

NATIONAL NATURAL LANDMARK EVALUATION

Craters of the Moon National Monument (IDAHO)

Columbia Plateau Natural Region

Low Sagebrush Theme

Low Sagebrush/Idaho Fescue Subtheme

November 1989

prepared for

U.S. Department of the Interior  
National Park Service

by

Idaho Natural Heritage Program  
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## INTRODUCTION

Daubenmire, in his 1975 theme study, proposed several "zones" that contain low sagebrush (Artemisia arbuscula) and early low sagebrush (A. longiloba) biotic communities. It was proposed in Phase I of the current study (The Nature Conservancy et al. 1989), that all low sagebrush and early low sagebrush communities be treated as a separate Low Sagebrush Theme. To best include the diversity of the Low Sagebrush Theme in the NNL registry, two subthemes were proposed: Low Sagebrush/Bluebunch Wheatgrass and Low Sagebrush/Idaho Fescue. This report evaluates a potential NNL site to represent the Low Sagebrush/Idaho Fescue Subtheme.

In Phase II of the current study (Crawford et al. 1989), a total of five Low Sagebrush/Idaho Fescue sites from Oregon and Idaho were evaluated on the basis of illustrative character, condition, diversity, rarity, and value for science and education. Sites evaluated were Craters of the Moon National Monument (ID), Toppin Creek Butte (OR), Triplet Butte Proposed Research Natural Area (PRNA) (ID), Brass Cap Kipuka PRNA (ID), and Shaketable Mountain PRNA (OR). On the basis of the Phase II evaluation, Craters of the Moon National Monument was chosen to be the best example of this subtheme.

## SITE CHARACTERISTICS

### Location

Craters of the Moon National Monument lies on the northern edge of the eastern Snake River Plain, Blaine and Butte counties, Idaho. The approximate center of the Monument lies at a latitude of  $42^{\circ}25'00''$  N and a longitude of  $113^{\circ}32'30''$  W. The proposed NNL occurs in two units, occurring at the southwest and northwest corners of the Monument (Figures 1, 2, and 3). Lands within the proposed NNL boundary lie within Township 2 North, and Range 24 East (North Unit) and Township 1 South, and Range 24 East (South Unit). U.S. Geological Survey topographic map coverage is available on the Inferno Cone (North Unit) and Little Park (South Unit), 1972 7.5' quadrangles. The North Unit is also covered on the 1957 Craters of the Moon National Monument 1:31,680-scale U.S.G.S. topographic map. The Craters of the Moon Quadrangle Surface Management Status map, 1:100,000-scale series, published by the BLM also provides coverage.

The site lies about 31 km (19 miles) east of Carey, Idaho. Access to the North Unit of the proposed NNL is via a dirt that intersects U.S. Highway 20/26/93, about 0.8 km (0.5 mile) northeast of the Monument Information Center. Proceed northwesterly on this road for about 5.6 km (3.5 miles), up Little Cottonwood Creek to the end of the road. A short walk upslope to the ridge brings you to the North Unit. Permission from the Superintendent of the National Monument is needed to travel on the road to Little Cottonwood Creek.

Figure 1. Map of the western half of Craters of the Moon National Monument, showing the location of the North and South units of the proposed NNL, Blaine and Butte counties, Idaho (portion of Craters of the Moon 1978 Surface Management Status Map).

North Unit

South Unit (Carey Kipuka)

Figure 2. Location of the North Unit of the proposed Craters of the Moon National Monument NNL on ridges surrounding Little Cottonwood Canyon (portion of Inferno Cone 7.5' Quadrangle).

Proposed NNL (North Unit)

Proposed NNL (North Unit)

R 24 E                    T 2 N                    T 1 N

Figure 3. Location of Carey Kipuka, the South Unit of the proposed Craters of the Moon National Monument NNL (portion of Little Park 7.5' Quadrangle).

T 1 S                    R 23 E                    R 24 E

Proposed NNL (South Unit)

The South Unit is accessed via a series of dirt roads that begin at the intersection of the Carey-Kimama Desert Road and U.S. Highway 20/26/93, about 6.4 km (4 miles) northeast of Carey. Proceed about 8 km (5 miles) east on the Carey-Kimama Desert Road, a well maintained, all-weather, gravel road, to Paddleford Flat. At the intersection of the Carey-Kimama Desert Road and the Laidlaw Park Road, proceed east on the Laidlaw Park Road. A choice of two routes, each requiring a hike of equal distance across rough lava, is available. The first is via a dirt road that heads northeast in Little Park from the Laidlaw Park Road about 11 km (7 miles) from its intersection with the Carey-Kimama Desert Road. Proceed to the end of this road in Section 25, T1S, R23E. Walk east a short distance to the top of a small knoll, where Carey Kipuka (the South Unit of the proposed NNL) can be seen across the lava to the north. A short, but rough hike north across the lava will bring you to the proposed NNL. The second access point is gained by proceeding on the Laidlaw Park Road another 5 km (3 miles) to Laidlaw Park. Turn east at the first intersection, which eventually heads north along the west side of Laidlaw Park to the end of the road in Section 20, T1S, R24E. Follow a faint trail west to Carey Kipuka, the South Unit of the proposed NNL. Several intersections are passed along both routes, and the Craters of the Moon Surface Management Status map should be consulted frequently.

Four-wheel-drive is not necessary if either road is traveled in the dry season. More specific directions should be obtained from the Information Center at Craters of the Moon National Monument.

#### Boundary

A boundary was chosen to encompass the range in diversity of the

low sagebrush (Artemisia arbuscula) and early low sagebrush (Artemisia longiloba) communities in Craters of the Moon National Monument. It is the minimum boundary required to include an adequate representation of features needed in the subtheme. The boundary of the North Unit in part follows the Monument boundary and in part the limits of low sagebrush communities on the ridges on the west, north, and east of the Little Cottonwood Creek canyon. The boundary of the South Unit follows a major landscape feature, the edge of the recent lava flows that surround Carey Kipuka.

The two units of the proposed Craters of the Moon National Monument NNL are separated by about 17.7 km (11 miles), and lie in the following sections:

North Unit - T2N, R24E, Sections 16, 21, 22, 26, and 27

South Unit - T1S, R24E, Sections 19 and 20

The boundary of the North Unit of the proposed NNL is as follows: Beginning where the hydrologic divide west of Little Cottonwood Creek intersects the section line common to Sections 21 and 28, proceed west along the Monument boundary about 0.4 km (0.25 mile) to the section corner common to Sections 20, 21, 28, and 29. Proceed north for 2 km (1.25 miles), along the Monument boundary, to the northwest corner of the Monument. Proceed east along the Monument boundary for 1.6 km (1.0 mile) to its corner on the section line common to Sections 15 and 16. Proceed south for about 0.5 km (0.3 mile), along the Monument boundary, to the section corner common to Sections 15, 21, and 22. Proceed east along the Monument boundary for about 0.8 km (0.5 mile) to a point where it intersects the hydrologic divide west of Little Cottonwood Creek. Proceed southeast for about 1.2 km (0.75 mile), along the northeastern edge of the low sagebrush communities, to a point where it intersects



the Monument boundary on the section line common to Sections 22 and 23. Follow the Monument boundary south for about 49 m (150 feet) to a point where the eastern edge of the low sagebrush communities bears to the southwest. Proceed southerly for about 1.6 km (1.0 mile) along the generally distinct eastern boundary of the low sagebrush communities on this ridge, to the southern limit of low sagebrush in the W 1/2 of Section 26. Proceed northerly, then westerly, then southerly long the edge of the low sagebrush communities on the Little Cottonwood Creek side of the ridge, to the beginning.

The boundary of the South Unit of the proposed NNL is coincidental with the boundary of Carey Kipuka, which is defined by the distinct contact between recent lava of the Craters of the Moon Lava Field and the older lava of the kipuka.

#### Size

The total area contained within the proposed NNL is estimated to be 255.7 ha (631.9 acres); 186.8 ha (461.6 acres) in the North Unit and 68.9 ha (170.3 acres) in the South Unit. Area was computed using a Tamay Planix 5000 digitizing planimeter. The proposed NNL lies within the 21,669.7 ha (53,545.05 acre) Craters of the Moon National Monument.

#### Description

Craters of the Moon National Monument lies at the northern edge of the Snake River Plain, a large, relatively flat volcanic surface that bisects southern Idaho. The Monument encompasses the most diverse and geologically recent part of the Plain, and part of the adjacent foothills of the Pioneer Mountains. The proposed NNL is comprised of two units; the North Unit encompasses low sagebrush communities on a

ridge system in the Pioneer foothills, at the north end of the Monument, and the South Unit encompasses Carey Kipuka, surrounded by the Craters of the Moon Lava Field at the southwest corner of the Monument.

Geology of the proposed NNL is largely of volcanic origin, however, the two units differ widely in age and rock-type. The North Unit is mostly composed of undifferentiated volcanic rocks, predominantly latite and andesite conglomerate, of the Tertiary Challis Volcanics. A small area of this unit, is underlain by Tertiary quartz monzonite (Rember and Bennett 1979). Although it is difficult to tell from available maps, Carey Kipuka (the South Unit) is probably underlain by Quaternary Snake River Basalt similar to that of Little Park (Rember and Bennett 1979). It is surrounded by aa lava of the Carey Kipuka and Little Park flows, which are presumed to have emanated from Silent Cone about 6,600 years ago (Kuntz et al. 1982).

Climate of the upper Snake River Plain is best characterized as continental, modified somewhat by marine air from the Pacific. It is semiarid with typical intermountain characteristics of hot dry summers and cold winters with precipitation occurring principally as snow during the winter and rain during the spring and fall. Summer precipitation is generally sparse and ineffective. These generalizations are borne out by precipitation and temperature records from Craters of the Moon National Monument Headquarters, located between the two units of the proposed NNL. (Table 1).

The average monthly maximum temperature reaches its highest point during the month of July, a month which also marks the beginning of a pronounced dry season; less than 20 percent of the total annual precipitation falls during the period from July through October. Two periods of peak precipitation occur, one in January and the other in

May. The length of the period between the last freezing temperature in the spring and the first freeze of fall is about 107 days.

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 Table 1. Temperatures and precipitation for Craters of the Moon National Monument, Idaho, weather station, from 1962 to 1981 (Molnau 1983).  
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Month	Temperature °C (°F)		Precipitation mm (inches)	
	Average Maximum	Average Minimum	Mean Monthly	Percent Annual
January	-2.5 (27.5)	-13.2 ( 8.2)	71.6 (2.82)	16.4
February	0.8 (33.5)	-10.3 (13.4)	38.4 (1.51)	8.7
March	3.9 (39.1)	-7.7 (18.2)	32.8 (1.29)	7.6
April	10.5 (50.9)	-2.6 (27.4)	33.0 (1.30)	7.6
May	17.7 (63.8)	2.3 (36.2)	47.2 (1.86)	10.8
June	22.4 (72.3)	6.6 (43.9)	34.8 (1.37)	8.0
July	28.8 (83.8)	10.5 (50.9)	14.0 (0.55)	3.2
August	27.4 (81.3)	9.4 (48.9)	21.1 (0.83)	4.9
September	22.3 (72.2)	5.0 (41.0)	20.8 (0.82)	4.8
October	14.6 (58.3)	-0.7 (30.6)	21.3 (0.84)	4.9
November	4.8 (40.7)	-6.4 (20.4)	40.1 (1.58)	9.1
December	-1.4 (29.5)	-11.9 (10.6)	61.2 (2.41)	14.0
Annual	12.2 (54.0)	-1.7 (28.9)	436.4 (17.18)	100.0

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Two types of soils support low sagebrush communities in the North Unit of the proposed NNL. Soils supporting the low sagebrush/Sandberg bluegrass (*Poa sandbergii*) association are too shallow to support Idaho fescue, and there is little to no soil development (soil order Entisol) (Hironaka et al. 1983). Soils underlying the low sagebrush/Idaho fescue (*Festuca idahoensis*) association have not been well studied (Hironaka et al. 1983), but Day and Wright (1985) indicate that they are finer textured and/or deeper than those supporting the low sagebrush/Sandberg bluegrass association.

The distribution of the early low sagebrush/Idaho fescue association in Carey Kipuka (South Unit) appears to be controlled by the depth to the clay B horizon (Fosberg 1963). Studies of Carey Kipuka by the U.S.D.A. Soil Conservation Service soil-vegetation correlation research team, between 1958 and 1963, classified the soil underlying the early low sagebrush/Idaho fescue association as Gooding loam (Hugie et

al. 1964). The soils were formed in basaltic ash and cinders. The surface soil, 0-36 cm (0-14 inches), is brown, slightly acid to neutral loam containing angular basalt pebbles. In the lower 10 cm (4 inches) of this horizon, the ped surfaces are coated with bleached sand and silt grains. The subsoil, at 36-76 cm (14-30 inches), is brown, neutral to mildly alkaline clay with thin continuous clay films. From 76-89 cm (30-35 inches), the soil is pale brown, strongly calcareous clay underlain by basalt (Hugie et al. 1964). Results of the SCS observations on soil-vegetation relationships in this association are discussed below.

The proposed NNL was chosen to represent the Low Sagebrush/Idaho Fescue Subtheme of the Low Sagebrush Theme. Three associations are included in this subtheme, low sagebrush/ bluebunch wheatgrass, low sagebrush/Sandberg bluegrass, and early low sagebrush/Idaho fescue (Hironaka et al. 1983). All three associations occur at the proposed Craters of the Moon National Monument NNL, occurring in two different areas of the Monument.

The North Unit includes the low sagebrush communities, where the low sagebrush/Idaho fescue and low sagebrush/Sandberg bluegrass comprise a majority of the vegetation in the unit. These two associations occur over a large area of the unit (map units 13 and 14, Figure 4) or in a mosaic pattern with each other (map unit 15, Figure 4).

Figure 4. Location of biotic communities in the North Unit of the proposed Craters of the Moon National Monument NNL (from Day and Wright 1985).

Key to vegetation types:

- 4 = Mountain big sagebrush/bluebunch wheatgrass association (13%).
- 8 = Mountain big sagebrush/Idaho fescue association (15%).
- 13 = Low sagebrush/Sandberg bluegrass association (49%).
- 14 = Low sagebrush/Idaho fescue association (13%).
- 15 = Mosaic of low sagebrush/Idaho fescue and low sagebrush/Sandberg bluegrass associations (10%).

= proposed NNL

Plate 1. Low sagebrush/Idaho fescue association in the North Unit of the proposed NNL, occurring on a north-facing slope near the north boundary of Craters of the Moon National Monument.

Plate 2. Low sagebrush/Sandberg bluegrass association (center) on south-facing ridgeline in the North Unit; the mountain big sagebrush/bluebunch wheatgrass association occurs on less exposed slopes on either side (right and left).

Plate 3. Scenic view to south from the proposed NNL, down Little Cottonwood Creek canyon and the Great Rift.

These associations occur on exposed, windswept ridges, where total plant cover is less than 40%. Low sagebrush is the only shrub present in most areas. Common forbs include stemless goldenweed (Haplopappus acaulis), Hood's phlox (Phlox hoodii), rabbit-foot crazyweed (Oxytropis lagopus), mat eriogonum (Eriogonum caespitosum), and Indian paintbrush (Castilleja spp.). In the low sagebrush/Sandberg bluegrass association Sandberg bluegrass is the dominant grass, with spike-fescue (Leucopoa kingii) becoming common at higher elevations. Sandberg bluegrass is replaced by Idaho fescue in the low sagebrush/Idaho fescue association. Total cover is higher in this type, but species richness is similar to the low sagebrush/Sandberg bluegrass association (Day and Wright 1985).

In areas where the soil is deeper, and moisture is retained longer into the growing season, two mountain big sagebrush (Artemisia tridentata ssp. vaseyana) associations occur: mountain big sagebrush/bluebunch wheatgrass (map unit 4; Figure 4) and mountain big sagebrush/Idaho fescue (map unit 8, Figure 4) (Hironaka et al. 1983; Day and Wright 1985).

The South Unit includes the early low sagebrush/Idaho fescue association (Hironaka et al. 1983). This stand has received considerable study beginning in 1958 and continuing to the present (Hugie et al. 1964; Tisdale et al. 1965; Day and Wright 1985). Carey Kipuka was discovered in the fall of 1955 by ecologists from the University of Idaho, who were looking for relict areas on the Snake River Plain to use as reference for the study of climax sagebrush vegetation. Reconnaissance of the area in 1956 was followed by detailed studies of vegetation and soils in 1957 and subsequent years. Altogether, eight permanently marked stands of differing vegetation and soils were sampled. Permanent plots and photopoints were established in

the early low sagebrush/Idaho fescue association at this time (Tisdale et al. 1965). These plots were remeasured in 1988 by the Monument staff and biologists from the Cooperative Parks Studies Unit at the University of Idaho. Several of the associations in Carey Kipuka, including the early low sagebrush/Idaho fescue association were studied in cooperation by the University of Idaho ecologists and the Soil Conservation Service soil-vegetation research team (Hugie et al. 1964). Vegetative condition on environmentally similar sites throughout southern Idaho is based largely on a comparison of their vegetation with that of Carey Kipuka (e.g., Hironaka et al. 1983).

The early low sagebrush/Idaho fescue association in Carey Kipuka is a sharply defined and edaphically determined community (map unit 12, Figure 5). The shrub cover consists of a thin stand of early low sagebrush, with about 25 plants/83.6 m<sup>2</sup> (100 ft<sup>2</sup>), but a foliar cover of only 1.5% and a mean height of 25.4 cm (10 inches). The sparse herbaceous cover is dominated by Idaho fescue. Thurber's needlegrass (Stipa thurberiana), Sandberg bluegrass, and bottlebrush squirreltail (Sitanion

Figure 5. Location of biotic communities in the South Unit of the proposed Craters of the Moon National Monument NNL (from Day and Wright 1985).

= proposed NNL

Key to vegetation types:

- 8 = Basin big sagebrush/Idaho fescue association (43%).
- 9 = Basin big sagebrush/cheatgrass (10%).
- 11 = Three-tip sagebrush/Idaho fescue association (45%).
- 12 = Early low sagebrush/Idaho fescue association (2%).

Plate 4. View across aa lava to Carey Kipuka (light-colored vegetation in middle-ground), the South Unit of the proposed NNL.

Plate 5. Early low sagebrush/Idaho fescue association in Carey Kipuka; flagged stakes are permanent plots established by Tisdale et al. (1965) in 1957.

Plate 6. Soil pit in early low sagebrush/Idaho fescue association used by Hugie et al. (1964) for soil-vegetation correlation studies in Carey Kipuka.



hystrix) are common associates. The principal forbs are low-growing forms, including mat eriogonum (Eriogonum caespitosum), Hood's phlox (Phlox hoodii), narrowleaf pussytoes (Antennaria stenophyllus), and Beckwith's violet (Viola beckwithii). Tall forbs are scarce in this association (Tisdale et al. 1965; Day and Wright 1985).

Hugie et al. (1964) observed that the Gooding loam, which underlies the early low sagebrush/Idaho fescue association, is the driest found in the kipuka. The well-developed A2 horizon of this soil suggests lateral movement of soil moisture down the slope above the clay B horizon. This is the only soil in the kipuka on which early low sagebrush grows. A variety of grasses grow on this soil but plants are small, widely spaced, and produce little herbage. The abundant growth of Hood's phlox and narrowleaf pussytoes is due to plentiful spring moisture and extensive roots systems of the plants. In the early spring the saturated upper 36 cm (14 inches) of this soil is favorable to the growth of Anderson's buttercup (Ranunculus andersonii) and Beckwith's violet. Early low sagebrush secures moisture from the clay B horizon and lower horizons to complete its growth later in the season. Root systems of the low forbs in this association, such as narrowleaf pussytoes, Hood's phlox, and mat eriogonum are well suited to soils with clay subsoils. The roots branch profusely under the crown, spread laterally, and penetrate the clay B horizon along vertical cleavage planes. The roots are flattened but unbroken by expansion and contraction of this horizon (Hugie et al. 1964).

Other associations that occur in Carey Kipuka include three-tip sagebrush (Artemisia tripartita)/Idaho fescue (map unit 11, Figure 5), basin big sagebrush (Artemisia tridentata ssp. tridentata)/Idaho fescue (map unit 8, Figure 5), and basin big sagebrush/cheatgrass (map unit 9,

Figure 5) (Day and Wright 1985).

Because of its size and undisturbed nature, in addition to the soil and vegetation studies that had taken place, Ed Tisdale, Min Hironaka, and Maynard Fosberg, University of Idaho ecologists, made a request to the Department of the Interior that Carey Kipuka be added to the adjacent Craters of the Moon National Monument. In 1962 the Carey Kipuka and 7,500 acres of adjacent raw lavas were added to the monument by Presidential order. The purpose was to preserve the outstanding ecological features of the kipuka for scientific study and education (Tisdale et al. 1965).

#### Land Use and Present Condition

Natural values of the North Unit of the proposed NNL are currently being protected due to its inclusion within the larger Craters of the Moon National Monument. Although some development activity has taken place at lower elevations in the Little Cottonwood Creek area, the ridgeline area constituting the North Unit has not been altered to a significant degree. There are metal-post, barbed-wire fences running in various directions along the ridge and north slopes and several old mining prospect pits were dug within the proposed area, but their impact is local and minor. Occasionally, cattle trespass into the Monument in this area, but damage to the low sagebrush communities is minor and of no long-term consequence. The major effect of this trespass grazing, if any, would be in the adjacent mountain big sagebrush associations, where available forage is greater and cattle tend to congregate. Little recreational activity appears to take place in the North Unit.

Natural values of the South Unit of the proposed NNL are currently being protected due to its inclusion within the larger Craters of the

Moon National Monument and Craters of the Moon Wilderness. Because of the wide expanse of aa lava surrounding Carey Kipuka, no significant amount of livestock grazing, if any, has occurred there. Tisdale et al. (1965) found no evidence of grazing by domestic livestock in the kipuka, but mention an unconfirmed verbal report of grazing by sheep during one winter in the 1920's. One-time use of the vegetation in a dormant state would not be likely to cause any observable changes.

Cheatgrass (Bromus tectorum) is abundant in some vegetation types in the kipuka, thought by some to be an indication of past grazing disturbance. I've surveyed numerous isolated kipukas, of varying size, in the Craters of the Moon, Wapi, Hells Half Acre, Shohsone, and Cerro Grande lava fields and found cheatgrass in all of them. This indicates to me that cheatgrass has a tremendous dispersal ability, and has established itself in naturally disturbed gaps in pristine stands, especially those on loess substrates. Tisdale et al. (1965) observed considerable mortality of Idaho fescue plants in Carey Kipuka between 1961 and 1963. Much of the space released by this die-off was invaded by cheatgrass.

A faint trail, marked by cairns, leads to Carey Kipuka from Laidlaw Park. Recreational activity in the kipuka appears to be minimal; however, Shelly Sparhawk, Resource Specialist with Craters of the Moon National Monument, observed horse tracks in the kipuka in 1988. The rough nature of the surrounding aa lava and lack of significant attractions, including hunting opportunity, will preclude significant recreational use of the area.

#### Anticipated Damage to the Area

Natural values of the proposed NNL are currently being protected

due to its inclusion within the larger Craters of the Moon National Monument. In addition, the South Unit is within the Craters of the Moon Wilderness.

No roads exist within the proposed NNL, and no roads are currently being planned. Recreational use of the proposed area is expected to be minimal.

#### Effects of Publicity

The proposed NNL is not expected to be sensitive to increased publicity. The only effect foreseen of increased publicity is positive, that is, more of the public will learn of the additional nationally significant values of the Monument. Any increase in visitor use to the NNL is not expected to be great enough to impact the ecology of the area.

#### Ownership

All land within the proposed NNL is Federally owned. The U.S. Department of the Interior, Craters of the Moon National Monument, administers both surface and mineral rights of the area. Craters of the Moon National Monument is located at:

Craters of the Moon National Monument  
Arco, ID 83213  
208/527-3257

### ANALYSIS

#### Significance

The two low sagebrush and one early low sagebrush associations occurring in Craters of the Moon National Monument are outstanding examples of the Low Sagebrush/Idaho fescue Subtheme of the Low Sagebrush

Theme, as defined in Phase I of the 1989 study (The Nature Conservancy et al. 1989). It is also the best known example of this subtheme in the Columbia Plateau Natural Region, as evaluated in Phase II of the 1989 study (Crawford et al. 1989).

### Recommendation

In my opinion, the site appears to be nationally significant and I recommend that it be designated as a National Natural Landmark.

### Management Guidelines

Natural values of the proposed NNL are currently being protected due to its inclusion within the larger Craters of the Moon National Monument. In addition, the South Unit is within the Craters of the Moon Wilderness. Current management of the Monument appears compatible with the long-term viability of the ecological features of the proposed NNL.

Cattle occasionally wander into the North Unit, but do not remain there long due to lack of water. Although no increase in cattle grazing is anticipated, over and above the incidental use that takes place there now, it should be periodically monitored.

The NNL is well removed from areas of concentrated recreational use on the Monument and can easily be managed to protect natural values of the NNL.

Prescribed burning of mountain big sagebrush stands adjacent to the North Unit will probably have little impact on the low sagebrush communities on the ridge; fuel loads are very light in low sagebrush communities and will not carry a fire far into the stands.

### General Background

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Information contained in this report is based on literature cited and interviews with Craters of the Moon National Monument personnel. Ed Tisdale, Emeritus Professor of Range Ecology, University of Idaho, and member of the Idaho Natural Areas Committee, provided considerable data and insight into the ecology of Carey Kipuka. I inventoried the proposed NNL in October 1989. A total of approximately four days was spent researching and writing this NNL site evaluation for Craters of the Moon National Monument proposed NNL.

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## APPENDIX

Common and scientific names of the vascular plant, mammal, reptile and bird species of known or probable occurrence within the recommended boundaries.



Vascular plant species observed in the proposed Craters of the Moon National Monument NNL.

SHRUBS

<u>Artemisia arbuscula</u>	Low sagebrush
<u>Artemisia longiloba</u>	Early low sagebrush
<u>Artemisia tridentata</u> ssp. <u>tridentata</u>	Wyoming big sagebrush
<u>Artemisia tridentata</u> ssp. <u>vaseyana</u>	Mountain big sagebrush
<u>Artemisia tripartita</u>	Three-tip sagebrush
<u>Chrysothamnus nauseosus</u>	Gray rabbitbrush
<u>Chrysothamnus viscidiflorus</u>	Green rabbitbrush
<u>Purshia tridentata</u>	Bitterbrush
<u>Tetradymia canescens</u>	Horsebrush

GRASSES

<u>Agropyron spicatum</u>	Bluebunch wheatgrass
<u>Bromus tectorum</u>	Cheatgrass
<u>Elymus cinereus</u>	Basin wildrye
<u>Festuca idahoensis</u>	Idaho fescue
<u>Koeleria nitida</u>	Junegrass
<u>Leucopoa kingii</u>	Spike-fescue
<u>Poa sandbergii</u>	Sandberg bluegrass
<u>Sitanion hystrix</u>	Bottlebrush squirreltail
<u>Stipa thurberiana</u>	Thurber's needlegrass

FORBS

<u>Antennaria dimorpha</u>	Low pussytoes
<u>Antennaria stenophylla</u>	Narrowleaf pussytoes
<u>Aster scopulorum</u>	Lava aster
<u>Astragalus purshii</u>	Pursh's milkvetch
<u>Astragalus whitneyi</u>	Whitney's milkvetch
<u>Castilleja miniata</u>	Indian paintbrush
<u>Cirsium utahense</u>	Utah thistle
<u>Crepis acuminata</u>	Taper-tip hawksbeard
<u>Erigeron compositus</u>	Cut-leaf fleabane
<u>Eriophyllum lanatum</u>	Oregon sunshine
<u>Eriogonum caespitosum</u>	Mat eriogonum
<u>Eriogonum heracleoides</u>	Wyeth eriogonum
<u>Fritillaria atropurpurea</u>	Checker-lily
<u>Haplopappus acaulis</u>	Stemless goldenweed
<u>Lomatium triternatum</u>	Desert-parsley
<u>Lupinus argenteus</u>	Silver lupine
<u>Mentzelia albicaulis</u>	White-stemmed mentzelia
<u>Microseris troximoides</u>	False-agoseris
<u>Navarretia breweri</u>	Brewer's navarretia
<u>Oxytropis lagopus</u>	Rabbit-foot crazyweed
<u>Phacelia linearis</u>	Threadleaf phacelia
<u>Phlox hoodii</u>	Hood's phlox
<u>Phlox longifolia</u>	Long-leaf phlox
<u>Ranunculus andersonii</u>	Anderson's buttercup
<u>Sedum stenopetalum</u>	Stonecrop
<u>Senecio canus</u>	Hairy butterweed
<u>Senecio integerrimus</u>	Butterweed
<u>Viola beckwithii</u>	Beckwith's violet
<u>Zigadenus venenosus</u>	Deadly zigadenus

Mammals, reptiles, and birds of probable occurrence within the proposed Craters of the Moon National Monument NNL.

MAMMALS

<u>Sorex vagrans</u>	Vagrant shrew
<u>Sorex monticolus</u>	Dusky shrew
<u>Sorex merriamii</u>	Merriam's shrew
<u>Myotis lucifugus</u>	Little brown bat
<u>Myotis evotis</u>	Long-eared bat

<u>Myotis californicus</u>	California myotis
<u>Lasiurus cinereus</u>	Hoary bat
<u>Plecotus townsendii</u>	Townsend's big-eared bat
<u>Ochotona princeps</u>	Pika
<u>Brachylagus idahoensis</u>	Pygmy rabbit
<u>Sylvilagus nuttallii</u>	Nuttall's cottontail
<u>Lepus americana</u>	Snowshoe hare
<u>Lepus townsendii</u>	White-tailed jackrabbit
<u>Lepus californica</u>	Black-tailed jackrabbit
<u>Marmota flaviventris</u>	Yellow-bellied marmot
<u>Spermophilus columbianus</u>	Columbian ground squirrel
<u>Spermophilus lateralis</u>	Golden-mantled g. squirrel
<u>Thomomys talpoides</u>	Northern pocket gopher
<u>Perognathus parvus</u>	Great Basin pocket mouse
<u>Reithrodontomys megalotis</u>	Western harvest mouse
<u>Peromyscus maniculatus</u>	Deer mouse
<u>Neotoma cinerea</u>	Bushy-tailed woodrat
<u>Microtus montanus</u>	Montane vole
<u>Microtus longicaudus</u>	Long-tailed vole
<u>Zapus princeps</u>	Western jumping mouse
<u>Canis latrans</u>	Coyote
<u>Vulpes vulpes</u>	Red fox
<u>Ursus americanus</u>	Black bear
<u>Procyon lotor</u>	Raccoon
<u>Mustela erminea</u>	Short-tailed weasel
<u>Mustela freneta</u>	Long-tailed weasel
<u>Taxidea taxus</u>	Badger
<u>Mephitis mephitis</u>	Striped skunk
<u>Felis concolor</u>	Mountain lion
<u>Felis rufus</u>	Bobcat
<u>Cervus elaphus</u>	Elk
<u>Odocoileus hemionus</u>	Mule deer
<u>Antilocarpa americanus</u>	Pronghorn

AMPHIBIANS

<u>Bufo boreas</u>	Western toad
<u>Pseudacris triseriata</u>	Boreal chorus frog

REPTILES

<u>Phrynosoma douglasii</u>	Short horned lizard
<u>Sceloporus graciosus</u>	Sagebrush lizard
<u>Eumeces skiltonianus</u>	Western skink
<u>Charina bottae</u>	Rubber boa
<u>Coluber constrictor</u>	Racer
<u>Pituophis melanoleucus</u>	Gopher snake
<u>Crotalus viridus</u>	Western rattlesnake

BIRDS

<u>Cathartes aura</u>	Turkey vulture
<u>Circus cyaneus</u>	Northern harrier
<u>Buteo swainsoni</u>	Swainson's hawk
<u>Buteo jamaicensis</u>	Red-tailed hawk
<u>Buteo regalis</u>	Ferruginous hawk
<u>Buteo lagopus</u>	Rough-legged hawk
<u>Aquila chrysaetos</u>	Golden eagle
<u>Falco sparverius</u>	American Kestrel
<u>Falco columbarius</u>	Merlin
<u>Falco mexicanus</u>	Prairie falcon
<u>Alectoris chukar</u>	Chukar
<u>Dendragapus obscurus</u>	Blue grouse
<u>Centrocercus urophasianus</u>	Sage grouse
<u>Columba livia</u>	Rock dove
<u>Zenaida macroura</u>	Mourning dove
<u>Bubo virginianus</u>	Great horned owl
<u>Asio otus</u>	Long-eared owl

<u>Asio flammeus</u>	Short-eared owl
<u>Aegolius acadicus</u>	Northern saw-whet owl
<u>Chordeiles minor</u>	Common nighthawk
<u>Phalaenoptilus nuttallii</u>	Common poorwill
<u>Aeronautes saxatalis</u>	White-throated swift
<u>Archilochus alexandri</u>	Black-chinned hummingbird
<u>Stellula calliope</u>	Calliope hummingbird
<u>Selasphorus rufus</u>	Rufous hummingbird
<u>Colaptes auratus</u>	Northern flicker
<u>Empidonax oberholseri</u>	Dusky flycatcher
<u>Sayornis saya</u>	Say's phoebe
<u>Myiarchus cinerascens</u>	Ash-throated flycatcher
<u>Tyrannus verticalis</u>	Western kingbird
<u>Eremophila alpestris</u>	Horned lark
<u>Tachycineta bicolor</u>	Tree swallows
<u>Pica pica</u>	Black-billed magpie
<u>Corvus corax</u>	Common raven
<u>Salpinctes obsoletus</u>	Rock wren
<u>Sialia currucoides</u>	Mountain bluebird
<u>Myadestes townsendi</u>	Townsend's solitaire
<u>Oreoscoptes montanus</u>	Sage thrasher
<u>Lanius excubitor</u>	Northern shrike
<u>Lanius ludovicianus</u>	Loggerhead shrike
<u>Vermivora celata</u>	Orange-crowned warbler
<u>Passerina amoena</u>	Lazuli bunting
<u>Pipilo chlorurus</u>	Green-tailed towhee
<u>Pipilo erythrophthalmus</u>	Rufous-sided towhee
<u>Spizella passerina</u>	Chipping sparrow
<u>Spizella breweri</u>	Brewer's sparrow
<u>Pooecetes gramineus</u>	Vesper sparrow
<u>Chondestes grammacus</u>	Lark sparrow
<u>Amphispiza bilineata</u>	Black-throated sparrow
<u>Amphispiza belli</u>	Sage sparrow
<u>Passerculus sandwichensis</u>	Savannah sparrow
<u>Zonotrichia leucophrys</u>	White-crowned sparrow
<u>Plectrophenax nivalis</u>	Snow bunting'
<u>Sturnella negelecta</u>	Western meadowlark
<u>Euphagus cyanocephalus</u>	Brewer's blackbird
<u>Molothrus ater</u>	Brown-headed cowbird

Craters of the Moon National Monument

National Natural Landmark Brief

Location: 31 km (19 miles) east of Carey, Blaine and Butte Counties, Idaho.

Natural Region: Columbia Plateau

Size: 255.7 ha (631.9 acres)

Owner: Federal; Administered by the U.S. Department of the Interior, National Park Service, Craters of the Moon National Monument.

Description: The site occurs in Craters of the Moon National Monument on the northern edge of the Snake River Plain, a large, relatively flat volcanic surface that bisects southern Idaho. The Monument encompasses the most diverse and geologically recent part of the Plain, and part of the adjacent foothills of the Pioneer Mountains. The NNL is composed of two units. The North Unit encompasses low sagebrush (Artemisia arbuscula) associations on a ridge system in the Pioneer foothills at the north end of the Monument. The South Unit encompasses Carey Kipuka at the southwest corner of the Monument.

The NNL represents the Low Sagebrush/Idaho Fescue Subtheme of the Low Sagebrush Theme. Three associations are included in this subtheme, low sagebrush/Idaho fescue (Festuca idahoensis), low sagebrush/Sandberg bluegrass (Poa sandbergii), and early low sagebrush (Artemisia arbuscula)/Idaho fescue.

Excellent examples of the low sagebrush associations occur in the North Unit, largely confined to wind-swept ridges and north-facing slopes around the head of Little Cottonwood Creek canyon. In areas with deeper soil, mountain big sagebrush (Artemisia tridentata ssp. vaseyana) associations occur.

An excellent example of the early low sagebrush association occurs in Carey Kipuka (South Unit). Extensive examples of basin big sagebrush (A. tridentata ssp. tridentata) and three-tip sagebrush (A. tripartita) associations also occur in the unit. Carey Kipuka has had a 30 year history of ecological research. It has been used as an ecological reference area for soil - vegetation correlation by the University of Idaho and the Soil Conservation Service, and has had permanent monitoring plots established since 1957.

Significance: The two low sagebrush and one early low sagebrush communities occurring in Craters of the Moon National Monument are outstanding examples of the Low Sagebrush/Idaho fescue Subtheme of the Low Sagebrush Theme. The NNL is considered the best known example of this subtheme in the Columbia Plateau Natural Region.

Land use: The ecological condition of the site is excellent, due largely its inclusion in the Craters of the Moon National Monument and to physical barriers that have prevented disturbance. The South Unit is in the Craters of the Moon Wilderness.

Special conditions: Natural values of the NNL are currently being protected due to its inclusion within the larger Craters of the Moon National Monument. The South Unit is also in the Craters of the Moon

Wilderness.

Proposed by: Rexford C. Crawford, Washington Natural Heritage Program, Jimmy S. Kagan, Oregon Natural Heritage Data Base, and Robert K. Moseley, Idaho Natural Heritage Program; 1989; Phase I and II Reports, 1989 National Natural Landmark Project, Columbia Plateau Natural Region Ecological Themes, National Park Service.

Evaluated by: Robert K. Moseley, Plant Ecologist, Idaho Natural Heritage Program, Idaho Department of Fish and Game, Boise, ID, November 1989.

Designated:

Owner agreement: