unable to locate any scatters, concentrations of, or isolated artifacts in the marked location. The utilized flakes and scrapers collected by Sneed seem to have been the complete surface assemblage. This location should be checked periodically to see if the movement of the alluvial deposits uncovers any other evidence of prehistoric use.

10-BT-89: A small lava blister in an area of lava tunnels contained only a few artifacts. Sneed felt that, despite the lack of cultural material, it might warrant testing because of the soil deposition. Sneed also recorded a hearth on the surface of the deposits. The 1992 crew was unable to confirm Sneed's findings; assuming they were in the correct location and lava blister, they saw no artifacts or evidence of a hearth. This site occurs in Sample Unit #25.

10-BT-90: This site lies outside of the Monument and Wilderness boundaries and was not included in any sample units. However, it was revisited by the 1992 crew and found to be in the same condition as when Sneed recorded it in 1966. Of course, the artifacts collected by Sneed were missing, but five flakes of volcanic glass and cryptocrystalline material were recorded. There was also evidence of recent disturbance in the form of recent trash and cattle tracks. The site lies on the lower slopes of the Pioneer Mountains near the mouth of an unnamed, intermittent stream.

6. SUMMARY AND CONCLUSIONS

The 1992 archaeological survey of the Craters of the Moon National Monument and Wilderness Area systematically sampled 2,000 acres. Only five archaeological sites were recorded within these 2,000 acres. In addition, sites originally recorded in 1966 were revisited in order to determine their current condition. Informal transects into and out from the sample quadrats and the Sneed sites were also surveyed, although they were not marked on USGS maps. Therefore, the original survey of 2,000 acres is increased by 5-10% by the simple process of accessing Sneed sites and sample quadrats.

Twenty-six Sneed sites and five new archaeological sites have been recorded within the Craters of the Moon boundary. Table 6.1 correlates these thirty-one sites with environmental variables tested by the 1992 survey. In order to complete this correlation, the locations of the Sneed sites were noted within our 359 sampling cells and the environmental variables for the relevant sampling cell recorded for the Sneed site (see Sneed Sites, above).

Some of the correlations between site occurrence and environmental variables are as expected: for example, over half of the sites recorded occur at or near a water resource, although less than half of the sample units contained a water source (Table 6.1). However, other correlations are not as strong as expected. There appears to be only a weak link between the presence of a cave and an archaeological site. Less than one-third of the archaeological sites were associated with caves, and not all caves explored contained archaeological material. The 1992 crew surveyed eight quadrats with caves, but only one of the caves contained an archaeological site. Therefore, we can conclude that the shelter of a cave itself was an insufficient factor for prehistoric occupation. Three of the new archaeological sites recorded did occur at or near water sources, out of seven sample units that contained water sources. This implies that, although there is a much higher probability of encountering a site at a waterhole than at a cave, the waterhole itself is also insufficient to predict the presence of an archaeological site. Apparently, water holes which are isolated in extremely rugged lava flows with few other resources nearby were not used prehistorically. Surprise Waterhole, for example, had no associated prehistoric material.

The expected correlation between archaeological sites and intersecting plant communities was not as strong as expected. Seven of the 31 known archaeological sites do occur within zones which contain three or more plant communities; however, seven archaeological sites also occur in zones with no plant communities. A more concrete relationship was noted between the presence of archaeological sites and big sagebrush communities. Nearly half (13 of 31) of the archaeological sites recorded occur within this environmental zone. This is not surprising given the number of game and game trails noted by field crews within the big sagebrush prairies and kipukas in the Monument. If the subjective correlation of big sagebrush with an abundance of game animals is correct, then we can postulate that the big sagebrush prairies should contain evidence of hunting stations, blinds, and processing locations. We recommend that further investigation of big sagebrush communities be undertaken to test the hypothesis that site density will be higher in these zones.

Most of the archaeological sites recorded in 1966 and 1992 are associated with the younger lava flows in the Monument (Eruptive Period A). Diagnostic artifacts recorded in 1992 and in 1966 almost all fall within a late prehistoric period (less than 2,000 years), so theoretically they could occur on top of flows of any age. However, for the most part, sites are found only on younger flows; why this should be so is not immediately evident. Older artifacts (greater than 2,000 years) have been recovered from within the Monument, but only in small numbers; indications of older sites may be buried under succeeding lava flows. We suggest that lava flows continue to be surveyed for cultural resources, but that, because of low site density, they may be selectively sampled rather than intensively surveyed.

Using the information generated by Sneed (1967) and the 1992 systematic survey, we conclude that prehistoric aboriginal populations avoided the barren stretches of rugged aa and broken pahoehoe flows; at least, they have left little evidence there. Instead, it appears that archaeological resources will most likely be found around resource vectors; twenty-nine of the thirty-one recorded sites within the Monument are associated with either water, caves, or big sagebrush plant communities. Nineteen of the thirty-one sites are associated with two or more of these three variables. The two sites which do not occur near any of these resources are both possible quarry sites (Sneed 1967).

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TABLE 6.1. Correlation of Sites with Resource Variables

Variable	Number of Sites (N=31)	All Sample Units (N=25)
Water		
Present	21	7
Absent	10	18
Cave		
Present	9	8
Absent	22	17
Vegetation Type		
None (0)	7	14
Big Sagebrush (1)	13	4
Bitterbrush (3)	2	-
Limber Pine (5)	2	-
Mixed Community (8)	7	7
Lava Flows		
3+ Eruptive Periods (0)	2	1
Period A (1)	12	11
Period C (3)	9	8
Period D (4)	1	1
Period G (7)	2	7
Period H (8)	-	1
Alluvium/colluvium (10)	1	2
Cinder cones (11)	4	-

Of the 31 recorded sites within the Monument, 29 are associated with either water=1, cave=1, and/or vegetation=1 or 8. The two sites that fall outside all of those environmental parameters are both quarry sites.

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7. BIBLIOGRAPHY

- Blakesley, Jennifer A., and R. Gerald Wright
1988 A Review of Scientific Research at Craters of the Moon National Monument. Forest, Wildlife, and Range Experiment Station Bulletin No. 50. Moscow: University of Idaho.
- Butler, B. Robert
1978 A Guide to Understanding Idaho Archaeology: the Upper Snake and Salmon River Country. Idaho Museum of Natural History Special Publication, Pocatello.
- Chance and Associates
1991 Letter report to the National Park Service, Pacific Northwest Region, July 22, 1991. On file, Craters of the Moon National Monument.
- Day, Thomas A., and R. Gerald Wright
1985 The Vegetation Types of Craters of the Moon National Monument. Forest, Wildlife, and Range Experiment Station, University of Idaho, Moscow.
- Griffith, B.
1983 Ecological Characteristics of Mule Deer: Craters of the Moon National Monument, Idaho. Cooperative Park Studies Unit/University of Idaho Report, No. B83-2. Moscow.
- Henrikson, L. Suzanne
1990 The New Production Reactor Archaeological Sample Survey. Idaho Museum of Natural History, Northern Intermountain Quaternary Institute, Reports of Investigations, No. 90-4. Pocatello.
- Holmer, Richard N.
1986 Shoshone-Bannock Culture History. Swanson/Crabtree Anthropological Research Laboratory Reports of Investigations, No. 85-16. Idaho State University, Pocatello.

1990 Prehistory of the Northern Shoshone. Rendezvous: Idaho State University Journal of Arts and Letters 26(1):41-59. Pocatello.
- Lohse, Ernest S.
1992 Manual for Archaeological Analysis: Field and Laboratory Analysis Procedures. Idaho State University Department of Anthropology Miscellaneous Papers, No. 92-1. Pocatello.
- Lohse, Ernest S., and D. Sammons
1991 Test Excavations at Site 10-OE-3781, the Bruneau River Take-Out Site. Idaho Museum of Natural History, Northern Intermountain Quaternary Institute Reports of Investigation, No. 91-2. Pocatello.
- Lowie, Robert H.
1909 The Northern Shoshone. Anthropological Papers of the American Museum of Natural History, Vol. 2, No. 2, pp. 165-306. New York.

- Murphy, Robert F., and Yolanda Murphy
 1986 Northern Shoshone and Bannock. In Great Basin, Warren L. d'Azevedo (ed.), Handbook of North American Indians, Vol. 11, pp. 284-207, William C. Sturtevant, series editor. Washington, D.C.: Smithsonian Institution Press.
- Reed, William G.
 1985 An Approach to the Archaeological Identification of Shoshonean Subsistence Territories in Southern Idaho. Unpublished Master's thesis, Department of Sociology, Anthropology and Social Work, Idaho State University, Pocatello.
- Reed, William G., J.W. Ross, B.L. Ringe, and Richard N. Holmer
 1987 Archaeological Investigations of the Idaho National Engineering Laboratory, 1984-1985: A Report of Cultural Resource Inventory Projects, Vol. 1, Revised Edition. Swanson-Crabtree Anthropological Research Laboratory Reports of Investigations, No. 87-1. Pocatello.
- Sammons, D., and John Furniss
 1992 Archaeological Investigations at 10-BM-148, Cedar Butte. Idaho Museum of Natural History, Northern Intermountain Quaternary Institute Reports of Investigations, No. 92-8. Pocatello.
- Sneed, Paul G.
 1967 An Archaeological Reconnaissance of Craters of the Moon National Monument. Tebiwa 10:37-52. Idaho Museum of Natural History, Pocatello.
- Stearns, Harold T.
 1930 A Guide to Craters of the Moon National Monument. Caldwell, Id: Caxton Printers. (Reprint of 1928, Idaho Bureau of Mines and Geology Bulletin, No. 13).
- Steward, Julian H.
 1938 Basin-Plateau Sociopolitical Groups. Bureau of American Ethnology Bulletin, No. 120. Washington, D.C. [Reprinted: University of Utah Press, Salt Lake City, 1970.]
 1943 Culture Element Distributions, XXIII: Northern and Gosiute Shoshone. University of California Anthropological Records, Vol. 4, No. 2, pp. 209-360. Berkeley.
- Torgler, Kim J.
 1993 Excavations at Dagger Falls on the Middle Fork of the Salmon River, Idaho. Idaho Museum of Natural History, Northern Intermountain Quaternary Institute Reports of Investigations, in preparation. Pocatello.

