

NATIONAL NATURAL LANDMARK EVALUATION

GREAT RIFT SYSTEM

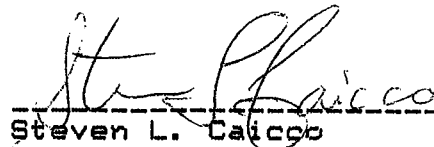
Columbia Plateau Province

Artemisia tridentata (big sagebrush) Steppe Theme

prepared for

U.S. Department of the Interior
National Park Service

April 1987



Steven L. Caicco

INTRODUCTION

In his 1975 theme study of the Columbia Plateau Natural Region, Daubenmire included all Grasslands and Sagebrush Shrublands within a "Grassland and Desert: Steppe Zone" theme. In Phase I of the current study, a Big Sagebrush Shrub Steppe was defined and divided into two subthemes representing those associations which occur on zonal soils and those associations which occur on specialized habitats, respectively.

In Phase II, a total of seven sites from the states of Oregon, Washington, and Idaho were evaluated on the basis of illustrative character, condition, diversity, rarity, and value for science and education. Sites evaluated for the zonal soils subtheme included the Great Rift (ID), Marcellus Shrub Steppe (WA), Substation Tract (ID), Jordan Craters Natural Area (OR), and Quincy Scabland (WA). Those evaluated for the specialized habitats subtheme included the Great Rift (ID), Juniper Dunes (WA), Substation Tract (ID), and Vernita Shrub Steppe (WA).

On the basis of this evaluation, the Great Rift was chosen to be most illustrative of both subthemes. It was agreed that the Phase III product of this study would be a single site evaluation of the national significance of the Great Rift with respect to both subthemes of the Big Sagebrush Shrub Steppe theme.

In 1968, an area encompassing approximately 405 ha (1000 ac) near Crystal Ice Cave was designated by the Secretary of the Interior as the Great Rift National Natural Landmark for its geological values. In 1978, Scott recommended that the existing landmark be expanded to include about 705 km² (272 mi²) of the Great Rift, basing his boundary recommendations on those of Jones (1969) modified to include areas suggested by Trimble (1974).

After redefinition in 1980, the existing NNL was extended to encompass the entire 705 km² (272 mi²) area and renamed the Great Rift System National Natural Landmark (GRSNNL). The volcanic landscape was described as "a dramatic and outstanding example of tensional tectonic forces in the Earth's crust . . . [that] provides a geologically historic record of crustal rifting and basaltic volcanism unmatched anywhere in North America and perhaps in the world" (Trimble 1980).

The boundaries of the existing NNL are based primarily on the distribution of geological features of significance. These features are aligned along an axis extending toward the southeast from Craters of the Moon National Monument (COTMNM). Most of the ecological features of national significance within the Great Rift, however, lie to the north, to the southwest, and to the south of the current boundaries. For this reason, it is recommended that the existing boundaries of the NNL be expanded to include these ecological features (Fig. 1; Appendix I).

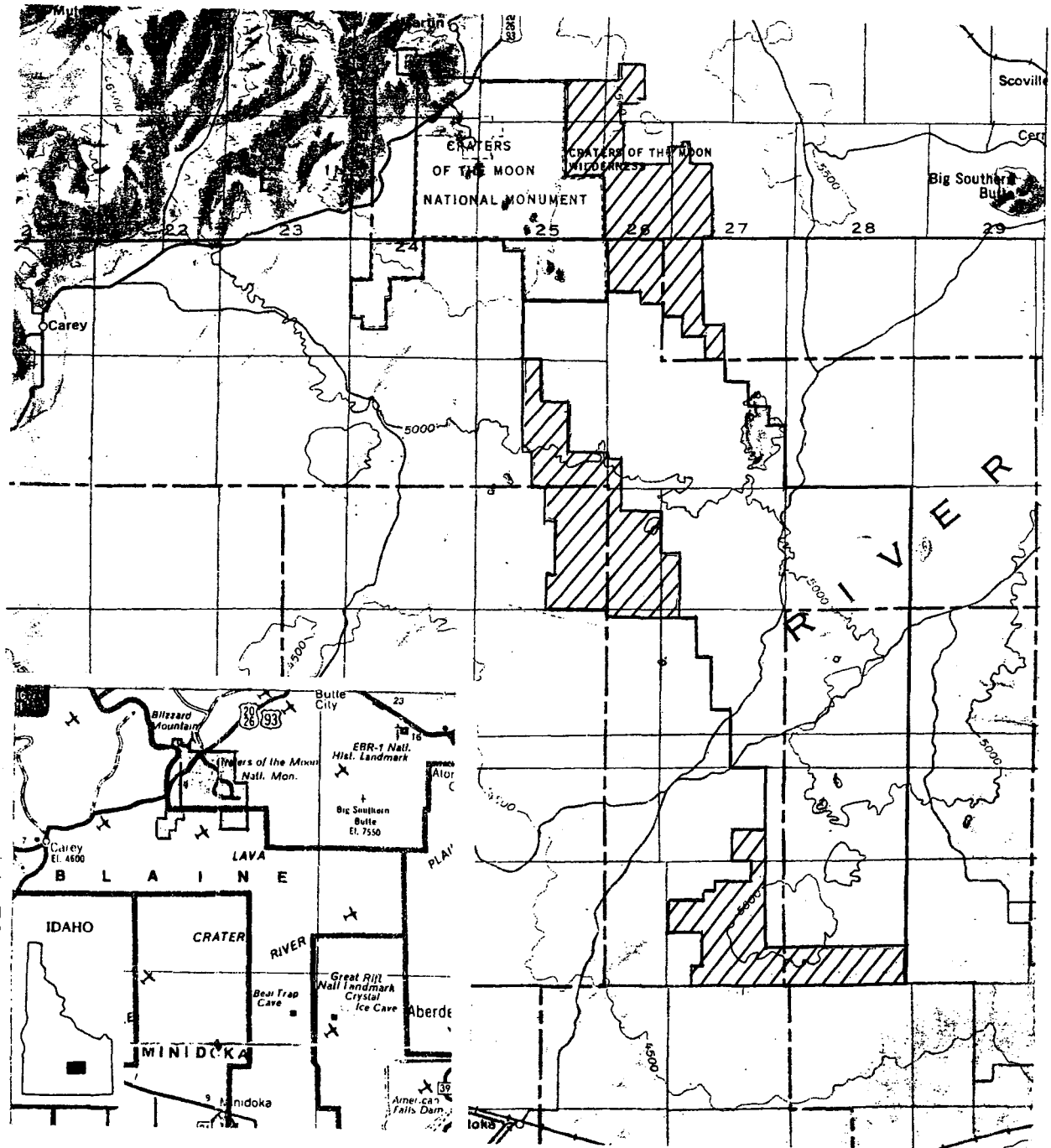


Figure 1. Current boundaries of the Great Rift System National Natural Landmark based on geological features of national significance. Areas recommended for addition to the landmark based on ecological features are indicated by diagonal hatching. Inset maps show location of area with respect to local highways and general location within the State of Idaho.

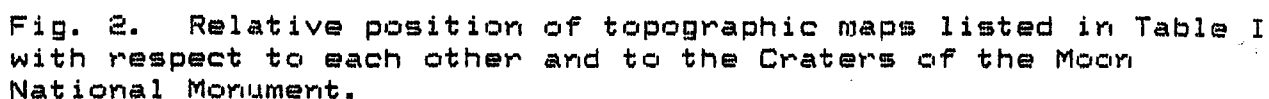
SITE CHARACTERISTICS

Location

The recommended extension of the existing NNL includes land on the northern Snake River Plain of central Idaho contained within Blaine [15,120 ha (37,360 ac)], Minidoka [4,275 ha (10,560 ac)], Butte [12,170 ha (30,080 ac)], and Power [3,885 ha (9,600 ac)] Counties (Fig. 1). The approximate center of the area lies at a latitude of 43°07'30" N and a longitude of 113°30'00" W. Lands within the proposed boundaries lie within Townships 1N, 2N, and 1S through 6S, and Ranges 25E through 28E (Boise Meridian). U.S. Geological Survey topographic map coverage is available for the entire area (Table I, Fig. 2).

The northern end of the area lies about 40 km (25 mi) southwest of Arco and 40 km (25 mi) northeast of Carey, both of which are in Blaine County. The southern end lies about 40 km (25 mi) northeast of Rupert in Minidoka County. Access to such an extensive area is possible via many routes. Only the major points of access will be discussed here. It should be noted that most routes approach over unimproved desert roads. While a 4-wheel drive vehicle is not necessary for most of these, it is desirable. A minimum of 13 cm (5.1 in) of ground clearance is an asset over all routes. Accurate maps, preferably the topographic maps listed in Table I, are essential. Air photos are very useful. A helicopter is expensive, but efficient.

<u>Name</u>	<u>Scale</u>	<u>Date</u>
The Watchman	1:24,000	1973
Fingers Butte	1:24,000	1972
Fissure Butte	1:24,000	1973
Pratt Butte	1:24,000	1972
Bear Park West	1:24,000	1972
Bear Park East	1:24,000	1972
Bear Park SW	1:24,000	1972
Mule Butte	1:24,000	1972
Pillar Butte	1:24,000	1972
Schodde Well	1:24,000	1972
Rattlesnake Butte	1:24,000	1972



A few words of caution are necessary for those who consider venturing on foot into the lava fields. Temperatures can be very high during the spring and summer months. Reradiation of heat from the dark lava augments the effect. Loose-fitting, long pants and long-sleeved shirts, preferably light in color, are adaptive. A wide-brimmed lightweight hat and sunscreen with a high-blockage factor are advisable. There is no surface water. Each person must take a minimum of one gallon of water per day.

In addition, the surface of the lavas is extremely rough. Lava blocks on some flows will shift abruptly underfoot. Study boots with good ankle support are essential. First-aid supplies should be of sufficient quality to be useful on serious cuts, punctures, and abrasions. Taking any domestic pet, including even dogs experienced with long-distance hiking, borders on cruelty.

It is highly recommended that visitors check with the Monument Headquarters prior to their departure into the lava fields. A permit is required for overnight stays in the Craters of the Moon Wilderness Area (COTMWA).

There are several major approaches to the Great Rift. From COTMNM it is possible to travel on foot into the northeastern portion of the proposed extension. Access to the central portion of the extension is possible on foot through the COTMWA, but the route is long and difficult.

Access from the east is via a series of roads which depart from U.S. highway 20/26/93 south of Arco. Care should be taken to avoid trespassing on the Idaho National Engineering Laboratory, which lies a few miles to the east. It is also possible to reach the central and southern extensions of the area from this vicinity. The Carey-Kimama desert road, which heads south from U.S. highway 20/26/93 about 4 miles east of Carey, allows access from the west to the central extension of the area .

Access to the southern portion of the area is possible from the east via the road to Crystal Ice Cave and Wapi Park.

Boundary Explanation

It is necessary to propose boundary extensions to the existing Great Rift System NNL in order to incorporate all known examples of high-quality vegetation representative of the Big Sagebrush Theme (see Appendix I). All but the northernmost third of the existing NNL lies in areas which, although remote, are heavily roaded and have been long used for the grazing of domestic livestock. As a result much of the existing landmark is in poor ecological condition; many portions of it have been seeded to non-native bunchgrass cultivars.

The general trend of the geological features upon which the existing boundaries are based is to the southeast. Three areas of boundary extension are recommended in order to incorporate all known examples of the two subthemes into the existing Great Rift System NNL. These areas are: 1) to the east of the COTMNM; 2) to the west of the existing Great Rift System NNL; and 3) to the south of the existing Great Rift System NNL (Attachment 1). They will be referred to as the northern, central, and southern extensions, respectively. Following the methodology of previous evaluators in the area, boundaries follow land lines.

The northern extension lies mostly in Butte County. Excluded is Huddles Hole, a privately-owned cultivated field. This extension is one of the two areas for which excellent quantitative data on

the plant communities exists (Lovejoy 1980). The boundary lies, for the most part, within the lava flow borders because the adjacent area to east has numerous roads and is either cultivated or has been seeded (USDI-BLM 1981).

The central extension extends south from the northwestern boundary of the GRSNNL to the general vicinity north of Mule Butte. A field reconnaissance during the 1986 field season documented that the kipukas and lava flows of this area include many high-quality examples of both subthemes. In contrast, the ecological condition of adjacent lands outside the proposed boundary is generally poor, although fair-to-good quality vegetation is found locally, especially along the northern and southeastern edges (USDI-BLM 1984).

The proposed southern extension incorporates the northern portion of the Wapi lava field into the existing Great Rift NNL. Limited quantitative data exists for the northeastern edge of the area (Lovejoy 1980). Additional semi-quantitative information exists on high-quality examples of several Artemisia tridentata associations within the southern portions of the extension (Caicco and Wellner 1983). Excluded areas adjacent to the Wapi lava field are in either poor or seeded condition (USDI-BLM 1984).

Boundary

Proposed northern extension

Beginning at the northeastern corner of the Craters of the Moon National Monument at the NE corner of Section 27, T2N, R25E, go due east 4.8 km (3 mi), then north 1.6 km (1 mi), and east again 2.4 km (1.5 mi) to the center of the northern boundary of Section 21, T2N, R26E. From this point proceed due south 3.2 km (2 mi), then west 0.8 km (0.5 mi), then south again 0.4 km (0.25 mi), and west 1.6 km (1 mi) to Section 31. Go south about 3.2 km (2 mi) along the section lines of Section 31, partial Section 3 of T1N, R26E, and Section 9. From the SE corner of Section 9, proceed 3.2 km (2 mi) east, then 1.6 km (1 mi) north, and 0.8 km (0.5 mi) east again. From this point go north to the center of partial Section 6, T1N, R27E, then east to the eastern section line and south to the SE corner of Section 7. From this point go 1.6 km (1 mi) east, then 6.4 km (4 mi) south to the northern section boundary of partial Section 4, T1S, R27E. Proceed west to the NW corner of Section 4, then south to the center of the western boundary of Section 28, then east 1.6 km (1 mi) and south 2.4 km (1.5 mi) to the NE corner of Section 4, T2S, R27E. This corner lies along the eastern boundary of the established geological>NNL. From here the boundary follows the existing GRS>NNL boundary NW to the National Monument, and then north along the NM boundary to the starting point.

Proposed central extension

From the corner of the existing GRSNNL in Section 6, T4S, R27E along the western boundary of the existing GRSNNL, proceed 5.6 km (3.5 mi) west to the Blaine/Minidoka Co. line. Go north to the SE corner of Section 36, T3S, R25E, then 4.8 km (3 mi) west to the SW corner of Section 34, T3S, R25E.

From this corner, proceed north 2.4 km (1.5 mi), east 0.8 km (0.5 mi), north 4.8 km (3 mi), west 0.8 km (0.5 mi), north 2.4 km (1.5 mi), west 0.8 km (0.5 mi), north 3.2 km (2 mi), west .8 km (.5 mi) and north 6.4 km (4 mi) to the SW corner of Section 33, T1S, R25E. This corner lies along the western boundary of the established GRSNNL. Follow this boundary east and south to the starting point.

Proposed southern extension

From the starting point at the southeastern corner of the existing GRSNNL at the center point of the eastern boundary of Section 24, T6S, R28E, proceed 4 km (2.5 mi) south to the northern section line of Section 1, T7S, R28E, then west 16.8 km (10.5 mi) to the center southern section line of Section 32, T6S, R27E.

From the center of the southern boundary of Section 32, go north 1.6 km (1 mi), then east 0.8 km (0.5 mi), north 2.4 km (1.5 mi),

and west to the center of the western boundary of Section 19. From here proceed north 2.4 km (1.5 mi) to the NW corner of partial Section 18, T6S, R27E, then go east 3.2 km (2 mi) to the center northern boundary of Section 16, north 0.8 km (0.5 mi), east 0.8 km (0.5 mi), north 0.4 km (0.25 mi), east 2.4 km (1.5 mi), north 2 km (1.25 mi), west 1.6 km (1 mi), north 2.4 km (1.5 mi), and east 2.4 km (1.5 mi) to the existing boundary of the GRSNNL. Follow this boundary south, and then east, to the starting point.

Size

Area calculations were estimated from the boundaries drawn on Attachment 1 of this report and are based on standard 259 ha (640 ac) sections. The total area contained within the three proposed extensions to the existing NNL is 34,450 ha (87,600 ac).

Description

Most of the Columbia Plateau physiographic province is covered by flood basalts which resulted from fluid lava flows which erupted from fissures (Fig. 3). The ages of most of the lava flows in Oregon and Washington range from 6-18 million years (Miocene). In contrast, the surface volcanics of large portions of the Snake River Plain were erupted during the Quaternary, with some flows as young as 2,100 years (Camp et al. 1982; Leeman 1982; Kuntz et al. 1982).

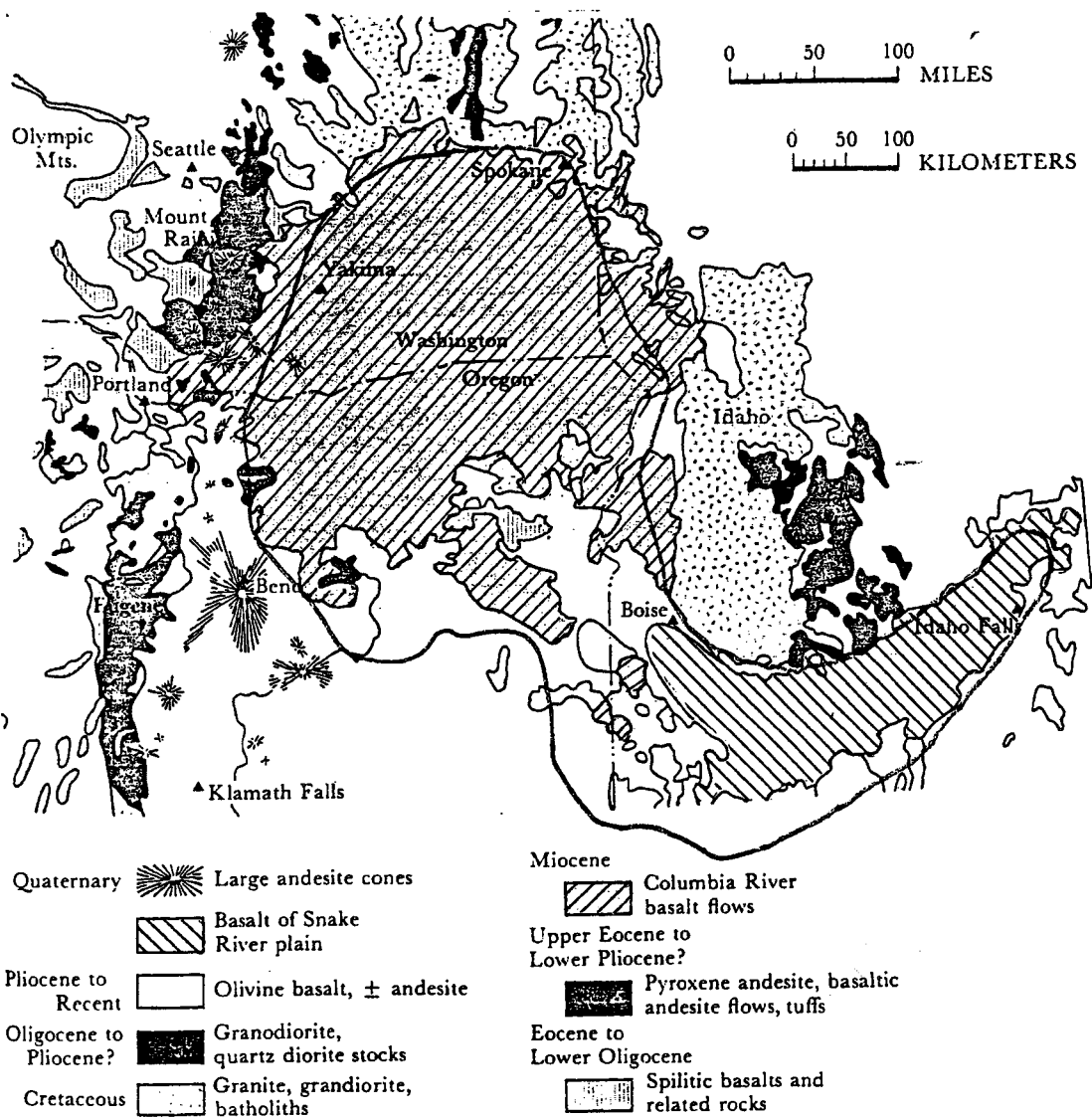


Figure 3. Distribution of the Columbia River flood basalts within the Columbia Plateau natural region with respect to the younger lava flows of the Snake River Plain. Minor modification from Hyndman (1972).

The style of these younger lava fields is well-displayed in the Great Rift, a 85-km-long and 2-to-8 km wide (53-mi-long and 1-to-5 mi wide) belt of cinder cones, shield volcanoes, eruptive fissures and associated lava flows, and open cracks in the central Snake River Plain (Fig. 4). Within many of the lava flows of the Great Rift may be found kipukas. 'Kipuka' is a Hawaiian word which is used to refer to a variation or change in form (Pukui and Elbert 1971). A calm place in a big sea, or an opening in a forest, could be kipukas. It is especially used for a clear place or oasis within a lava bed where there may be vegetation. The latter usage has been adopted by geologists (Bates and Jackson 1980). The Bureau of Land Management (USDI-BLM 1980) has identified over 450 kipukas within the Great Rift, ranging in size from about one hectare to over 900 hectares (1 to 2200 acres).

Geologic kipukas can be classified into two broad landform types, referred to as either "hill" or "hole" kipukas. The former is found where lavas have flowed around the base of a higher landform, such as the remnants of an old volcanic cone, thereby isolating it from its previous surroundings. Hole kipukas are commonly found along the edges of lava flows, where the molten lavas often enclose but do not entirely cover a level terrain; they can also be found a considerable distance in from the edges of lava flows. In the formation of either a hill or a hole kipuka, the end result is the same: a sharp discontinuity in

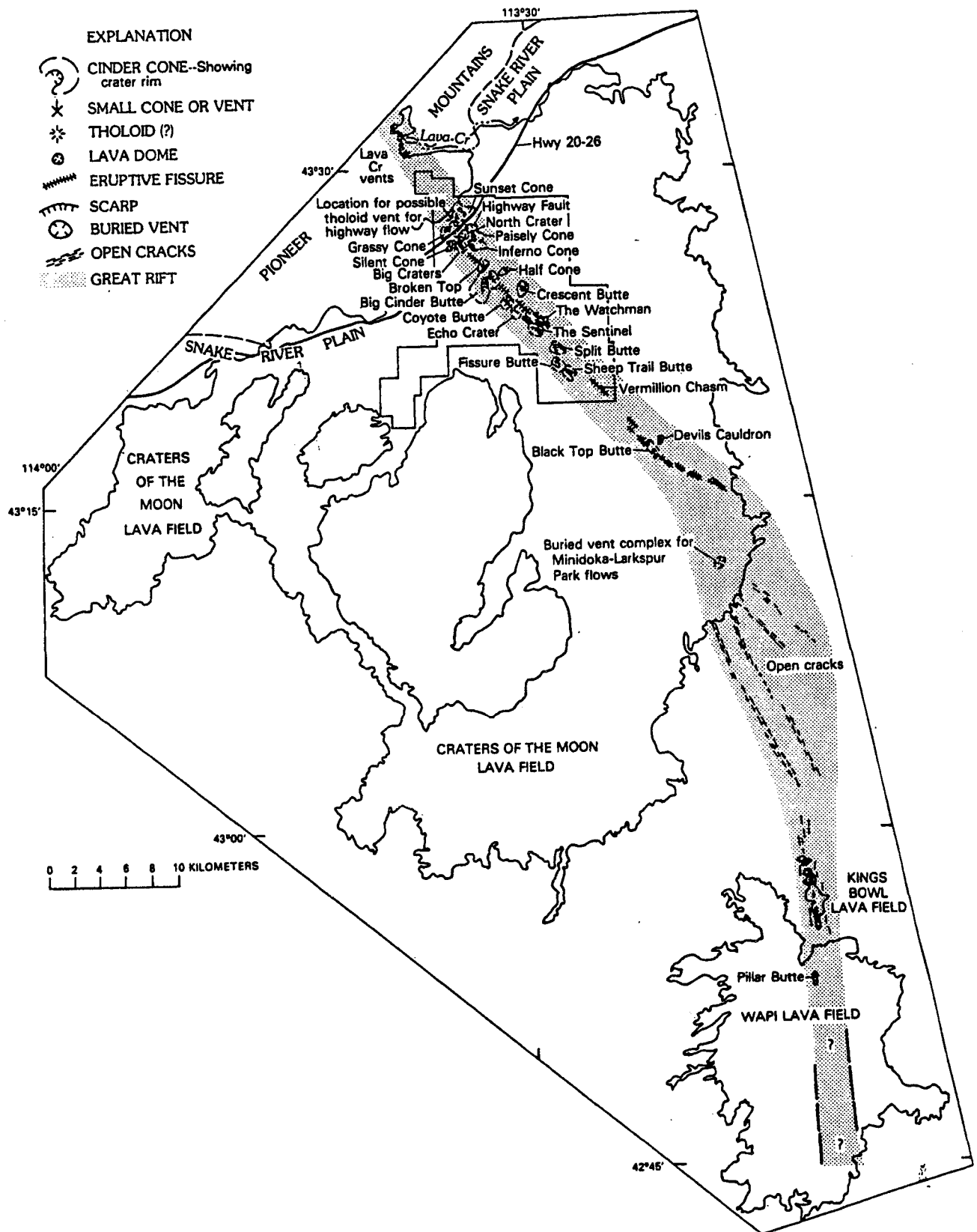


Figure 4. Geologic features of the vicinity of the Great Rift System National Natural Landmarks. The current boundaries enclose the geologic features in the shaded area; in contrast, the ecological features of national significance lie within the lava fields to the north, west, and south of the existing boundaries. (from Kuntz et al., 1982)

substrate occurs. More often than not, this discontinuity is a 3 to 5 m (10 to 16 ft) wall of lava.

As one might expect, this edaphic discontinuity produces an environmental discontinuity. Hole kipukas and low hill kipukas on the central Snake River plain are often overlain by aeolian deposits of clay-, silt-, and sand-sized materials. On higher or steeper hill kipukas a wide variety of volcanic substrates is often exposed; topographic relief in the Great Rift can approach 305 m (1000 ft), although the average relief is a great deal less (Fig. 5). Since both zonal and azonal soil formation is, in part, a product of the parent material and topographic relief, a correspondingly wide variety of soils can also be found.

In addition to parent material and topography, time, and the past and present climate and biota are important factors in soil formation (Jenny 1961). Studies of the absolute ages of the lava flows of various eruptive periods vary (Table II), but all of the surficial soils of the area are younger than 20,000 years and have therefore developed under a late Pleistocene to Recent climatic regime.

The present day range of temperature and precipitation of the Great Rift varies along an elevational gradient which ranges from about 1800 m (6000 ft) at COTMNM along the north edge of the Snake River Plain to about 1200 m (4000 ft) near Minidoka at the

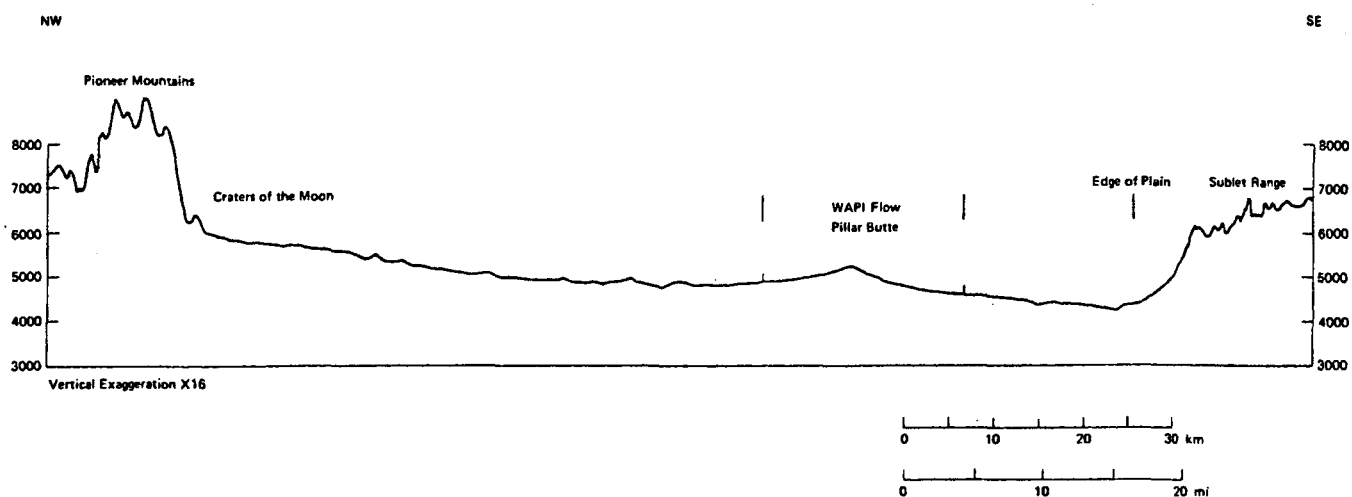


Figure 5. Topographic profile from the Pioneer Mountains at the northern edge of the Snake River Plain to the Sublet (sic) Range along the southern edge. Crater of the Moon National Monument is on the left at an approximate elevation of 1800 m (6000 ft) while the Snake River lies at 1200 m (4000 ft) in the trough on the right. This is the approximate gradient represented in the climatic data given in Table II. Taken from Greeley (1982).

Table II. Approximate ages of various major lava flows within the Craters of the Moon, Wapi, and Kings Bowl lava fields (refer to Figure 4). Taken from Kuntz *et al.* (1982).

Eruptive period and approximate age	Informal name and lava type of major flows* (in order of ascending stratigraphic position)	Source vents (queried where uncertain)
A 2,100 to 2,300 years b.p.	Broken Top (p)	Broken Top, east and south sides
	Blue Dragon (p)	Eruptive fissures south of Big Craters cinder cone
	Trench Mortar Flat (p)	Eruptive fissures between Big Cinder Butte and The Watchman cinder cone
	North Crater (p)	North Crater cinder cone
	Big Craters (Green Dragon) (p)	Eruptive fissure at north end of Big Craters cinder cone
	Kings Bowl (p)	Fissure vents north and south of Kings Bowl
	Wapi (p)	Vents at Pillar Butte
	Serrate (a-b)	North Crater(?)
B 3,500 to 4,500 years b.p.	Devils Orchard (a-b)	North Crater cinder cone(?)
	Highway (a-b)	North Crater cinder cone(?) or tholoid vent
	Vermillion Chasm (p)	Eruptive fissures at Vermillion Chasm
	Deadhorse (p)	Eruptive fissures north and south of Black Top Butte cinder cone
	Devils Cauldron (p)	Devils Cauldron
	Minidoka (p)	Obscure vents located about 5 kilometers northeast of New Butte cinder cone
C 5,800 to 6,200 years b.p.	Larkspur Park (p)	Black Top Butte cinder cone(?)
	Range fire (p)	
	Indian Wells north (a)	Big Cinder Butte cinder cone(?)
	Indian Wells south (a)	Big Cinder Butte cinder cone(?)
	Sawtooth (a)	Big Cinder Butte cinder cone
	South Echo (p)	Eruptive fissures south of Echo Butte cinder cone
	Sheep Trail Butte (p-a)	Sheep Trail Butte cinder cone
	Fissure Butte (p-a)	Fissure Butte cinder cone
D About 6,600 years b.p.	Sentinel west (p)	The Sentinel cinder cone
	Sentinel south (p)	The Sentinel cinder cone
	Silent Cone (a)	Silent Cone cinder cone
	Carey Kipuka (a)	Silent Cone cinder cone(?)
E 7,300 to 7,800 years b.p.	Little Park (a)	Silent Cone cinder cone(?)
	Little Laidlaw Park (a)	Silent Cone cinder cone(?)
	Grassy Cone (p)	Grassy Cone cinder cone
	Laidlaw Lake (p)	Grassy Cone cinder cone
F 10,000 to 11,000 years b.p.	Lava Point (a)	Great Rift northwest of Echo Crater
	Pronghorn (p)	Great Rift near Sheep Trail Butte
	Bottleneck Lake (p)	Great Rift near Sheep Trail Butte
G 12,000 to 12,900 years b.p.	Heifer Reservoir (p)	Great Rift near Crescent Butte
	Sunset (p)	Sunset Cone cinder cone
	Carey (p)	Sunset Cone cinder cone
H About 15,000 years b.p.	Lava Creek (p-a)	Vents near Lava Creek
	Kimama (p)	unknown
	Bear Den Lake (p)	unknown
	Baseline (p)	unknown
	Little Prairie (p)	unknown Echo Crater and (or) Crescent Butte(?)
	Lost Kipuka (p)	unknown
	No Name (p)	unknown
	Brown flow (p)	unknown

*(p) chiefly pahoehoe flows
(a) chiefly aa flows

(a-b) aa and block flows
(p-a) pahoehoe and aa flows

southern end of the rift zone. Climatic characteristics for weather stations located at the two extremes show significant differences in the average maximum and minimum temperatures, as well as the mean monthly precipitation (Table III; Molnau 1983).

The annual distribution of precipitation shows similar patterns for both stations, that is, two periods of peak precipitation, one occurring in December/January and the other in May/June. Much of the winter precipitation at the northern station falls as snow with accumulations of several feet commonly remaining until the spring thaw. The spring rains throughout the Great Rift coincide with the peak growing season, which is followed by a pronounced dry season which extends from July through September. Thus, although the period between the last spring freeze (50 percent probability of 0°C (32° F) is estimated to be 107 days at Craters of the Moon National Monument as compared to 140 days at Minidoka Dam (Everson et al. 1978), the effective growing season is likely to be significantly shorter due to fact that most of the plants exhibit a drought-related period of dormancy.

The marked aridity, the short growing season, and the low temperature regime during the winter months result in a shrub-steppe ecosystem in which the dominant overstory species are woody members of the family Asteraceae, especially the genera Artemisia (sagebrush) and Chrysothamnus (rabbitbrush). The understory of this ecosystem, prior to the arrival of European

Table III. Temperatures and precipitation for the period 1962-1981 at Craters of the Moon National Monument and the period 1947-1981 at Minidoka Dam. The former lies along the northern edge of the Snake River Plain at 1800 m (6000 ft) while the latter is on the Snake River at the southern edge of the plain at an elevation of 1200 m (4000 ft).

Craters of the Moon

Month	Temperature (°F)		Precipitation (in)	
	Average Maximum	Average Minimum	Mean	Percent Annual
January	27.5	8.2	2.82	16.4
February	33.5	13.4	1.51	8.7
March	39.1	18.2	1.29	7.6
April	50.9	27.4	1.30	7.6
May	63.8	36.2	1.86	10.8
June	72.3	43.9	1.37	8.0
July	83.8	50.9	0.55	3.2
August	81.3	48.9	0.83	4.9
September	72.2	41.0	0.82	4.8
October	58.3	30.6	0.84	4.9
November	40.7	20.4	1.58	9.1
December	29.5	10.6	2.41	14.0
Annual	54.0	28.9	17.18	100.0

Minidoka Dam

Month	Temperature (°F)		Precipitation (in)	
	Average Maximum	Average Minimum	Mean	Percent Annual
January	33.8	16.0	1.08	11.5
February	40.6	21.4	0.65	7.0
March	48.5	26.5	0.79	8.5
April	58.8	33.3	0.86	9.3
May	68.6	41.5	1.15	12.3
June	78.0	48.9	0.92	9.8
July	88.3	56.3	0.34	3.7
August	86.1	54.4	0.48	5.2
September	76.8	45.7	0.54	5.8
October	63.7	36.1	0.68	7.4
November	47.4	27.6	0.89	9.5
December	37.1	20.5	0.93	10.0
Annual	61.1	35.9	9.31	100.0

settlers and the consequent overgrazing and introduction of highly competitive exotic plant species was comprised principally of perennial bunchgrasses, the most common of which include Agropyron spicatum (bluebunch wheatgrass), Festuca idahoensis (Idaho fescue), Poa sandbergii (Sandberg bluegrass), and Stipa comata (needle-and-thread grass), as well as numerous herbaceous species (Tisdale and Hironaka 1981).

Species diversity within the sagebrush steppe and woodlands of the Great Rift is moderate with over 130 vascular plant species, and the probable occurrence of 48 species of mammals, amphibians, and reptiles, and 80 species of birds (see Appendix II).

The steppe vegetation of the Washington portion of the Columbia Plateau has been classified into habitat types by Daubenmire (1970). A classification of the steppe vegetation of southern Idaho by Hironaka et al. (1983) is also based upon the habitat type approach.

The classification of the big sagebrush (Artemisia tridentata) shrub steppe which was developed under Phase I of this project was based primarily upon these classifications and recognizes two subthemes in which the shrub layer is dominated by either of two subspecies of big sagebrush (ssp. wyomingensis or tridentata; other recognized subtaxa, for example ssp. vaseyana, are specifically excluded) as having significance at the national

level relevant to the National Natural Landmark program. These subthemes, each of which includes several plant associations, emphasize the intrinsic distinction between those plant associations characteristic of zonal soils and those characteristic of specialized habitats.

Since most of the surface of the Great Rift is covered by lava flows, the majority of the plant communities within the area are representative of the big sagebrush steppe on specialized habitats subtheme. Most flows are vegetated with a sparse to dense shrub layer of big sagebrush; Sandberg bluegrass is the most common bunchgrass (Plate I). A number of herbaceous plants can also be found; these are generally restricted to microsites such as cracks, crevices, and depressions in which aeolian silts and sands have accumulated. Although the range of variability within the vegetated lava flows is great (Plate II), adequate quantitative data are lacking. Nevertheless, these communities would classify as Artemisia tridentata/Poa sandbergii associations sensu lato.

Also falling within the domain of the specialized habitats subtheme are those communities which would classify as Artemisia tridentata/Stipa comata associations (Plate III). These are widely distributed throughout the Great Rift wherever soils have developed on aeolian sand deposits, such as in hole and shallow hill kipukas; they can also be found on hill kipukas where the



Plate I. Big sagebrush steppe on specialized habitats subtheme of the big sagebrush steppe theme in the Columbia Plateau natural region: Artemisia tridentata/Poa sandbergii association on lithosol of recent lava flow. Photo taken in Section 14, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.

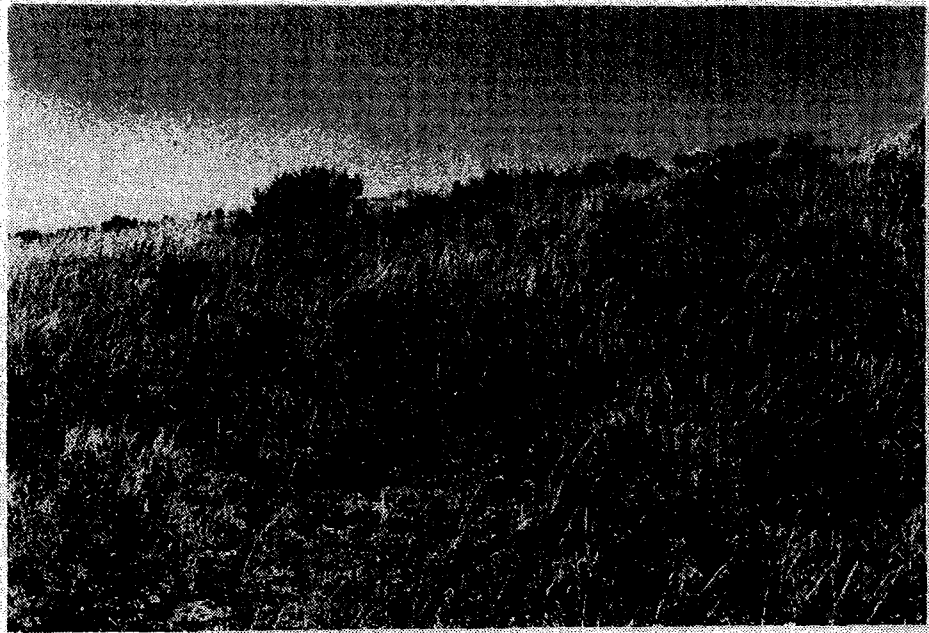


Plate IV. The Artemisia tridentata/Stipa comata association of the big sagebrush steppe on specialized habitats subtheme growing on coarse soils derived from cinders. Photo taken in Bear Park, a hill kipuka in Section 12, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.

Note collapse features in foreground and lava flow in distance. Photo taken in Section 14, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.



Plate III Big sagebrush steppe on specialized

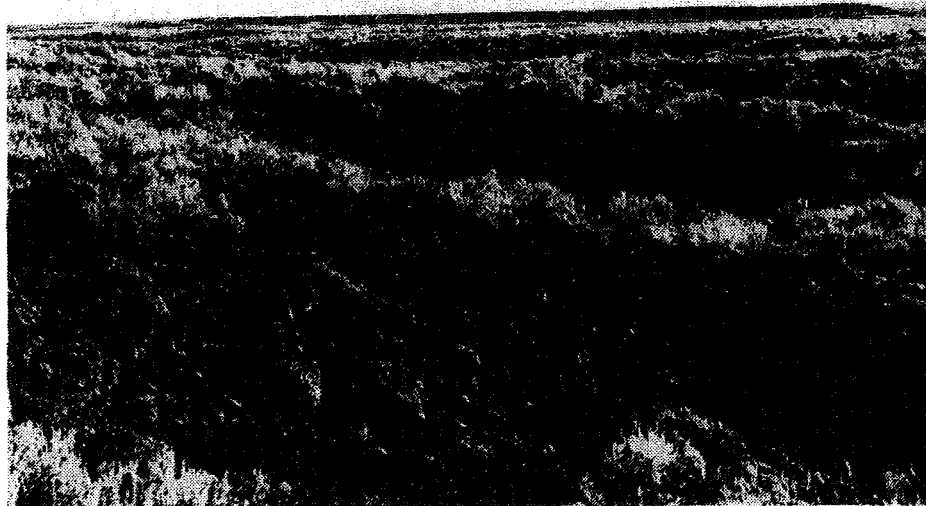


Plate II. Range of variability within the Artemisia tridentata/Poa sandbergii association of the big sagebrush steppe on specialized habitats subtheme. Note collapse features in foreground and lava flow in distance. Photo taken in Section 14, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.



Plate III. Big sagebrush steppe on specialized habitats subtheme: Artemisia tridentata/Stipa comata association on aeolian sands. Photo taken in hole kipuka in Section 11, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.

underlying substrate is of a coarse texture. Examples can be found in the Bear Park Kipuka (Plate IV).

A third association of the big sagebrush on specialized habitats subtheme is Artemisia tridentata/Stipa thurberiana (Thurber needlegrass), known only from the central Snake River Plain (Hironaka et al. 1983). Within the Great Rift, this association is known only from Big Juniper Kipuka (Plate V; Caicco and Wellner 1983), but it is to be expected elsewhere.

The big sagebrush steppe on zonal soils subtheme is represented within the Great Rift by the Artemisia tridentata/Agropyron spicatum and the A. tridentata/Elymus cinereus (basin wildrye) associations. The former community is widely distributed in the Great Rift, although an exemplary stand can be found on Big Juniper Kipuka in the Wapi lava field (Plate VI; Caicco and Wellner 1983). The latter community is currently known (within the Great Rift) only from Bear Park Kipuka. The third community of the zonal soils subtheme is the A. tridentata/Festuca idahoensis (Idaho fescue) association. A stand of this can be found on Carey Kipuka within the National Monument (Tisdale et al. 1965), but it has not yet been found south of this area; nevertheless, it is to be expected in areas adjacent to the boundary of the National Monument.



Plate IV. The Artemisia tridentata/Stipa comata association of the big sagebrush steppe on specialized habitats subtheme growing on coarse soils derived from cinders. Photo taken in Bear Park, a hill kipuka in Section 12, T3S, R25E (Boise Meridian) by S.L. Caicco during June 1986.



Plate V. The third association of the big sagebrush steppe on specialized habitats, Artemisia tridentata/Stipa thurberiana, at Big Juniper Kipuka in Section 36, T6S, R27E (Boise Meridian). Photo taken by S.L. Caicco during June 1983.



Plate VI. Big sagebrush steppe on zonal soils
subtheme: Artemisia tridentata/Agropyron spicatum
association on the inside wall of the crater at
Big Juniper Kipuka in Section 36, T6S, R27E (Boise
Meridian). Photo taken by S.L. Caicco during June
1983.

It should be emphasized that although stands of vegetation within the Great Rift can be placed within either of the two subthemes description above, the actual range of variability within the vegetation of the kipukas and their surrounding lava flows far exceeds the adequacy of any practical means of description. The range of physical and chemical differentiation among the volcanic substrates as well as the effects of the relative length of exposure (and therefore availability for colonization), the topographic heterogeneity and resulting microclimatic partitioning, and the localized deposition of aeolian materials have resulted in a vegetated landscape in which a traditional approach to classification produces only a broad picture of the actual range of natural biotic diversity.

In addition, one recent investigator has reported situations in which, contrary to the assumptions upon which the traditional approach to sagebrush steppe classification is based, the apparent climax dominant shrub is Chrysothamnus (Lovejoy 1980). While the sample size (two kipukas) is rather small to base any conclusion upon, the kipukas of the Great Rift offer an important setting in which hypotheses concerning the pre-settlement nature of shrub steppe ecosystems may be tested.

It should also be noted that, although the Great Rift is being recommended for its ecological significance within the Artemisia tridentata (big sagebrush) theme, many of the kipukas (especially

those in the northern portion of the area contain mosaics of vegetation types representative of this theme and vegetation types more representative of a yet-to-be-defined Artemisia tripartita (threetip sagebrush) theme. The intergradient nature of the vegetation of the Great Rift precludes the possibility of delineating boundaries which would segregate the two themes.

Finally, it must be emphasized that the proposed boundary extensions are based on the known ecological features illustrative of the theme under consideration within the Great Rift. Because of the remoteness, the size, and the rigorous field conditions much of the area remains unexplored. Although no data is available for the unexplored areas, it is my professional opinion that a much larger area than contained within the proposed boundary extensions is likely to be of national ecological significance. For this reason, additional boundaries have been drawn in green on Attachment 1 to indicate the probable maximum extent of significant ecological features. The current proposed boundary extensions should be considered to be the minimum boundary necessary to enclose the documented features of national significance.

Land Use and Present Condition

The lands contained within the proposed boundaries are used primarily for recreation. Some local grazing of sheep occurs in the spring, but the lack of surface water limits the duration to

only a few days. The limited historic and current grazing of domestic livestock has resulted in no significant damage to the biotic systems. Most of the area is in good to very good condition; some areas are in excellent condition and show no sign of ever having been grazed.

Because of the rough nature of the surrounding lava flows, their relative isolation, and their lack of surface water, it is estimated that no more than 10 of the more than 450 kipukas of the Great Rift have been grazed by domestic livestock (USDI-BLM 1980). While my personal observations suggest that this is a somewhat optimistic estimate, there is no question that the lava flows of the Great Rift enclose many examples of the range of natural diversity within the big sagebrush steppe ecosystem in unequalled ecological condition.

Lands adjacent to the proposed National Natural Landmark are used for the grazing of domestic livestock including both cattle and sheep. Local mining of the lava rock also occurs. Much of this range is fair to poor condition; limited areas adjacent to the proposed landmark are in good condition. Range trend on lands to the west is apparently stable, or in some cases thought to be improving; a general decline in range condition is occurring on adjacent lands to the east (USDI-BLM 1981, 1984).

The recommended landmark lies adjacent to the COTMN and the COTMWA to the north. Land use here is primarily recreational. Although visitation to the National Monument is increasing, most use is restricted to trails. Recreational use of the Wilderness is also increasing, but the inhospitable character of the terrain and, in particular, the lack of surface water will probably keep damage to the natural values of the area to a minimum.

Anticipated Damage

Some limited grazing of both sheep and cattle does occur within the recommended boundaries. This occurs mainly near the edges of lava flows during spring and fall (USDI-BLM, 1980). Sheep are also driven into some of the larger kipukas (e.g., Bear Park) during the spring, although the lack of surface water limits their stay to about three days (John Butz, personal communication). Permanent vegetation transects would be necessary to establish any connection between present day grazing practices and ecological deterioration. The limited extent of grazing, as well as the short duration, probably do not warrant such monitoring. Any increase in livestock use, however, would be cause for concern.

Although the extraction of lava rubble, which is a popular building stone and classified as a saleable mineral, has occurred around the edges of other lava fields on the Snake River Plain, there has been very little mining of the lava flows of the Great

Rift because of poor access and distance from markets. No known natural gas, oil, or mineral deposits occur in the area. No geothermal leases or lease applications exist as of September 1983 (USDI-BLM 1980). When designation of the Proposed Great Rift Wilderness Area occurs, the minerals within all lands designated as wilderness will be withdrawn from all forms of appropriations under the mining laws and from disposition under all laws pertaining to mineral leasing.

Ownership

All of the land within the recommended landmark is publicly owned. Only the U.S. Department of Interior-Bureau of Land Management has management jurisdiction. Districts with management responsibilities include:

Shoshone District	Burley District	Idaho Falls District
P.O. Box 2B	Rt. 2, Box 1	940 Lincoln Rd.
Shoshone, ID	200 S. Oakley Hwy.	Idaho Falls, ID
83352	Burley, ID 83318	83401

Attachment I comprises two land surface management status maps prepared by the Idaho Bureau of Land Management which show the distribution of and proportion of ownership in the areas within or adjacent to the recommended landmark. State lands shown in blue within the proposed boundaries have been exchanged and are now under the management jurisdiction of the BLM. Also shown on the 1:100,000 scale maps are the boundaries of the existing National Natural Landmark which was established for geological

References

- Bates, R.L. and J.A. Jackson, editors. 1980. Glossary of geology. American Geological Institute, Falls Church, VA. 751 pp.
- Bonnichsen, B. and R.M. Breckenridge, eds. 1982. Cenozoic geology of Idaho. Idaho Bureau of Mines and Geology Bull. No. 26. Moscow. 725 pp.
- Butz, J. 1986. Personal communication. Idaho Falls District, Bureau of Land Management, Idaho Falls, ID.
- Caicco, S.L. and C.A. Wellner. 1983b. Research Natural Area recommendation for Big Juniper Kipuka. Report submitted to Shoshone District, Bureau of Land Management, Shoshone. 15 pp.
- Camp, V.E., P.R. Hooper, D.A. Swanson, and T.L. Wright. 1982. Columbia River Basalt in Idaho: physical and chemical characteristics, flow distribution, and tectonic implications. Pp. 55-75 in B. Bonnichsen and R.M. Breckenridge, eds. Op. cit.
- Daubenmire, R.F. 1970. Steppe vegetation of Washington. Washington Agric. Exp. Station Technical Bulletin 62. Washington State University, Pullman. 131 pp.
- Daubenmire, R.F. 1975. A survey of potential natural landmarks, biotic themes, on the Columbia Plateau. Mimeo report prepared for the National Park Service, Washington State Univ., Pullman. 88 pp.
- Everson, D.O., M. Faubion, and D.E. Amos. 1978. Spring and fall freezing temperatures and growing seasons in Idaho. Univ. Idaho Agric. Exp. Station Bulletin No. 494. 18 pp.
- Greeley, R. 1982. The style of basaltic volcanism in the eastern Snake River Plain. Pp. 407-421 in B. Bonnichsen and R.M. Breckenridge, eds. Op. cit.
- Hironaka, M., M.A. Fosberg, and A.H. Winward. 1983. Sagebrush-grass habitat types of southern Idaho. Forest, Wildlife, and Range Exp. Station Bulletin No. 35. Univ. Idaho, Moscow. 44 pp.
- Hyndman, D.W. 1972. Petrology of igneous and metamorphic rocks. McGraw-Hill Book Company, New York. 533 pp.
- Jenny, H. 1961. Derivation of state factor equations of soils and ecosystems. Soil Sci. Soc. Am. Proc. 25:385-388.

- Jones, R.W. 1969. Special report on problems related to Great Rift Natural Landmark. Submitted to National Park Service.
- Kuntz, M.A., D.E. Champion, E.C. Spiker, R.H. Lefebvre, and L.A. McBroome. 1982. The Great Rift and evolution of the Craters of the Moon lava field, Idaho. Pp. 423-437 in B. Bonnichsen and R.M. Breckenridge, eds. Op. cit.
- Leeman, W.P. 1982. Evolved and hybrid lavas from the Snake River Plain, Idaho. Pp. 193-202 in B. Bonnichsen and R.M. Breckenridge, eds. Op. cit.
- Lovejoy, S.H. 1980. Patterns in the distribution of plants and animals on lava flows and kipukas in southeastern Idaho. M.S. thesis. Idaho State University, Pocatello. 120 pp.
- Molnau, M. 1983. Climate and hydrology data for Idaho. Idaho Agric. Exp. Station Misc. Series No. 32. Univ. of Idaho, Moscow. 116 pp.
- Pukui, M.K. and S.H. Elbert. 1971. Hawaiian-English Dictionary. University of Hawaii Press, Hilo.
- Scott, F. 1978. Potential natural landmarks, geological themes, on the Columbia Plateau. Mimeo report prepared for the National Park Service. Washington State Univ., Pullman. 290 pp.
- Tisdale, E.W. and M. Hironaka. 1981. The sagebrush-grass region: a review of the ecological literature. Forest, Wildlife, and Range Exper. Sta. Bull. No. 33. Univ. of Idaho, Moscow. 31 pp.
- Tisdale, E.W., M. Hironaka, and M.A. Fosberg. 1965. An area of pristine vegetation in Craters of the Moon National Monument, Idaho. Ecology 46:349-352.
- Trimble, D.E. 1974. Evaluation report of the Great Rift, Idaho. Report submitted to the National Park Service.
- Trimble, D.E. 1980. National Natural Landmark Brief: enlargement of a previously designated landmark. Nat. Park Service. 2 pp.
- USDI-BLM. 1980. Great Rift proposed wilderness Final Environmental Impact Statement. U.S. Dept. Interior, Bureau of Land Management, Idaho Falls District, ID. 83 pp.

USDI-BLM. 1981. Big Desert draft Environmental Impact Statement. U.S. Dept. Interior, Bureau of Land Management, Idaho Falls District, ID. 192 pp., plus maps.

USDI-BLM. 1984. Monument proposed Resource Management Plan and final Environmental Impact Statement. U.S. Dept. Interior, Bureau of Land Management, Shoshone District, ID. 53 pp.

Zimowsky, P. 1986. Roughing it in the Great Rift. Idaho Statesman, June 12.

NATIONAL NATURAL LANDMARK EVALUATION

GREAT RIFT SYSTEM

Columbia Plateau Province

Artemisia tridentata (big sagebrush) Steppe Theme

Appendix I

Distribution of ecological features of national significance representative of the zonal soils and specialized habitats subthemes within the three recommended extensions of the existing boundaries.

The maps on the following three pages show the distribution of known ecological features of national significance representative of the big sagebrush steppe on the Columbia Plateau natural region theme that are included within the recommended boundary extensions to the Great Rift National Natural Landmark.

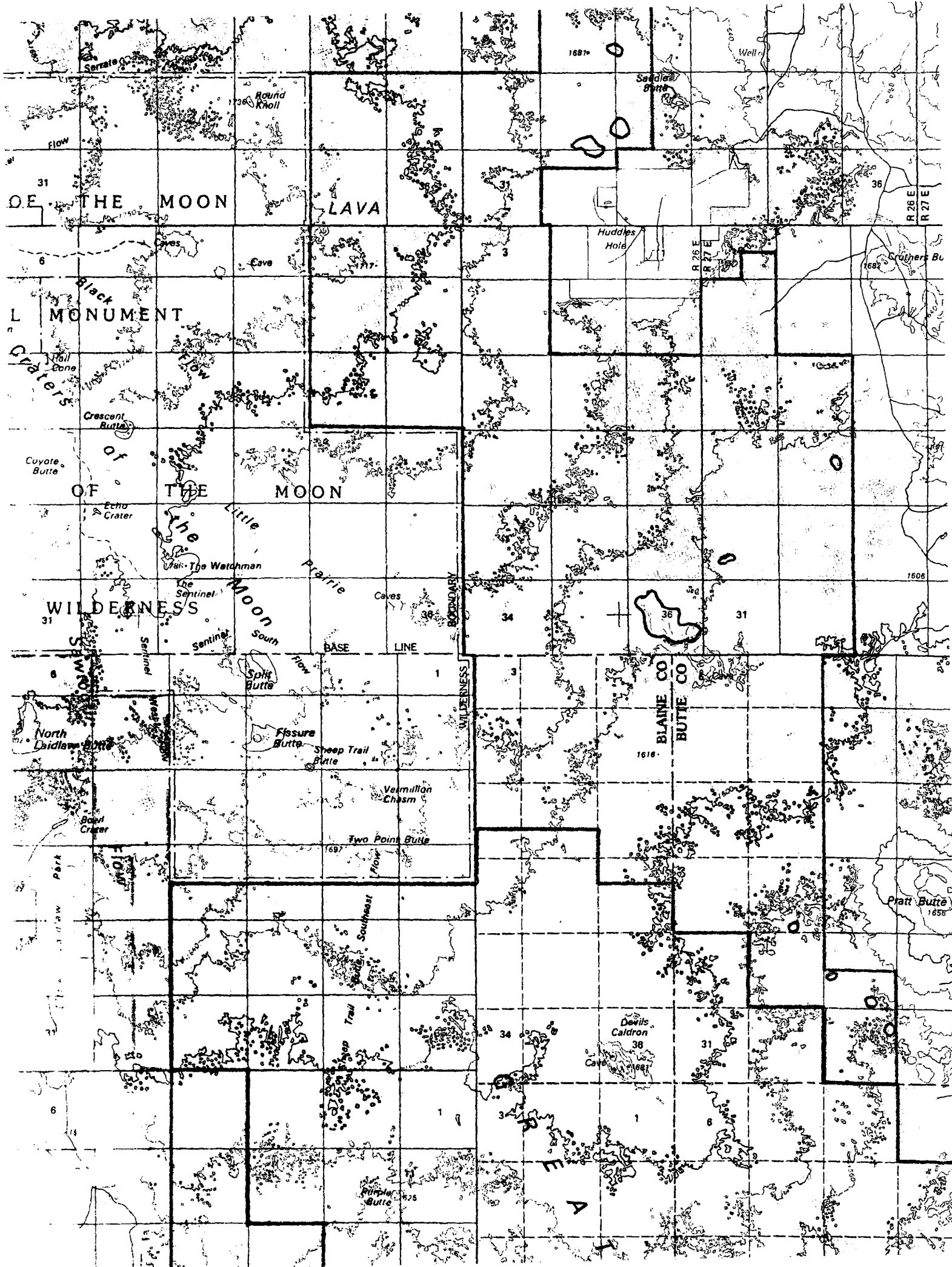
The enclosed areas (inside of the boundary extensions on each map represent either hill or hole kipukas and usually include examples of both the big sagebrush steppe on zonal soils subtheme and the big sagebrush steppe in specialized habitats subtheme. Plant associations of the first subtheme found in kipukas usually include big sagebrush/bluebunch wheatgrass and big sagebrush/basin wildrye; the big sagebrush/Idaho fescue association has not yet been found within the recommended boundaries, although it is to be expected. The most common plant association of the specialized habitats subtheme found within kipukas is big sagebrush/needle-and-thread grass. The big sagebrush/Thurber needlegrass association is currently known only from Big Juniper Kipuka but is to be expected elsewhere.

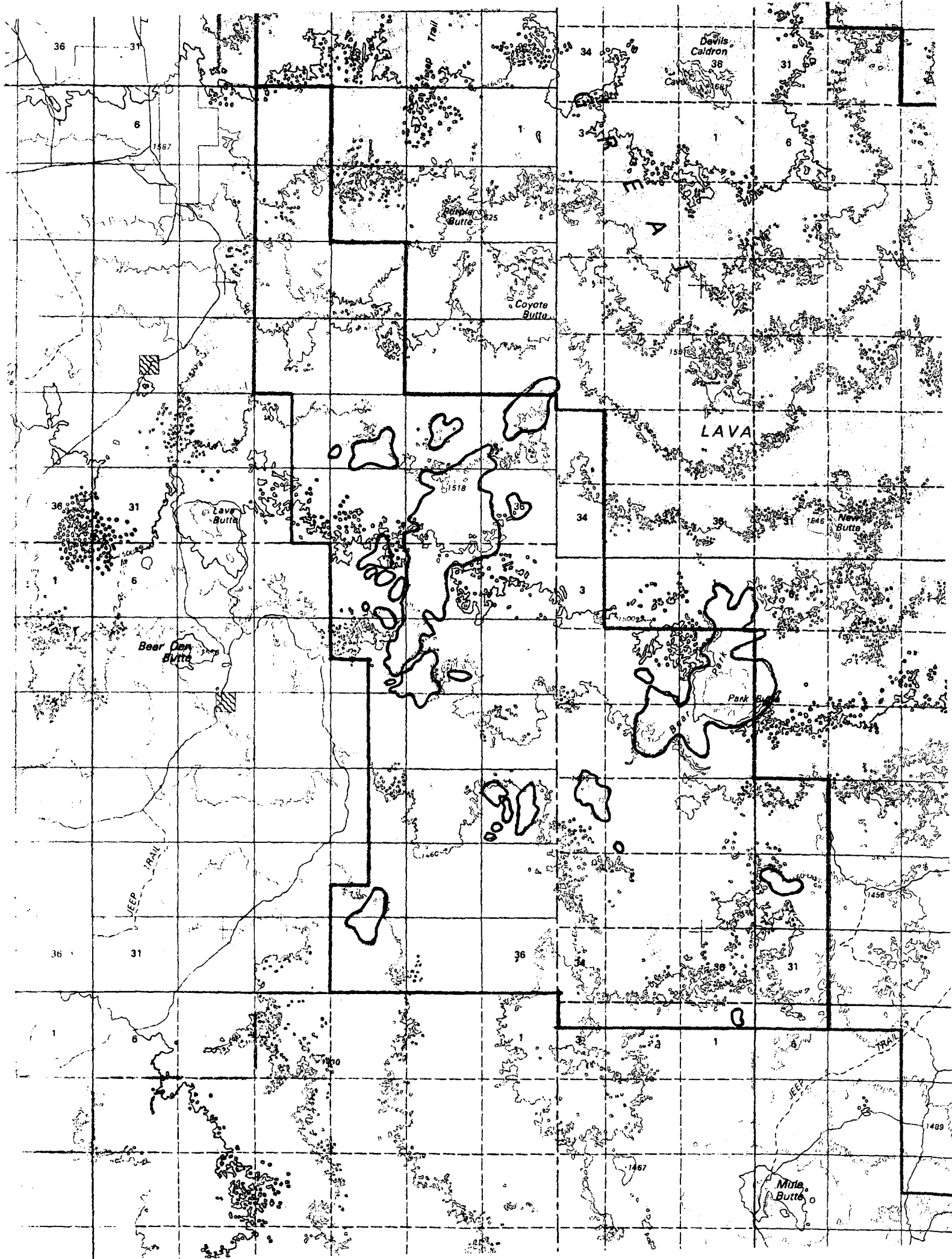
All of the ecological features which occur outside of the enclosed areas are representative of the specialized habitats subtheme. These are all classified as the big sagebrush/Sandberg bluegrass plant association sensu lato, although the range of variability within this unit is far greater than in any published description of this plant association.

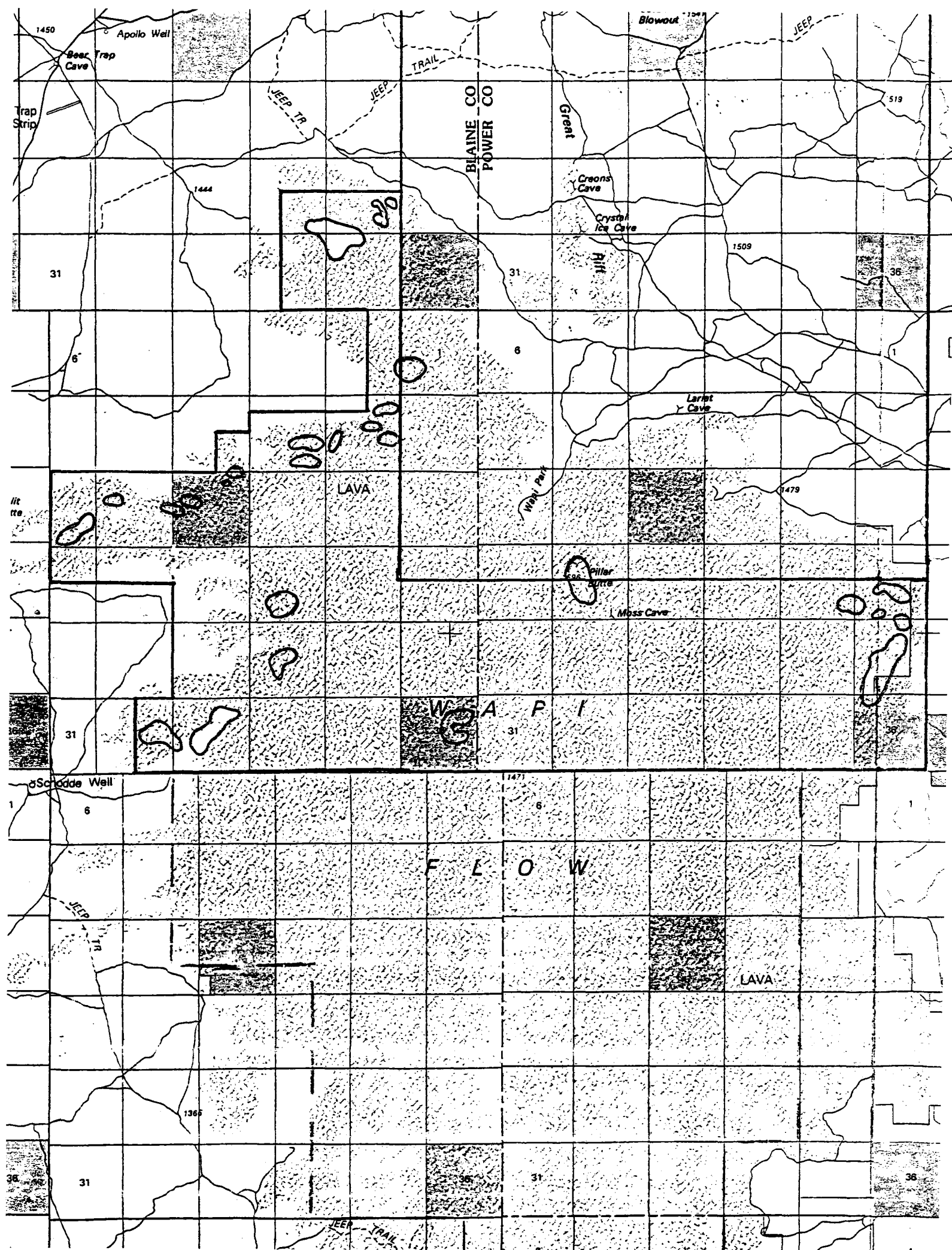
The boundaries of each of the three recommended extensions were drawn in such a way as to include as many of the known occurrences of ecological features of national significance within kipukas as possible while striving to keep the total area to minimum. In the western extension, the kipukas are relatively centralized and the minimum area is well defined.

In the northern extension, however, the kipukas are more widely dispersed. Two points should be made in regard to this area: 1) numerous smaller kipukas do not appear because of the scale of the map; and, 2) the kipukas of this area are the only ones for which there is documentation in the scientific literature of their ecological features.

The area within the southern boundary extension represents an intermediate situation within large kipukas, or clusters of kipukas represented throughout.







NATIONAL NATURAL LANDMARK EVALUATION

GREAT RIFT SYSTEM

Columbia Plateau Province

Artemisia tridentata (big sagebrush) Steppe Theme

Appendix II

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

Scientific and common names for plant taxa occurring within the recommended Great Rift National Natural Landmark of the central Snake River Plain, Idaho.

Trees

<i>Juniperus osteosperma</i>	Utah juniper
<i>Juniperus scopulorum</i>	Rocky Mountain juniper
<i>Pinus flexilis</i>	limber pine
<i>Populus tremuloides</i>	quaking aspen

Shrubs

<i>Amelanchier alnifolia</i>	western serviceberry
<i>Artemisia tridentata</i> ssp. <i>tridentata</i>	basin big sagebrush
<i>Artemisia tridentata</i> ssp. <i>wyomingensis</i>	Wyoming big sagebrush
<i>Artemisia tripartita</i>	threetip sagebrush
<i>Atriplex spinosa</i>	spiny hopsage
<i>Chamaebatiaria millefolium</i>	fernbush
<i>Chrysothamnus nauseosus</i>	rubber rabbitbrush
<i>Chrysothamnus viscidiflorus</i>	green rabbitbrush
<i>Holodiscus dumosus</i>	gland ocean-spray
<i>Philadelphus lewisii</i>	syringa
<i>Purshia tridentata</i>	antelope bitterbrush
<i>Prunus virginiana</i>	chokecherry
<i>Ribes aureum</i>	golden current
<i>Ribes cereum</i>	squaw current
<i>Symphoricarpos oreophilus</i>	mountain snowberry
<i>Tetradymia canescens</i>	gray horsebrush

Grasses and graminoids

<i>Agropyron caninum</i>	bearded wheatgrass
<i>Agropyron dasystachyum</i>	thickspike wheatgrass
<i>Agropyron smithii</i>	bluestem wheatgrass
<i>Agropyron spicatum</i>	bluebunch wheatgrass
<i>Bromus tectorum</i>	cheatgrass
<i>Carex douglasii</i>	Douglas' sedge
<i>Carex filifolia</i>	threadleaved sedge
<i>Carex hoodii</i>	Hood's sedge
<i>Danthonia unispicata</i>	onespike danthonia
<i>Elymus cinereus</i>	basin wildrye
<i>Festuca bromoides</i>	barren fescue
<i>Festuca idahoensis</i>	Idaho fescue
<i>Koeleria nitida</i>	prairie junegrass
<i>Oryzopsis hymenoides</i>	indian ricegrass
<i>Poa nevadensis</i>	Nevada bluegrass
<i>Poa sandbergii</i>	Sandberg bluegrass
<i>Sitanion hystrix</i>	bottlebrush squirreltail
<i>Stipa comata</i>	needle-and-threadgrass
<i>Stipa occidentalis</i>	western needlegrass
<i>Stipa thurberiana</i>	Thurber needlegrass

Herbaceous plants

Achillea millefolium	yarrow
Allium acuminatum	tapertip onion
Allium cernuum?	nodding onion
Allium geyeri	Geyer's onion
Allium simillimum	dwarf onion
Antennaria dimorpha	dwarf pussy-toes
Antennaria microphylla	rosy pussy-toes
Antennaria stenophyllus	narrow-leaf pussy-toes
Arabis holboellii	Holboell's rockcress
Arenaria franklinii	Franklin's sandwort
Arnica sororia	twin arnica
Aster scopulorum	lava aster
Astragalus atratus	mourning milkvetch
Astragalus filipes	basalt milkvetch
Astragalus purshii	Pursh milkvetch
Atriplex spinosa	spiny hopsage
Balsamorhiza sagittata	arrowleaf balsamroot
Calochortus macrocarpus	sagebrush mariposa
Calochortus nuttallii?	Nuttall's sego lily
Capsella bursa-pastoris	shepherd's purse
Castilleja angustifolia	northwest paintbrush
Castilleja chromosa	desert paintbrush
Castilleja inverta	dwarf pale paintbrush
Castilleja miniata	scarlet paintbrush
Chaenactis douglasii	Douglas' chaenactis
Cirsium utahense	Utah thistle
Collinsia parviflora	blue-eyed Mary
Comandra sp.	comandra
Cordylanthus sp.	birdbeak
Crepis acuminata	taper-tip hawksbeard
Cryptantha interrupta	bristly cryptantha
Cymopterus terebinthinus	desert parsley
Cystopteris fragilis	brittle bladder-fern
Delphinium andersonii	Anderson's larkspur
Descurainia sp.	tansymustard
Epilobium sp. (annual)	willow-herb
Erigeron compositus	fernleaf fleabane
Erigeron pumilus	shaggy fleabane
Eriogonum caespitosum	mat buckwheat
Eriogonum heracleoides	Wyeth's buckwheat
Eriogonum microthecum	slenderbrush buckwheat
Eriogonum ovalifolium	cushion buckwheat
Eriogonum umbellatum	sulfur buckwheat
Eriophyllum lanatum	Oregon sunshine
Erysimum sp.	wallflower
Eurotia lanata	winterfat
Fritillaria atropurpurea	checker-lily
Gayophytum decipiens	false groundsmoke
Geranium viscosissimum	sticky purple geranium
Haplopappus nanus	dwarf goldenweed
Haplopappus acaulis	stemless goldenweed
Haplopappus resinosus	Columbia goldenweed

Helianthella uniflora	one-flower helianthella
Hesperochiron sp.	hesperochiron
Lactuca serriola	lettuce
Lappula redowskii	western stickseed
Leptodactylon pungens	lava phlox
Lewisia rediviva	bitterroot
Lithophragma bulbifera	lithophragma
Lithospermum ruderales	stoneseed
Lomatium dissectum	fern-leaved lomatium
Lomatium triternatum	nine-leaf lomatium
Lupinus argenteus	silvery lupine
Lupinus caudatus?	tailcup lupine
Lygodesmia spinosa	thorn skeleton plant
Machaeranthera canescens	hoary aster
Mentzelia albicaulis	whitestemmed mentzelia
Mertensia oblongifolia	leafy bluebells
Microseris troximoides	false-agoseris
Mimulus nanus	dwarf monkeyflower
Mimulus suksdorfii	Suksdorf's monkeyflower
Navarretia breweri?	Brewer's navarretia
Oenothera caespitosa	desert evening primrose
Opuntia polyacantha	starvation prickly-pear
Oxytropis lagopus	rabbit-food crazyweed
Penstemon cyaneus	dark-blue penstemon
Penstemon deustus	hot-rock penstemon
Phacelia hastata	silverleaf phacelia
Phlox hoodii	Hood's phlox
Phlox longifolia	long-leaf phlox
Polygonum sp.	knotweed
Polystichum scopulinum	rock sword-fern
Potentilla glandulosa	sticky cinquefoil
Ranunculus testiculatus	hornseed buttercup
Sedum stenopetalum	stonecrop
Senecio canus	wooly groundsel
Senecio integerrimus	western groundsel
Stephanomeria tenuifolia	narrowleaved skeletonweed
Tragopogon dubius	yellow salsify
Viola nuttallii	valley yellow violet
Zigadenus venenosus	death camas

Scientific and common names for mammal, amphibian, and reptile species of known or probable occurrence within the recommended Great Rift National Natural Landmark of the central Snake River Plain, Idaho.

<i>Sorex merriami</i>	Merriam's shrew
<i>Sorex vagrans</i>	vagrant shrew
<i>Myotis lucifugus</i>	little brown myotis
<i>Myotis yumanensis</i>	Yuma myotis
<i>Myotis evotis</i>	long-eared myotis
<i>Myotis volans</i>	long-legged myotis
<i>Myotis californicus</i>	California myotis
<i>Myotis leibii</i>	small-footed myotis
<i>Lasionycteris noctivagans</i>	silver-haired bat
<i>Eptesicus fuscus</i>	big brown bat
<i>Lasiurus cinereus</i>	hoary bat
<i>Plectotus townsendii</i>	Townsend's big-eared bat
<i>Ochotona princeps</i>	pika
<i>Brachylagus idahoensis</i>	pygmy rabbit
<i>Sylvilagus nuttallii</i>	Nuttall's cottontail
<i>Lepus townsendii</i>	white-tailed jackrabbit
<i>Lepus californicus</i>	black-tailed jackrabbit
<i>Tamias minimus</i>	least chipmunk
<i>Marmota flaviventris</i>	yellow-bellied marmot
<i>Spermophilus townsendii</i>	Townsend's ground squirrel
<i>Thomomys talpoides</i>	northern pocket gopher
<i>Perognathus parvus</i>	Great Basin pocket mouse
<i>Dipodomys ordii</i>	Ord's kangaroo rat
<i>Reithrodontomys megalotis</i>	western harvest mouse
<i>Peromyscus maniculatus</i>	deer mouse
<i>Onychomys leucogaster</i>	northern grasshopper mouse
<i>Neotoma cinerea</i>	bushy-tailed woodrat
<i>Lemmys curtatus</i>	sagebrush vole
<i>Erethizon dorsatum</i>	porcupine
<i>Canis latrans</i>	coyote
<i>Vulpes vulpes</i>	red fox
<i>Mustela frenata</i>	long-tailed weasel
<i>Taxidea taxus</i>	badger
<i>Mephitis mephitis</i>	striped skunk
<i>Felis concolor</i>	mountain lion
<i>Felis rufus</i>	bobcat
<i>Odocoileus hemionus</i>	mule deer
<i>Antilocapra americana</i>	pronghorn
<i>Bufo boreas</i>	western toad
<i>Phrynosoma douglassii</i>	short-horned lizard
<i>Sceloporus graciosus</i>	sagebrush lizard
<i>Eumeces skiltonianus</i>	western skink
<i>Charina bottae</i>	rubber boa
<i>Coluber constrictor</i>	racer
<i>Pituophis melanoleucus</i>	gopher snake
<i>Crotalus viridis</i>	western rattlesnake

Scientific and common names for bird taxa of known or probable occurrence within the recommended Great Rift National Natural Landmark of the central Snake River Plain, Idaho. (B = breeds in Idaho; W = winters in Idaho; all others both breed and winter in Idaho.)

<i>Cathartes aura</i>	turkey vulture (B)
<i>Circus cyaneus</i>	northern harrier
<i>Accipiter striatus</i>	sharp-shinned hawk
<i>Accipiter cooperi</i>	Cooper's hawk
<i>Accipiter gentilis</i>	northern goshawk
<i>Buteo jamaicensis</i>	red-tailed hawk
<i>Buteo swainsoni</i>	Swainson's hawk (B)
<i>Aquila chrysaetos</i>	golden eagle
<i>Falco sparverius</i>	American kestrel
<i>Falco mexicanus</i>	prairie falcon
<i>Perdix perdix</i>	gray partridge
<i>Dendragapus obscurus</i>	blue grouse
<i>Centrocercus urophasianus</i>	sage grouse
<i>Columba livia</i>	rock dove
<i>Zenaida macroura</i>	mourning dove
<i>Bubo virginianus</i>	great-horned owl
<i>Athene cunicularia</i>	burrowing owl (B)
<i>Asio otus</i>	long-eared owl
<i>Asio flammeus</i>	short-eared owl
<i>Aegolius acadicus</i>	northern saw-whet owl
<i>Chordeiles minor</i>	common nighthawk (B)
<i>Phalaenoptilus nuttallii</i>	common poorwill (B)
<i>Melanerpes lewis</i>	Lewis' woodpecker (B)
<i>Picoides villosus</i>	hairy woodpecker
<i>Sphyrapicus nuchalis</i>	red-naped sapsucker (B)
<i>Colaptes auratus</i>	northern flicker
<i>Contopus borealis</i>	olive-sided flycatcher (B)
<i>Contopus sordidulus</i>	western wood-pewee (B)
<i>Empidonax oberholseri</i>	dusky flycatcher (B)
<i>Sayornis saya</i>	Say's phoebe
<i>Tyrannus verticalis</i>	western kingbird (B)
<i>Eremophila alpestris</i>	horned lark
<i>Tachycineta thalassina</i>	violet-green swallow (B)
<i>Pica pica</i>	black-billed magpie
<i>Corvus brachyrhynchos</i>	American crow
<i>Corvus corax</i>	common raven
<i>Parus atricapillus</i>	black-capped chickadee
<i>Parus gambeli</i>	mountain chickadee
<i>Sitta canadensis</i>	red-breasted nuthatch
<i>Sitta carolinensis</i>	white-breasted nuthatch
<i>Sitta pygmaea</i>	pygmy nuthatch
<i>Certhia americana</i>	brown creeper
<i>Salpinctes obsoletus</i>	rock wren (B)
<i>Troglodytes aedon</i>	house wren (B)
<i>Troglodytes troglodytes</i>	winter wren
<i>Regulus satrapa</i>	golden-crowned kinglet
<i>Regulus calendula</i>	ruby-crowned kinglet

Sialia currucoides
Myadestes townsendii
Turdus migratorius
Oreoscoptes montanus
Bombycilla garrulus
Bombycilla cedrorum
Lanius excubitor
Sturnus vulgaris
Vireo gilvus
Piranga ludoviciana
Pheucticus melanocephalus
Passerina amoena
Pipilo chlorurus
Pipilo erythrophthalmus
Spizella passerina
Spizella breweri
Poocetes gramineus
Chondestes grammacus
Amphispiza bilineata
Amphiapiza belli
Passerella iliaca
Melospiza melodia
Zonotrichia leucophrys
Junco hyemalis
Sturnella neglecta
Euphagus cyanocephalus
Pinicola enucleator
Carpodacus cassinii
Carpodacus mexicanus
Carduelis pinus
Carduelis tristis
Coccothraustes vespertinus
Passer domesticus

mountain bluebird
Townsend's solitaire
robin
sage thrasher (B)
Bohemian waxwing (W)
cedar waxwing
northern shrike (W)
European starling
warbling vireo (B)
western tanager (B)
black-headed grosbeak (B)
lazuli bunting (B)
green-tailed towhee (B)
rufous-sided towhee
chipping sparrow (B)
Brewer's sparrow (B)
vesper sparrow (B)
lark sparrow (B)
black-throated sparrow (B)
sage sparrow (B)
fox sparrow (B)
song sparrow
white-crowned sparrow
dark-eyed junco
western meadowlark
Brewer's blackbird
pine grosbeak
Cassin's finch
house finch
pine siskin
American goldfinch
evening grosbeak
house sparrow