CRATERS OF THE MOON
NATIONAL MONUMENTAND PRESERVE
ARCHAEOLOGICAL OVERVIEW

FINAL REPORT

prepared for the

USDI NATIONAL PARK SERVICE
and
USDI BUREAU OF LAND MANAGEMENT

by

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MANAGEMENT SUMMARY

Due to the combined efforts of the BLM, NPS and the University of Oregon, roughly 45,000 acres (18%) of the Monument have been intensively inventoried for archaeological resources. Due to these efforts, a total of 291 prehistoric sites and 306 prehistoric isolated finds have been documented. In addition, seven archaeological sites on the Monument have been subjected to subsurface investigations within the past 25 years (see Figure 5.1). These include Baker Caves (10BN153 and 154), Scaredy Cat Cave (10MA30/143), Bowl Crater (10BN1066), Alpha Cave (10PR641), the Roasting Rock Site (10BN389), Catchment Cove (10BN861) and the Drifting Gene Site (10MA421).

While previous archaeological survey coverage of the Monument has been excellent, there are at least 50,000 acres of lava edge and 150,000 acres of open steppe that have yet to be explored. Based on the results of previous surveys, there are likely to be an additional 500 cultural resources (both prehistoric sites and isolates) encountered at the lava edge and 600 additional cultural resources found on the sagebrush steppe. It is more than likely that some of these resources will consist of seasonal base camps and, perhaps, residential bases. In addition, it is suspected that numerous aboriginal trails cross the basalt flows within the Monument.

Due to the density of prehistoric archaeological sites that are likely to be encountered within 300 meters of the lava edge, these areas should be considered “high archaeological sensitivity” zones. Unless subsurface investigations can be performed, these zones should generally be avoided by any ground disturbing activities. In addition, the lava edge requires regular monitoring by BLM and NPS personnel to reduce the potential for illegal surface collection and excavations. Based on the 2005 University of Oregon field investigations, it is apparent that accreting sediments along the lava flows can obscure significant subsurface cultural deposits and features.

Due to the significant number of properties that are clearly eligible to the NRHP within its boundaries, the Monument should be nominated as a National Register District and afforded the protection that such a designation can provide.

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INTRODUCTION

The purpose of this document is to present current archaeological data for the Craters of the Moon National Monument and Preserve and provide park managers and researchers with the appropriate measures to manage and interpret cultural resources contained within the Monument boundaries. This document also identifies specific areas with elevated archaeological sensitivity requiring special management and presents a predictive model that provides sufficient information to make knowledgeable decisions regarding future cultural resource policies.

The Craters of the Moon National Monument and Preserve encompasses 750,000 acres, of which almost 500,000 are covered by late Pleistocene and Holocene basalt flows (Figure 1). The remaining acres are primarily contained within "kipukas", a Hawaiian term that refers to an island of land surrounded on all sides by lava. The Monument can boast of containing the largest kipuka in the world, referred to as Laidlaw Park.

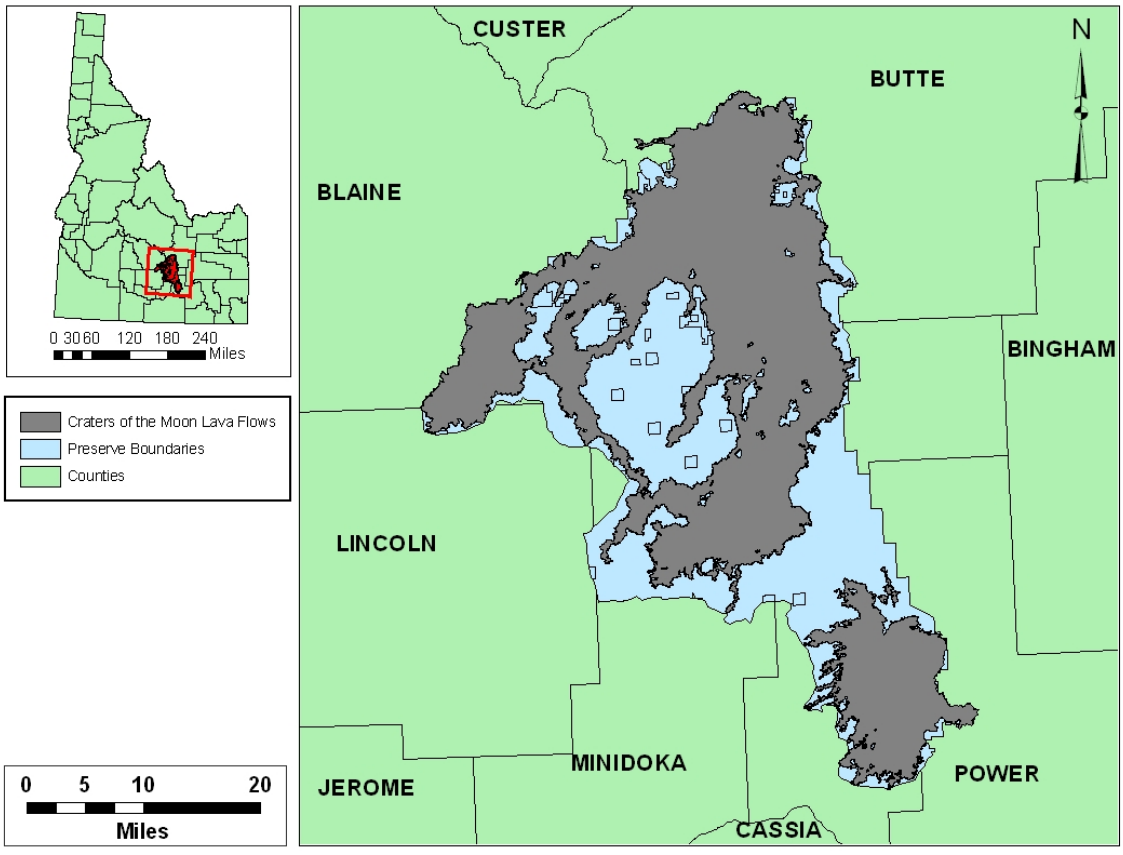

Figure 1. Location of the Craters of the Moon National Monument and Preserve in southern Idaho.

The Monument is located on the eastern Snake River Plain, a relatively flat volcanic feature bounded by the Basin and Range physiographic province to the south and the

Idaho batholith to the north. The plain drops gradually from an elevation of roughly 2000 meters at the border of the Yellowstone Plateau on the eastern side, to roughly 700 meters on the western edge. The surface of the eastern Snake River Plain is comprised of Pleistocene and Holocene basalt flows covered by aeolian deposits (Kuntz et al. 1992). More recent flows (including many of those on the Preserve) are devoid of sediments.

Previous Archaeological Research

The Monument contains over 600 documented archaeological sites and isolated finds. While the majority of these resources were initially recorded during intensive areal surveys associated with Bureau of Land Management (BLM) range fire rehabilitation efforts, the National Park Service (NPS) has also conducted archaeological investigations within the original monument boundaries.

One of the earliest formal archaeological investigations conducted on the Monument involved a reconnaissance survey by Idaho State University in the summer of 1966 (Sneed 1967). The survey included four segments of the Monument that Earl Swanson and Paul Sneed considered to be distinct. These included the mountainous northwestern section, the cinder cones and kipukas in the central section, the broken a'a and pahoehoe flows in the southeast and the Carey Kipuka in the southwestern most section. A total of 28 prehistoric sites were documented, ranging from middle to late Holocene in age (Figure 2). Most of the sites consisted of open lithic scatters and rock features associated with perennial or intermittent water sources. However, two hunting blind sites, two obsidian quarries and five lava tube caves were also recorded. Sneed carried out an intensive collection strategy, resulting in a substantial number of projectile points (98), flaked stone tools (98), flakes and blades (77), ground stone (12), and ceramics (71) being removed from the surface of the sites (Sneed 1967).

Although Sneed's research generated a significant number of archaeological resources, the disposition of specific sites and location of the survey areas were not sufficiently documented. Sites were not described in any detail and sketch maps and/or small scale maps of the area were inadequate. In 1992, the NPS engaged the Idaho Museum of Natural History to conduct the first systematic archaeological survey within the Monument (Sammons and McLaughlin 1992). The research involved the intensive survey of roughly 300 sample units totaling 2000 acres. The selection of survey units was based on environmental variables and an effort to relocate the sites previously recorded by Sneed in 1966. However, the map showing the locations of the 300 sample units does not clearly identify where the 1992 intensive inventory occurred. Some effort will be required in order to include this survey in the GIS database.

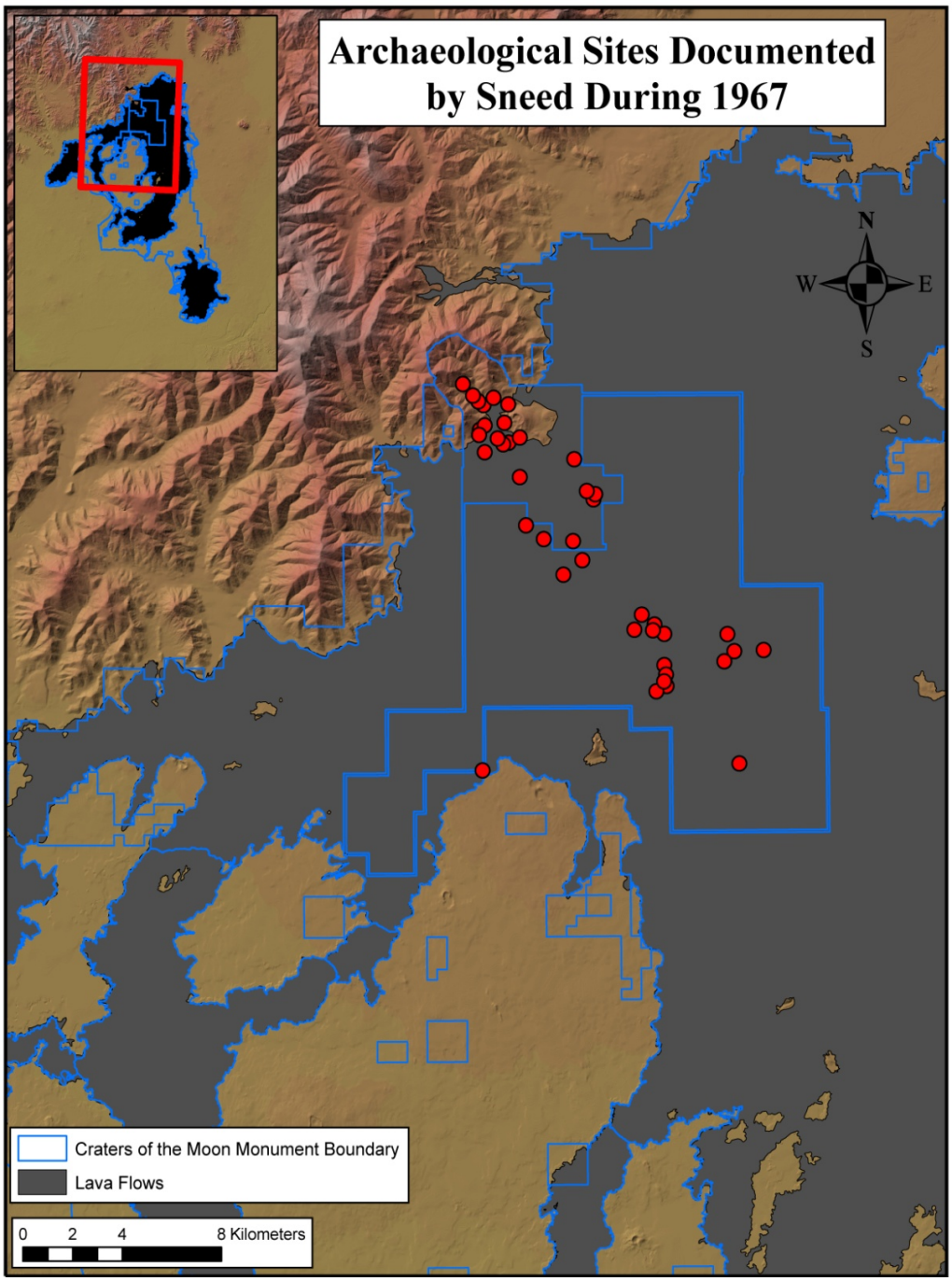

Figure 2. Map showing the locations of archaeological sites identified by Sneed in 1967.

A total of five new cultural resources were documented during the 1992 survey and most of Sneed's site locations were reportedly found. However, the ISU crew noted that the character of some sites differed from the original recording. Although most of the rock features were still intact, lithic scatters had either been altered by accreting sediments or heavy surface collecting. In fact, the lack of surface debris was directly attributed to the

previous intensive collecting by Sneed (Sammons and McLaughlin 1992). The "quarry" sites also exhibited only minimal evidence of use.

The Idaho Museum of Natural History returned in 1993 to conduct an intensive survey of 2000 acres in Little Prairie, located in the east-central portion of the Monument (Sammons 1993). Although ground exposure was exceptional due to a previous burn, only eight archaeological sites were documented. The report includes very brief descriptions of three prehistoric lithic scatters, four prehistoric isolated finds and one historic isolated find and, due to the absence of a 7.5 minute USGS map, the boundaries of the survey area are somewhat unclear.

In 1996, Idaho State University conducted an archaeological field school in the northern end of the Monument in the vicinity of Goodale's Cutoff (Jenks 1998). The primary goals of the field school were to attempt to locate any surviving material remains indicative of the Oregon Trail and characterize the nature of prehistoric sites associated with the transition zone between the Snake River Plain and Pioneer Mountains to the north. Although not specified in the report, approximately 235 acres were intensively surveyed during the field school. A total of eleven new prehistoric cultural resources were documented. However, no historic sites associated with the Oregon Trail were encountered. Immediately following the pedestrian survey, two extensive lithic scatters (10BT2054 and 10BT2064) were subjected to test excavations. However, the very limited nature of these subsurface investigations precludes an evaluation of NRHP eligibility.

In 2004 and 2005, the University of Oregon Archaeological Field School conducted intensive pedestrian surveys in portions of the Monument. A total of 1600 acres were examined during the 2004 field season and 28 new archaeological sites were recorded. In 2005, the UO Archaeological Field School returned to the Preserve for additional intensive pedestrian surveys. These surveys were primarily conducted along the perimeter of basalt flows of various ages within Laidlaw Park. These efforts were designed to gain information on the nature of archaeological sites associated with specific late Pleistocene and Holocene lava fields on the Preserve. A total of 3200 acres were inventoried during the 2005 field season and 84 new sites were recorded. In addition to the pedestrian surveys, five archaeological sites were subjected to test excavations.

In addition to the archaeological research discussed above, numerous intensive fire rehabilitation surveys have been conducted on the Monument within the past 20 years. These have been performed by the BLM, usually within a month to two months following range fires, prior to reseeding activities. Because of the potential ground disturbance that can be caused by reseeding with a range-land drill, intensive archaeological inventories were carried out to ensure that properties potentially eligible to the National Register of Historic Places are not adversely affected by these federal undertakings.

Table 1 below provides a list of previous archaeological surveys conducted within the Monument and information, if available, regarding the name of the survey, acreage

surveyed and number of documented cultural resources (including sites and isolated finds). It should be noted that this list is far from complete. It does not identify the multitude of small compliance surveys conducted by the BLM or NPS over the past few decades. However, the Idaho State Office of the BLM is currently in the process of creating a comprehensive survey database, which should be completed within the next five years.

In addition, the authors were not able to obtain specific information regarding large fire rehabilitation surveys conducted by the Burley and Idaho Falls field offices of the BLM. These surveys were primarily performed in the eastern and southern portions of the Monument. Although included in Section IV with other survey data, the names of these projects and their associated reports are unknown at this time.

Table 1. Previous Archaeological Surveys within the Monument

Year	Acres	Cultural Resources	Survey Name	Reference
1966	Unknown	28	Archaeological Reconnaissance of the CMNM	Sneed 1966
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Section I presents an environmental overview of the Monument and surrounding region, including a discussion of existing paleoclimatic studies. These studies can provide useful insights regarding the age and distribution of archaeological resources on the Monument and the cultural chronology of the region. Section II provides an overview of this chronology and highlights previously excavated archaeological sites that were used in the development of this chronology.

Geospatial analysis of the roughly 600 prehistoric sites and isolates on the Monument is presented in Section III. The analysis required manipulating the database provided by

the Idaho State Historic Preservation Office (SHPO). (However, roughly 40 sites and isolates recorded in the original Monument boundaries were not in the database, including those documented by Sneed in 1966, and could not be incorporated into this study).

The cultural resources in the SHPO database and those recorded during the past two field seasons were sorted into "types" based on the range of artifacts noted in surface assemblages. Because it was suspected that the "site description" attribute field in the database omitted useful information or contained erroneous data, efforts were made to resolve these issues. Dates of occupation were assigned to previously recorded archaeological sites within the study area if they contained diagnostic projectile points. This allowed for an examination of the distribution of sites through time.

Section IV presents a geochemical source analysis of diagnostic volcanic glass projectile points collected from the Monument over the last 25 years. The primary goal of this analysis was to examine how far volcanic glass projectile points from the Monument have been transported from their original source and assess whether patterns in the data suggest direct procurement or exchange networks. The results of this analysis are also considered with other facets of the archaeological record from the Monument to determine if changes in mobility and land use has occurred through time.

Section V provides of an overview of previously excavated sites on the Monument. A total of seven sites within the Monument have been subjected to formal test excavations. These have been conducted for research purposes, to evaluate NRHP eligibility or to assess damage associated with ARPA violations. Sites excavated prior to the University of Oregon investigations include Baker Caves (10BN153/154), Scaredy Cat Cave (10MA143) and Bowl Crater (10BN1066). The remaining sites, Roasting Rock (10BN389), Catchment Cove (10BN861), Alpha Cave (10PR641) and the Drifting Gene Site (Temporary No. 05-KM-20) were excavated in 2005 to collect data for inclusion in this document. Because surface lithic scatters on the eastern Snake River Plain are notorious for "disappearing" and "re-emerging" due to the continuous accretion and deflation of aeolian sediments, the primary purpose of the 2005 test excavations was to assist in identifying the geomorphic processes involved in this phenomenon. Section V also provides management recommendations for all previously excavated sites within the Preserve.

An overview of the 19th Century seasonal round of the Shoshone-Bannock is presented in Section VI and the delineation of archaeologically sensitive areas on the Preserve (as well as gaps in the data) is addressed in Section VII.

ENVIRONMENTAL SETTING

The Craters of the Moon National Monument and Preserve is located on the sagebrush steppe of the eastern Snake River Plain (Figure 3). The area is a cold desert with elevations ranging from 1500 to 2000 meters a.s.l. and winter snow and early spring rains

produce less than 10 inches of annual precipitation (Butler 1978). The region, bordered by the Basin and Range Province to the south and Northern Rocky Mountain Province to the north, is a lava plain given limited contrast by landforms of low topographic relief. These include rolling basalt pressure ridges, shallow basins, swales, knolls, buttes, vegetated areas surrounded by and isolated by lava flows (kipukas) and dozens of lava tube caves. These features were created primarily by pahoehoe basalt flows from low shield volcanoes and fissure eruptions ranging from Pliocene to Pleistocene in age (Greeley and King 1977; Kuntz et al. 1992). Sediments consist primarily of aeolian deposited silty or sandy loams, with most accumulations occurring on the lee sides of prominent land features. The Snake River, the region's only major waterway, transects the Plain, arcing east to west. Because of the incline of plain and catastrophic events such as the Bonneville Flood around 14,000 years ago (Currey and James 1982), much of the river corridor is characterized by deep, narrow gorges.

Figure 3. Craters of the Moon National Monument and Preserve, near Snowdrift Crater in northern Laidlaw Park.

The dominant native vegetation includes the shrubs *Artemisia tridentata* (big sagebrush), *Artemisia tripartita* (three-tip sagebrush), *Purshia tridentata* (bitterbrush), *Tetradymia canescens* (horsebrush), *Chrysothamnus puberulus* (rabbitbrush), and *Gutierrezia sarothrae* (snakeweed). Common native grasses include *Agropyron spicatum* (bluebunch wheatgrass), *Koeleria cristata* (junegrass), *Oryzopsis hymenoides* (ricegrass), *Poa nevadensis* (poa), *Poa secunda* (common poa), and *Stipa comata* (needle and thread grass) (Franzen 1980). Common mammals exploited by the region's historical inhabitants include *Antilocapra americana* (pronghorn antelope), *Odocoileus hemionus* (mule deer),

Bison bison (buffalo), *Cervus elaphus* (elk), *Lepus californicus* (blacktailed jackrabbit), *Sylvilagus nuttalli* (cottontail), *S. idahoensis* (pygmy rabbit), and *Marmota flaviventris* (yellow-bellied marmot). Common birds include *Dendragapus obscurus* (blue grouse), and *Centrocerous urophasianus* (sage grouse).

Although much of the eastern Snake River Plain is devoid of permanent water sources (except the Snake, Big Wood and Little Wood rivers), many swales and basins serve as natural catchment areas for winter snowmelt and spring rains (Henrikson et al. 1998). During the spring and early summer months, these ponds are a magnet for numerous species of waterfowl, including *Anas crecca* (green-winged teal), *A. acuta* (northern pintail), *A. cyanoptera* (cinnamon teal), *A. clypeata* (northern shoveler) and *Branta Canadensis* (Canada goose), which feed on the indigenous fresh water crustaceans.

GEOLOGICAL SETTING

An important consideration that is often overlooked in the investigation of Snake River Plain prehistory is the late Pleistocene and Holocene volcanism that has occurred in the region during the last 15,000 years (Kuntz et al. 1986, 1992). The geologic characteristics of the eastern Snake River Plain are distinct from those of the western Snake River Plain.

Geologists divide the two halves at roughly Highway 75 from Twin Falls to Ketchum because their "structural, geophysical, and geological characteristics" indicate "different origins" (Kuntz et al. 1992:229). The current character of the eastern Snake River Plain was established roughly 10 million years ago by continuous pahoehoe flows from fissure eruptions or vents that range between 1 and 2 kilometers across. Big Southern Butte, Middle and East Butte are rhyolite domes that were extruded between 1 million and 300,000 years ago (Kuntz, et al. 1992).

To grasp the potential impact of basaltic eruptions on prehistoric populations, it is important to review the various stages of volcanic activity that have occurred on the eastern Snake River Plain. The first stage of activity was characterized by harmonic tremors with the opening of fissures and steam vents. Lava fountains erupted, producing flames that may have extended to 500 meters in height, and tephra was ejected to distances as great as 10 kilometers downwind. The second stage began when lava fountains became localized, tephra cones formed and larger quantities of lava exuded from open fissures, resulting in surface flows. The third stage was marked by extended eruptions that may have lasted for months or a few years. Although lava tubes did form during the second stage (if the lava volume was adequate), tubes primarily formed during the third stage and dispersed lava to the outer edges of the flow. Most lava on the eastern Snake River Plain was dispersed in this fashion.

There are eight lava fields on the eastern Snake River Plain that formed during the late Pleistocene and Holocene. Although some are covered with a thin layer of aeolian deposits, most are fully exposed. These include Craters of the Moon, Wapi, Shoshone, Kings Bowl, North Robbers, South Robbers, Cerro Grande and Hells Half Acre (Figure

4). Cerro Grande is radiocarbon dated to roughly 13,000 ry B.P. and North and South Robbers dates to 12,000 ry B.P. The dates for each flow were generated from charcoal recovered from immediately beneath the flows (Kuntz et al. 1986).

Hells Half Acre, located southwest of Idaho Falls, has been radiocarbon dated at roughly 5200 ry B.P. The flow originated from a shield volcano that exuded pahoehoe lava for several months (Kuntz et al. 1992). Kings Bowl lava field, located between Craters of the Moon and Wapi flows, has been identified as a single eruption that may have lasted less than a day, occurring around 2200 ry B.P. Based on the character of the flow, this event must have been pretty spectacular, with explosion pits, lava lakes and spewed tephra. The Wapi lava field probably started at the same time as Kings Bowl but remained active for several months, as indicated by the lava tube systems typical of the

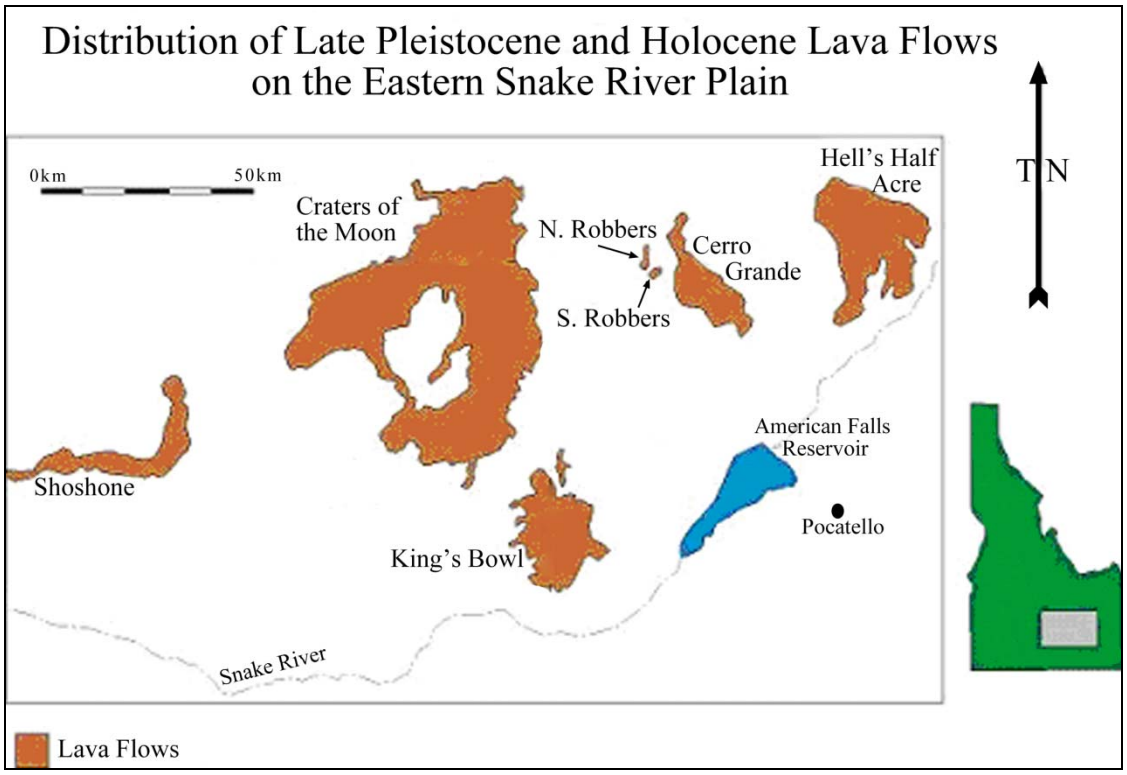

Figure 4. Distribution of late Pleistocene and Holocene lava flows on the eastern Snake River Plain (adapted from Kuntz et al. 1992).

third stage of a fissure eruption. A radiocarbon date of 2200 ry B.P. was obtained for the Wapi flow. The Shoshone lava field, west of Craters of the Moon, has been dated to 10,000 ry B.P. Although this flow occurred at the very beginning of the Holocene, it had to have impacted human populations. The lava field is 2 to 5 kilometers in diameter and altered the flows of the Big Wood and Little Wood Rivers at the time of its occurrence. Both rivers were forced to flow around the field. The two rivers now converge about 40

kilometers to the west at the terminus of the flow. The Craters of the Moon lava field is the largest in the continental United States and includes over 60 individual flows from cones or fissure eruptions (Figure 5). These eruptions range in age from 15,000 ry B.P. to 2100 ry B.P. (Kuntz et al. 1986) and have been classified into eight separate eruptive periods. These dates were generated from charcoal excavated from selected locations within the lava field to determine the ages of various eruptions. Specific eruption phases may have had significant impacts on the seasonal round and on the use of individual cold storage caves by humans then in the area.

Eruptive Period E, which includes the Grassy Cone, Laidlaw Lake and Lava Point flows, has been dated to between 7,840 ± 140 and 6,670 ± 100 ry B.P. Eruptive Period B and its associated flows range in age from 4510 ± 100 to 2660 ± 60 ry B.P. The largest of the Period B flows is the Minidoka. This massive flow is roughly 40 kilometers long and 5 to 10 kilometers wide, extending from the Craters of the Moon National Monument to the Wapi lava field to the south. It is thought to have occurred around 3600 ry B.P (Kuntz et al. 1986). The Minidoka flow may have also closed the area to game animals and people alike for an extended period, until creatures began entering the resultant “kipuka” at a later date when the eruptions ceased.

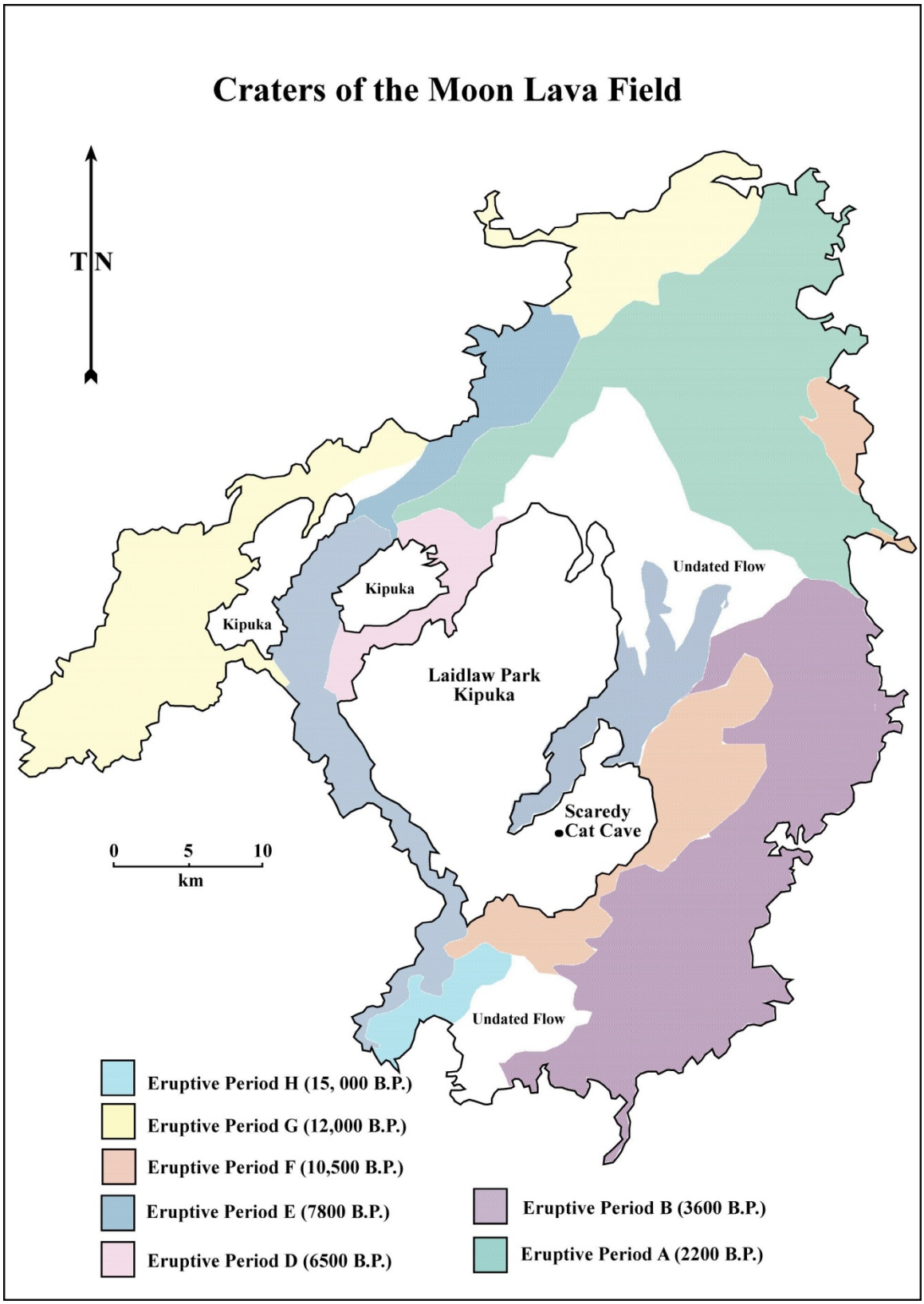

Figure 5. Eruptive periods documented on the Craters of the Moon Lava Field (adapted from Kuntz et al. 1992).

INTRODUCTION

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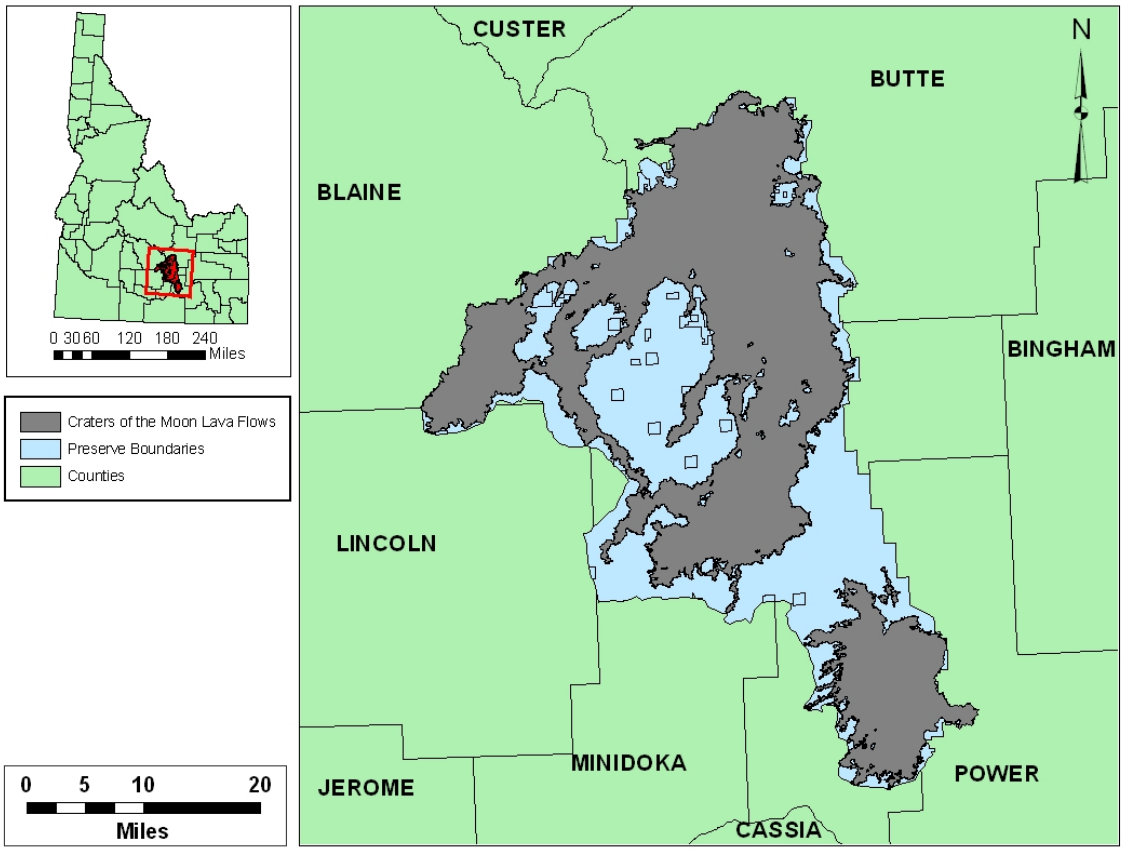

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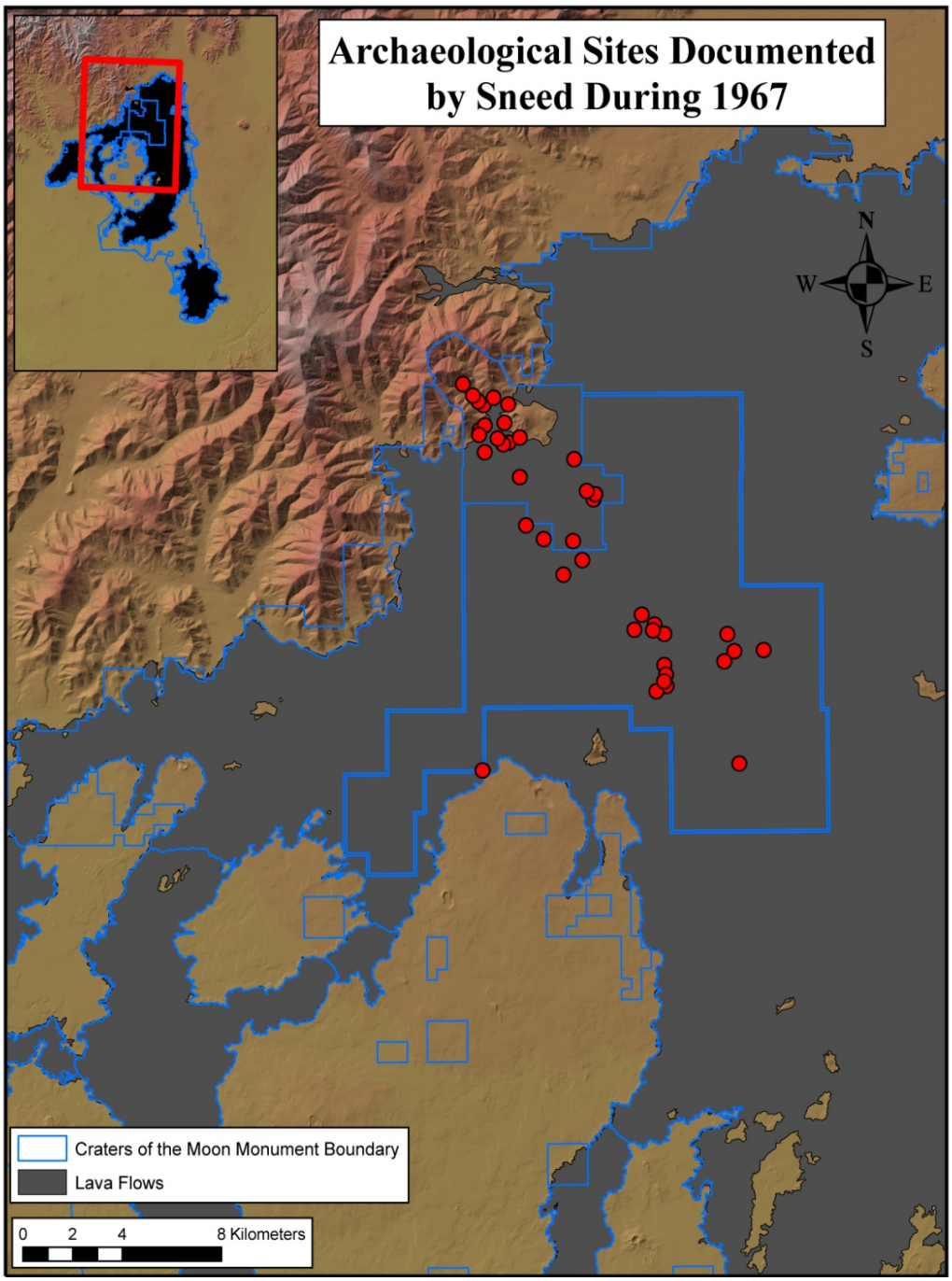

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2004	1618	32	East Laidlaw Park Survey	Henrikson et al. 2005
2005	3228	95	Laidlaw Park Thumb Survey	Henrikson et al. 2005

Section I presents an environmental overview of the Monument and surrounding region, including a discussion of existing paleoclimatic studies. These studies can provide useful insights regarding the age and distribution of archaeological resources on the Monument and the cultural chronology of the region. Section II provides an overview of this chronology and highlights previously excavated archaeological sites that were used in the development of this chronology.

Geospatial analysis of the roughly 600 prehistoric sites and isolates on the Monument is presented in Section III. The analysis required manipulating the database provided by

the Idaho State Historic Preservation Office (SHPO). (However, roughly 40 sites and isolates recorded in the original Monument boundaries were not in the database, including those documented by Sneed in 1966, and could not be incorporated into this study).

The cultural resources in the SHPO database and those recorded during the past two field seasons were sorted into "types" based on the range of artifacts noted in surface assemblages. Because it was suspected that the "site description" attribute field in the database omitted useful information or contained erroneous data, efforts were made to resolve these issues. Dates of occupation were assigned to previously recorded archaeological sites within the study area if they contained diagnostic projectile points. This allowed for an examination of the distribution of sites through time.

Section IV presents a geochemical source analysis of diagnostic volcanic glass projectile points collected from the Monument over the last 25 years. The primary goal of this analysis was to examine how far volcanic glass projectile points from the Monument have been transported from their original source and assess whether patterns in the data suggest direct procurement or exchange networks. The results of this analysis are also considered with other facets of the archaeological record from the Monument to determine if changes in mobility and land use has occurred through time.

Section V provides of an overview of previously excavated sites on the Monument. A total of seven sites within the Monument have been subjected to formal test excavations. These have been conducted for research purposes, to evaluate NRHP eligibility or to assess damage associated with ARPA violations. Sites excavated prior to the University of Oregon investigations include Baker Caves (10BN153/154), Scaredy Cat Cave (10MA143) and Bowl Crater (10BN1066). The remaining sites, Roasting Rock (10BN389), Catchment Cove (10BN861), Alpha Cave (10PR641) and the Drifting Gene Site (Temporary No. 05-KM-20) were excavated in 2005 to collect data for inclusion in this document. Because surface lithic scatters on the eastern Snake River Plain are notorious for "disappearing" and "re-emerging" due to the continuous accretion and deflation of aeolian sediments, the primary purpose of the 2005 test excavations was to assist in identifying the geomorphic processes involved in this phenomenon. Section V also provides management recommendations for all previously excavated sites within the Preserve.

An overview of the 19th Century seasonal round of the Shoshone-Bannock is presented in Section VI and the delineation of archaeologically sensitive areas on the Preserve (as well as gaps in the data) is addressed in Section VII.

ENVIRONMENTAL SETTING

The Craters of the Moon National Monument and Preserve is located on the sagebrush steppe of the eastern Snake River Plain (Figure 3). The area is a cold desert with elevations ranging from 1500 to 2000 meters a.s.l. and winter snow and early spring rains

produce less than 10 inches of annual precipitation (Butler 1978). The region, bordered by the Basin and Range Province to the south and Northern Rocky Mountain Province to the north, is a lava plain given limited contrast by landforms of low topographic relief. These include rolling basalt pressure ridges, shallow basins, swales, knolls, buttes, vegetated areas surrounded by and isolated by lava flows (kipukas) and dozens of lava tube caves. These features were created primarily by pahoehoe basalt flows from low shield volcanoes and fissure eruptions ranging from Pliocene to Pleistocene in age (Greeley and King 1977; Kuntz et al. 1992). Sediments consist primarily of aeolian deposited silty or sandy loams, with most accumulations occurring on the lee sides of prominent land features. The Snake River, the region's only major waterway, transects the Plain, arcing east to west. Because of the incline of plain and catastrophic events such as the Bonneville Flood around 14,000 years ago (Currey and James 1982), much of the river corridor is characterized by deep, narrow gorges.

Figure 3. Craters of the Moon National Monument and Preserve, near Snowdrift Crater in northern Laidlaw Park.

The dominant native vegetation includes the shrubs *Artemisia tridentata* (big sagebrush), *Artemisia tripartita* (three-tip sagebrush), *Purshia tridentata* (bitterbrush), *Tetradymia canescens* (horsebrush), *Chrysothamnus puberulus* (rabbitbrush), and *Gutierrezia sarothrae* (snakeweed). Common native grasses include *Agropyron spicatum* (bluebunch wheatgrass), *Koeleria cristata* (junegrass), *Oryzopsis hymenoides* (ricegrass), *Poa nevadensis* (poa), *Poa secunda* (common poa), and *Stipa comata* (needle and thread grass) (Franzen 1980). Common mammals exploited by the region's historical inhabitants include *Antilocapra americana* (pronghorn antelope), *Odocoileus hemionus* (mule deer),

Bison bison (buffalo), *Cervus elaphus* (elk), *Lepus californicus* (blacktailed jackrabbit), *Sylvilagus nuttalli* (cottontail), *S. idahoensis* (pygmy rabbit), and *Marmota flaviventris* (yellow-bellied marmot). Common birds include *Dendragapus obscurus* (blue grouse), and *Centrocerous urophasianus* (sage grouse).

Although much of the eastern Snake River Plain is devoid of permanent water sources (except the Snake, Big Wood and Little Wood rivers), many swales and basins serve as natural catchment areas for winter snowmelt and spring rains (Henrikson et al. 1998). During the spring and early summer months, these ponds are a magnet for numerous species of waterfowl, including *Anas crecca* (green-winged teal), *A. acuta* (northern pintail), *A. cyanoptera* (cinnamon teal), *A. clypeata* (northern shoveler) and *Branta Canadensis* (Canada goose), which feed on the indigenous fresh water crustaceans.

GEOLOGICAL SETTING

An important consideration that is often overlooked in the investigation of Snake River Plain prehistory is the late Pleistocene and Holocene volcanism that has occurred in the region during the last 15,000 years (Kuntz et al. 1986, 1992). The geologic characteristics of the eastern Snake River Plain are distinct from those of the western Snake River Plain.

Geologists divide the two halves at roughly Highway 75 from Twin Falls to Ketchum because their "structural, geophysical, and geological characteristics" indicate "different origins" (Kuntz et al. 1992:229). The current character of the eastern Snake River Plain was established roughly 10 million years ago by continuous pahoehoe flows from fissure eruptions or vents that range between 1 and 2 kilometers across. Big Southern Butte, Middle and East Butte are rhyolite domes that were extruded between 1 million and 300,000 years ago (Kuntz, et al. 1992).

To grasp the potential impact of basaltic eruptions on prehistoric populations, it is important to review the various stages of volcanic activity that have occurred on the eastern Snake River Plain. The first stage of activity was characterized by harmonic tremors with the opening of fissures and steam vents. Lava fountains erupted, producing flames that may have extended to 500 meters in height, and tephra was ejected to distances as great as 10 kilometers downwind. The second stage began when lava fountains became localized, tephra cones formed and larger quantities of lava exuded from open fissures, resulting in surface flows. The third stage was marked by extended eruptions that may have lasted for months or a few years. Although lava tubes did form during the second stage (if the lava volume was adequate), tubes primarily formed during the third stage and dispersed lava to the outer edges of the flow. Most lava on the eastern Snake River Plain was dispersed in this fashion.

There are eight lava fields on the eastern Snake River Plain that formed during the late Pleistocene and Holocene. Although some are covered with a thin layer of aeolian deposits, most are fully exposed. These include Craters of the Moon, Wapi, Shoshone, Kings Bowl, North Robbers, South Robbers, Cerro Grande and Hells Half Acre (Figure

4). Cerro Grande is radiocarbon dated to roughly 13,000 ry B.P. and North and South Robbers dates to 12,000 ry B.P. The dates for each flow were generated from charcoal recovered from immediately beneath the flows (Kuntz et al. 1986).

Hells Half Acre, located southwest of Idaho Falls, has been radiocarbon dated at roughly 5200 ry B.P. The flow originated from a shield volcano that exuded pahoehoe lava for several months (Kuntz et al. 1992). Kings Bowl lava field, located between Craters of the Moon and Wapi flows, has been identified as a single eruption that may have lasted less than a day, occurring around 2200 ry B.P. Based on the character of the flow, this event must have been pretty spectacular, with explosion pits, lava lakes and spewed tephra. The Wapi lava field probably started at the same time as Kings Bowl but remained active for several months, as indicated by the lava tube systems typical of the

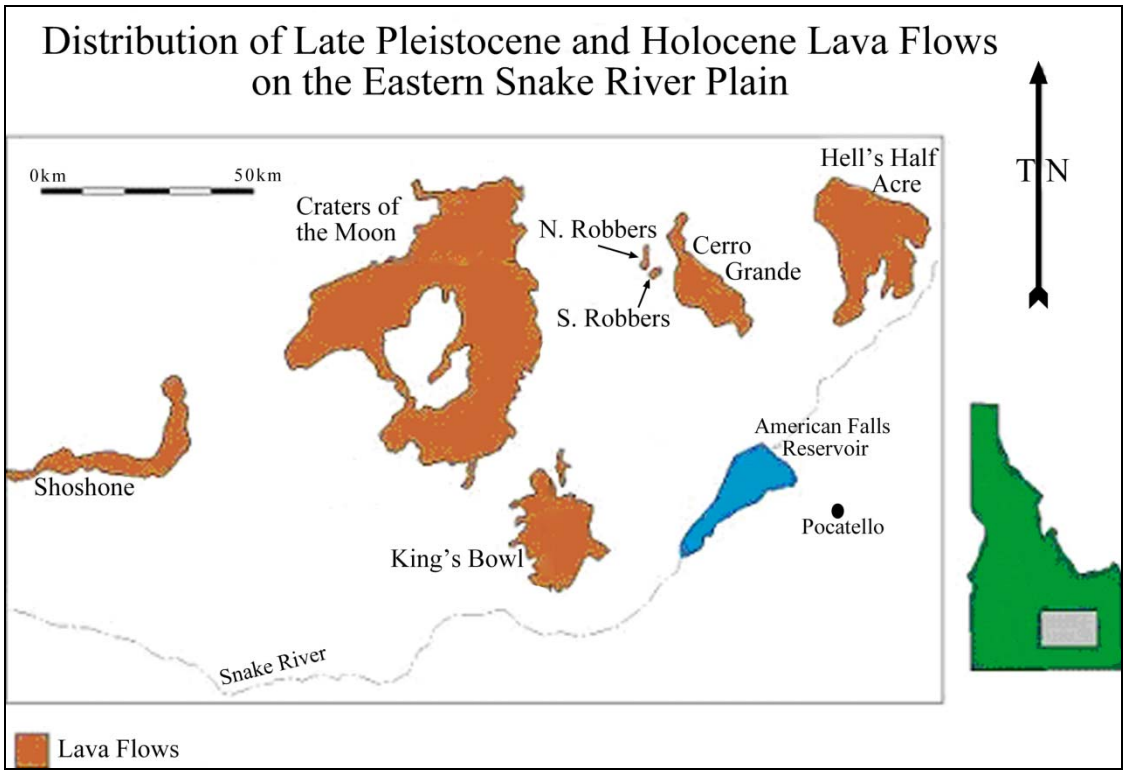

Figure 4. Distribution of late Pleistocene and Holocene lava flows on the eastern Snake River Plain (adapted from Kuntz et al. 1992).

third stage of a fissure eruption. A radiocarbon date of 2200 ry B.P. was obtained for the Wapi flow. The Shoshone lava field, west of Craters of the Moon, has been dated to 10,000 ry B.P. Although this flow occurred at the very beginning of the Holocene, it had to have impacted human populations. The lava field is 2 to 5 kilometers in diameter and altered the flows of the Big Wood and Little Wood Rivers at the time of its occurrence. Both rivers were forced to flow around the field. The two rivers now converge about 40

kilometers to the west at the terminus of the flow. The Craters of the Moon lava field is the largest in the continental United States and includes over 60 individual flows from cones or fissure eruptions (Figure 5). These eruptions range in age from 15,000 ry B.P. to 2100 ry B.P. (Kuntz et al. 1986) and have been classified into eight separate eruptive periods. These dates were generated from charcoal excavated from selected locations within the lava field to determine the ages of various eruptions. Specific eruption phases may have had significant impacts on the seasonal round and on the use of individual cold storage caves by humans then in the area.

Eruptive Period E, which includes the Grassy Cone, Laidlaw Lake and Lava Point flows, has been dated to between 7,840 ± 140 and 6,670 ± 100 ry B.P. Eruptive Period B and its associated flows range in age from 4510 ± 100 to 2660 ± 60 ry B.P. The largest of the Period B flows is the Minidoka. This massive flow is roughly 40 kilometers long and 5 to 10 kilometers wide, extending from the Craters of the Moon National Monument to the Wapi lava field to the south. It is thought to have occurred around 3600 ry B.P (Kuntz et al. 1986). The Minidoka flow may have also closed the area to game animals and people alike for an extended period, until creatures began entering the resultant “kipuka” at a later date when the eruptions ceased.

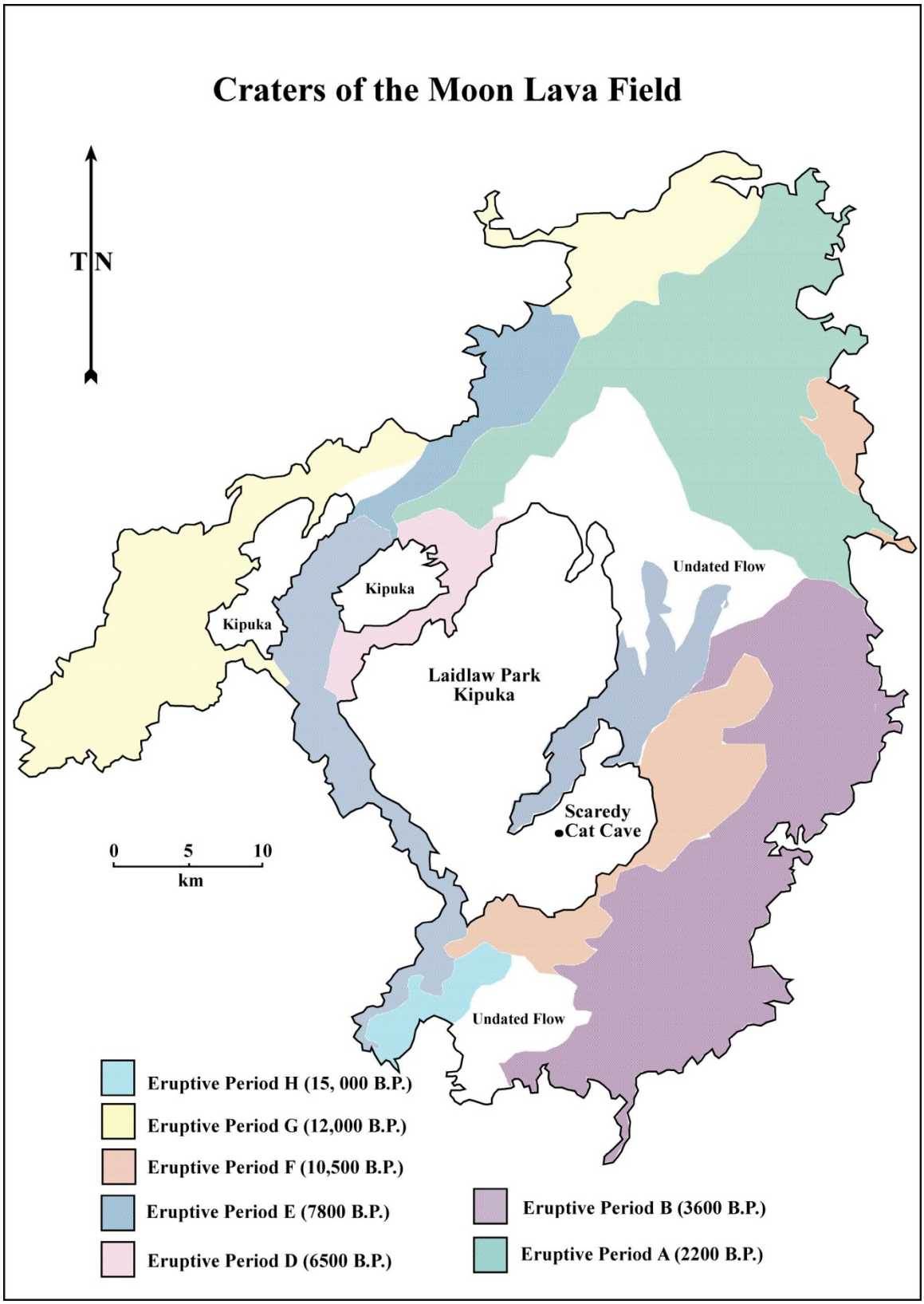

Figure 5. Eruptive periods documented on the Craters of the Moon Lava Field (adapted from Kuntz et al. 1992).

SECTION VII

SUMMARY

Due to the combined efforts of the BLM, the NPS and the University of Oregon, roughly 45,000 acres of the Monument have been intensively inventoried for archaeological resources (see Figure 3.1). Although these surveys do not represent a random or stratified sample of the research area they have been sufficiently numerous and extensive to provide a good view of the region's archaeology (see Appendix A). Through these efforts, over 600 prehistoric cultural resources have been documented on the Monument (Figure 7.1, see Appendix B). In addition, at least seven prehistoric archaeological sites on the Monument have been subjected to subsurface investigations within the past 25 years (see Figure 5.1). These include Baker Caves (10BN153 and 154), Scaredy Cat Cave (10MA30/143), Bowl Crater (10BN1066), Alpha Cave (10PR641), the Roasting Rock Site (10BN389), Catchment Cove (10BN861) and the Drifting Gene Site (10MA421). The Roasting Rock, Catchment Cove and Drifting Gene sites were tested during the 2005 University of Oregon Archaeological Field School to gain information on the geomorphology of open sites on the eastern Snake River Plain. Limited test excavations were also performed at Alpha Cave in 2005 to determine whether intact cultural deposits were still present in the cave.

In examining the distribution of prehistoric sites within the Monument, some patterns emerge that appear to conflict with a predictive model developed for the eastern Snake River Plain (Henrikson 2002). The temporal distribution of sites in the broad region surrounding the Monument indicates that many ephemeral ponds were used repeatedly throughout the middle and late Holocene, giving evidence of long term reliance on these resource localities over millennia. However, the study performed here suggests that, in the area containing the Monument, recent basalt flows were utilized to a greater degree than ephemeral ponds located on the open sagebrush steppe. Depressions in the lava flow near many archaeological sites are now suspected of containing water through the spring months (see Section V).

Based on the geospatial analysis of site distribution patterns on the Monument (see Section III), site density increases significantly within a distance of 300 meters of the lava edge. Using this distance as the delineating factor, roughly 22,900 acres of "lava edge" has been intensively surveyed within the Monument and roughly 261 prehistoric cultural resources (including prehistoric sites and isolates) have been recorded as part of these surveys. Based on these results, the density of prehistoric sites encountered along the lava edge is roughly 0.01sites/acre.

Almost an equal amount (roughly 21,400 acres) of the open sagebrush steppe within the Monument has been intensively surveyed, with the documentation of 90 prehistoric cultural resources (both sites and isolates) in these areas. Therefore, the estimated density of prehistoric sites in open steppe is roughly 0.004sites/acre. Of course, it should be noted that the frequency of sites encountered on open steppe may be influenced by the density of ephemeral ponds in a given area.

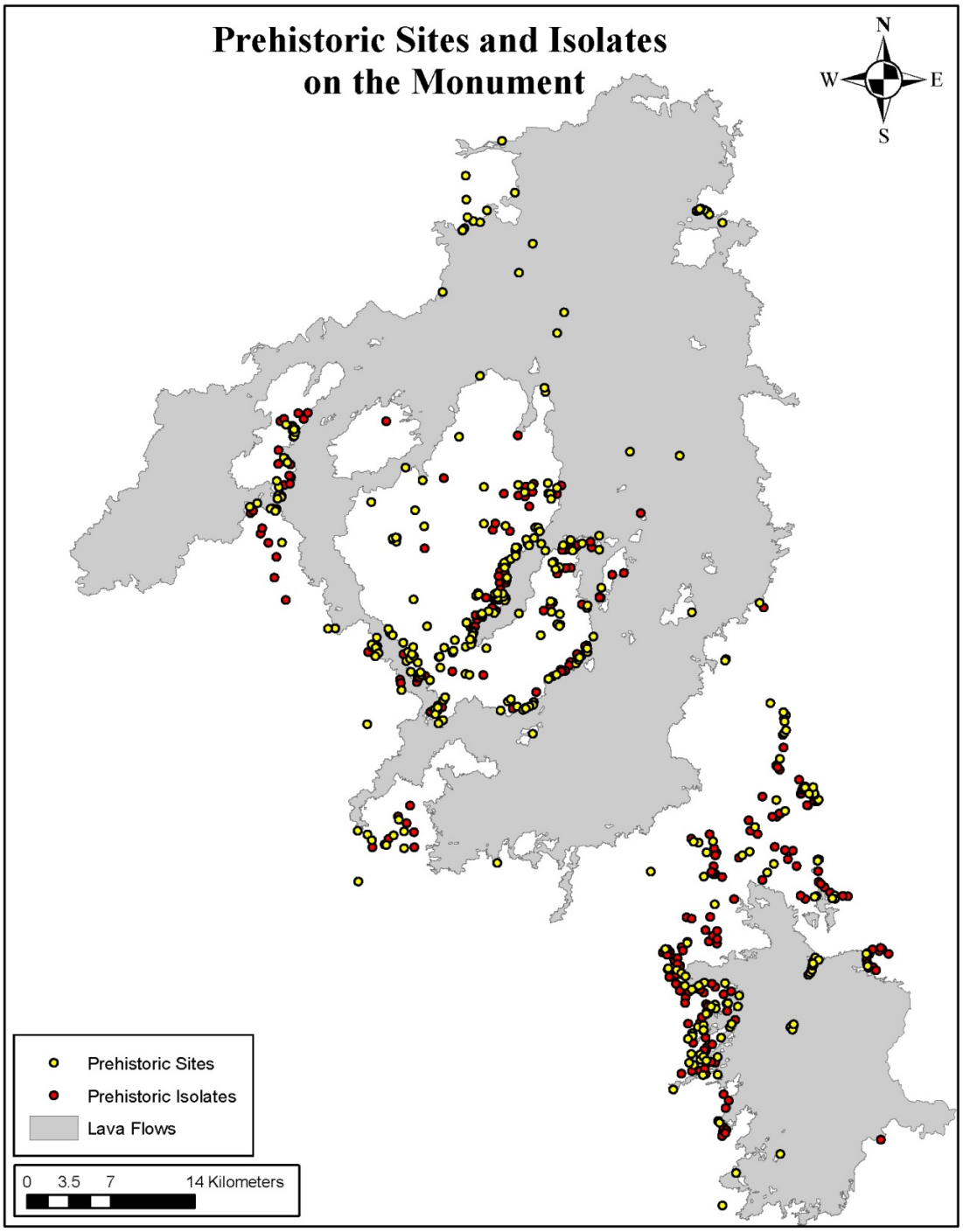

Figure 7.1. Distribution of recorded prehistoric sites and isolated finds on the Monument.

While over 600 prehistoric sites and isolated finds are presently known to exist within the Monument, as of 2005, only 18% of the Monument has been intensively inventoried (of

the 250,000 acres not covered in basalt flows). There are at least 50,000 acres of lava edge and 150,000 acres of open steppe that have yet to be explored. Based on the results of previous surveys, there are likely to be an additional 500 cultural resources (both prehistoric sites and isolates) encountered at the lava edge and 600 additional cultural resources found on the sagebrush steppe. It is more than likely that some of these resources will consist of seasonal base camps and, perhaps, residential bases. In addition, aboriginal trails recorded during the 2005 archaeological investigations at 10BN389 and 10BN861 may represent only the "tip of the iceberg". It is suspected that numerous trails cross the basalt flows within the Monument. Locating and documenting these trails will lead to greater insights into the prehistoric use of the area.

Due to the density of prehistoric archaeological sites likely to be encountered within 300 meters of the lava edge, these areas should be considered "high archaeological sensitivity" zones (Figure 7.2). Unless subsurface investigations can be performed, these zones should generally be avoided by any ground disturbing activities. In addition, the lava edge requires regular monitoring by BLM and NPS personnel to reduce the potential for illegal surface collection and excavations. Based on the 2005 test excavations at 10BN389, it is apparent that accreting sediments along the lava flows can obscure significant subsurface cultural deposits and features.

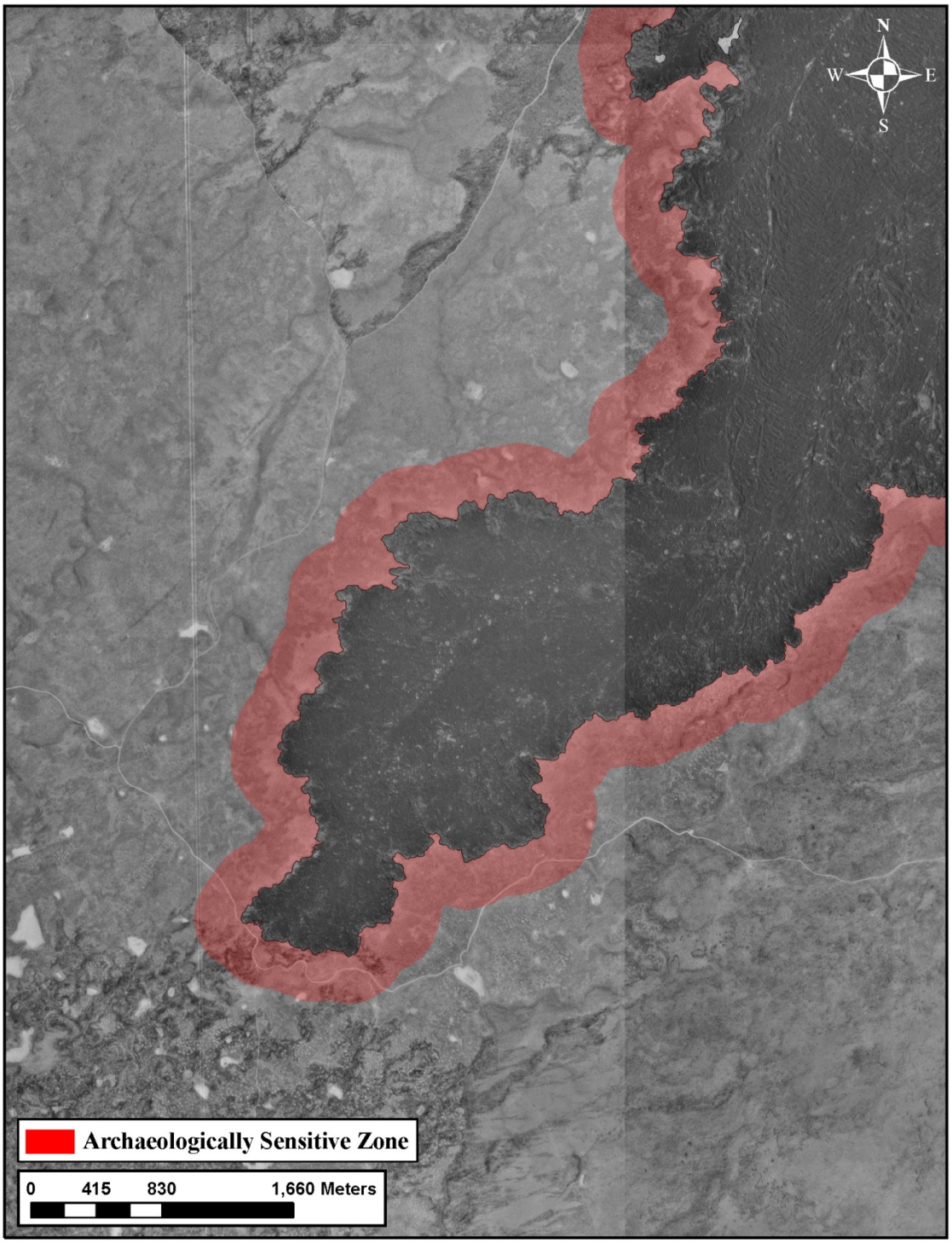

Figure 7.2. Example of High Archaeological Sensitivity Zone on the Monument.

RECOMMENDATIONS

Based on the analysis of prehistoric archaeological data within the Craters of the Moon National Monument and Preserve, Holocene lava flows clearly need to be considered in any investigation of pre-contact Shoshone settlement and subsistence patterns on the eastern Snake River Plain. The data indicate that, in the region containing the Monument, the lava edge was a preferred location whether groups intended to stay overnight or for longer periods. Recent test excavations on the Monument also suggest that, during the last 4000 years, there were perhaps less obvious incentives for camping at the lava edge. The more intense utilization of lava edges during the late Holocene may be correlated with an overall increase in site density in the region. The number of archaeological sites that can be assigned to the late Holocene on the Monument is more than double the number of middle Holocene sites.

The presence of what appear to be defensive structures at base camp 10BN389 and the inhospitable location of the Lost Lava Rings residential base suggest that the variables responsible for site distribution patterns as well as the character of late Holocene sites on the eastern Snake River Plain may be more complex than previously thought. Although the availability of food and water were critical in the cold high desert, recent discoveries on the Monument suggest that intercommunity stress associated with late Holocene population pressures may have also greatly influenced where people chose to stay. These intriguing developments should be pursued as part of future investigations of the region. Based on the geospatial analyses performed here, is predicted that an additional 1100 prehistoric sites and prehistoric isolated finds are likely to be encountered during future surveys within the Monument.

As noted in the introduction, the information regarding previous archaeological surveys on the Monument is currently incomplete. A more accurate GIS database of previous investigations should be constructed in the near future. This database should include the numerous small compliance surveys conducted by the BLM or NPS (including those performed by Idaho State University in the 1960s and 1990s) as well as the large fire rehabilitation surveys conducted by the Burley and Idaho Falls field offices of the BLM. In addition, those sites and isolates recorded in the original Monument boundaries need to be incorporated into the cultural resource inventory.

Some irregularities exist in the artifact records and site documentation, particularly for those sites recorded within the original Monument boundaries. While the artifacts collected by Sneed (1967) and others are currently housed at the Craters of the Moon National Monument and Preserve Headquarters, specimens collected during the numerous BLM fire rehabilitation surveys are curated at the Southeastern Repository of the Archaeological Survey of Idaho. Upon completion of the GIS database, a comprehensive artifact catalog should be created for all specimens recovered during previous pedestrian surveys and/or subsurface investigations on the Monument. Although many of the projectile points from previous BLM surveys have been used in obsidian sourcing studies (see Section IV), other artifacts (including the specimens collected by Sneed) have never been examined or analyzed. Once the catalog is complete, the

appropriate analyses should be performed. Following this, decisions should be made regarding the most suitable curatorial facility for these items.

Although not within the scope of the current study, research should be conducted on the numerous historic sites that have been documented within the Monument. Many of these are associated with 19th and 20th Century sheep herding and ranching activities and can provide valuable insights into early Euroamerican use of the area. The northern end of the Monument also contains Goodale's Cutoff of the Oregon Trail.

If the predictions regarding site densities are accurate, the Monument contains nearly 1500 prehistoric sites that may be eligible to the NRHP. Previous test excavations at open base camps such as 10BN389 and 10BN861 clearly indicate sufficient intact subsurface deposits to warrant NRHP eligibility and many more base camps are likely to be discovered during future surveys. In addition, due to their significant contribution to our understanding of regional prehistory, Baker Caves (10BN153 and 154), Scaredy Cat Cave (10MA30/143) and Alpha Cave (10PR641) are also recommended as eligible.

Because of the huge volume of potentially significant properties within its boundaries, it is recommended that the Monument be nominated as a National Register District and afforded the protection that such a designation can provide.