



Photo: Wally Pacholka

IDSP Application

Submitted to
International Dark-Sky Association
January 23, 2017

Craters of the Moon National Monument

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Foreword

This application for silver-tier International Dark Sky Park (IDSP) designation is being made for Craters of the Moon National Monument¹ in recognition of the exceptional natural resource formed by our dark skies above and, as a National Park Service unit, to further our work with the Natural Sounds and Night Skies Division to help protect the "cherished treasure," the "awe-inspiring night skies."



[Natural darkness is] . . . inspirational to the visitors who come to national parks, vital to the protection of wilderness character, fundamental to the historical and cultural context, and critical for park wildlife.²

The application represents a collaborative undertaking involving a full range of resources: as Superintendent, I organized the initial discussion for the accreditation effort and have attempted to keep the effort focused and to-the-point. Aiding this effort have been a highly effective Centennial Volunteer Ambassador, a number of our excellent ranger staff, talented members of the long-standing Craters of the Moon Natural History Association, a well-located Northern Utah chapter of the IDA, and the newly formed Committee for Dark Sky Studies at the University of Utah. Together we are responsible for this document and are pleased to submit it to the Board of Directors of the International Dark-Sky Association.

Wade Vagias, Superintendent
Craters of the Moon National Monument and Preserve
January 2017

¹ includes neither the National Preserve nor the BLM-managed portion of the National Monument (see Introduction, following, for details and map).

² NPS Natural Sounds and Night Skies Division

Introduction

The only National Park Service (NPS) unit named for a celestial body and one of the few used in training this nation's astronauts,³ Craters of the Moon National Monument (CRMO) can be considered, with its distinctive features and history, a meditation on cosmos, sky, earth, and exploration of the unfamiliar.



Photo: NPS

Robert Limbert⁴ in 1924 called it "a place of color and silence...." Almost one hundred years later, we can assert that it is also a place of exceptional darkness with the majestic sweep of the Milky Way regularly evident over the serene, lava-flow landscape (termed, under the Presidential Proclamation of Calvin Coolidge in 1924, "a weird and scenic landscape peculiar to itself").

³ Apollo 14 crew members Alan Shepard, Edgar Mitchel, Joe Engle, and Eugene Cernan prepared in August 1969 for future trips to the moon by studying and exploring at CRMO.

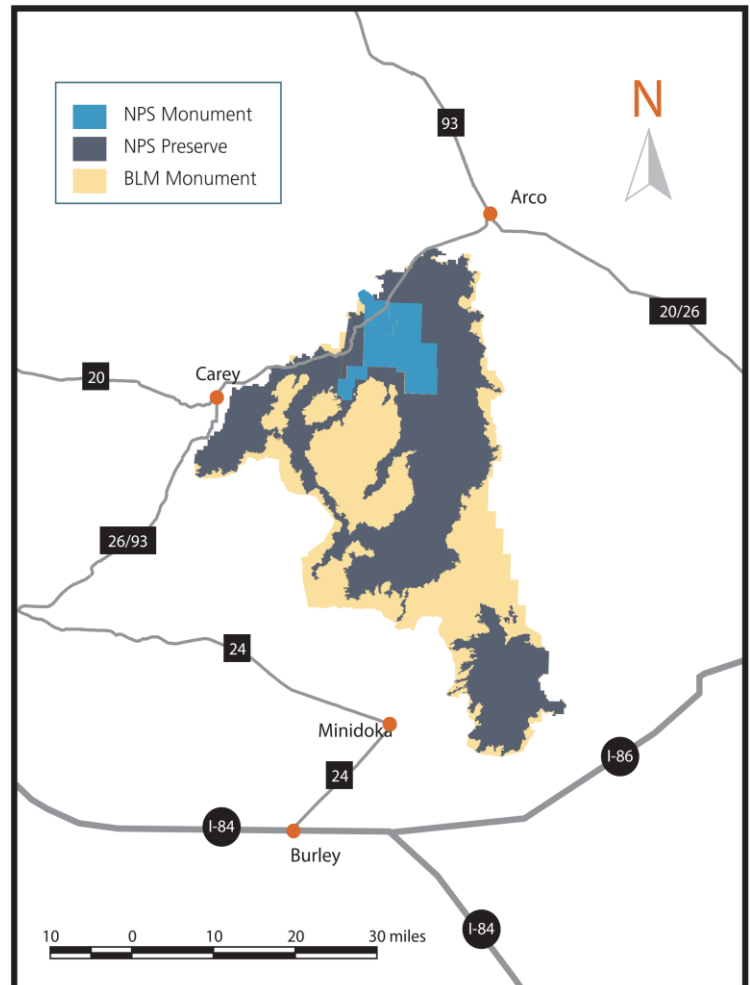
⁴ whose earlier explorations and writing about the CRMO area (especially in *National Geographic magazine*) led to designation as a national monument

The NPS-managed⁵ portion of the Craters of the Moon National Monument is the subject of this accreditation application. Neither the BLM-managed portion of the National Monument nor the NPS-managed Preserve (both designated by President Clinton in 2000) is included in the present application.

The BLM-managed portion allows both hunting and grazing; the NPS-managed Preserve allows hunting. Neither portion has more than occasional public use given the substantial access challenges: very few primitive roads requiring high-clearance vehicles, exceptionally durable tires, and fire-suppression equipment. The off-road lava beds in these portions are razor-sharp. Because of the lack of human presence and because virtually all impact is external, there is no immediate plan to implement any infrastructure.

It is the intention of CRMO management to work toward a later accreditation of these portions as the dark sky identity of CRMO deepens with:

- ▶ the significant dark sky education opportunities available,
- ▶ continued growth in visitorship, and
- ▶ partnership with the City of Ketchum in its application for recognition as a Dark Sky Community.



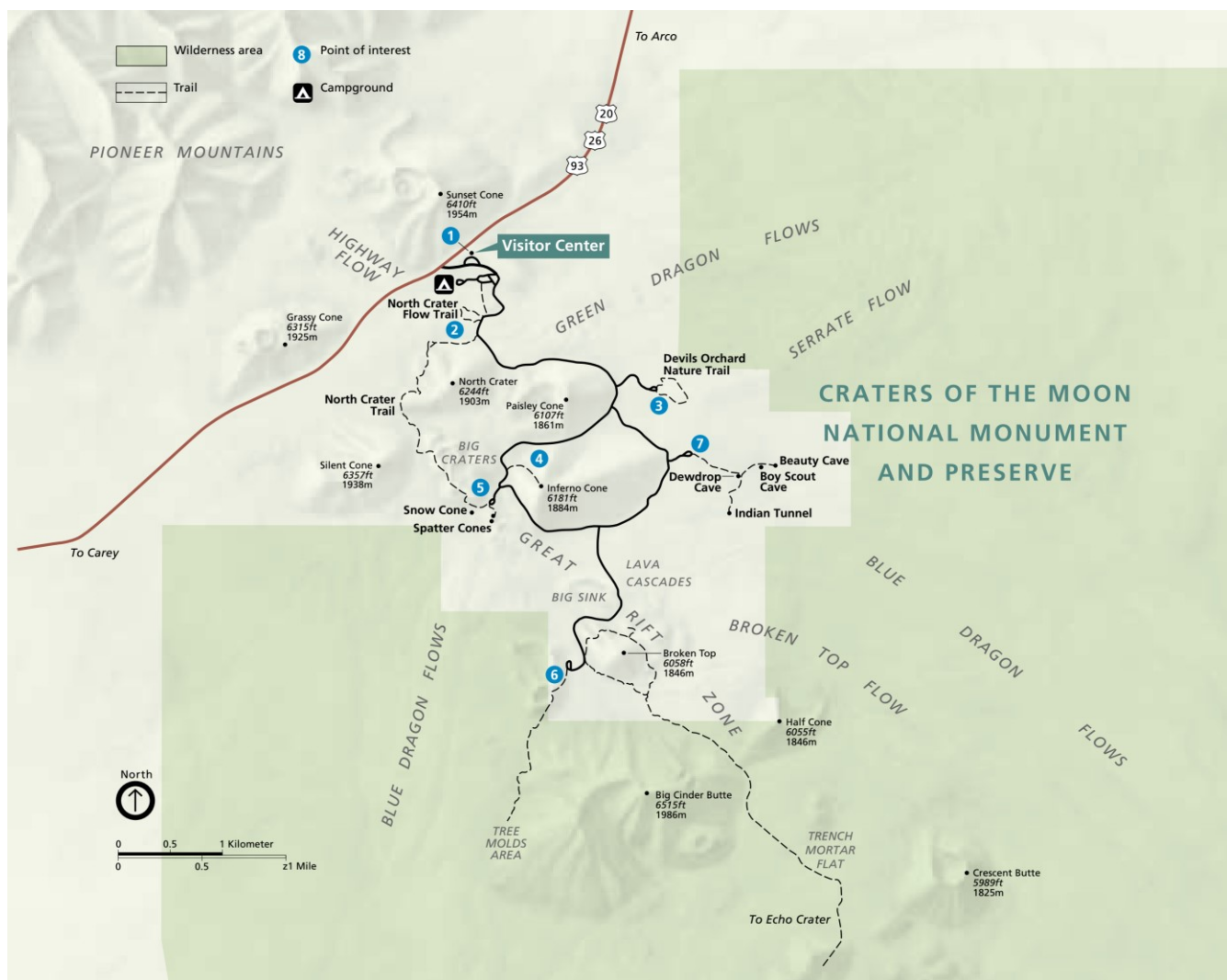
Map of Craters of the Moon National Monument and Preserve. Map shows the various park boundaries and their management. The bright blue area on the map is the NPS-managed National Monument.

⁵ originally designated as a National Monument by President Calvin Coolidge with a sub-portion protected as Wilderness in the 1970s

Section 1: Basics

Location

CRMO⁶ is located 18 miles southwest of Arco, Idaho⁷ on US 20/26/93 in the high desert (sometimes termed the Snake River Plain and described as sagebrush-steppe habitat) of Eastern Idaho. It is proximate to two interstates, I-15 and I-84, and is en route from Northern California to Yellowstone and the Grand Teton National Parks.



Map of the Loop Road through Craters of the Moon National Monument and points of interest

Map: NPS

⁶ Craters of the Moon National Monument's shorthand reference assigned by the NPS

⁷ home of Idaho National Laboratory and its nuclear energy research activities

History

The first reports of the area came from trappers and explorers⁸ who mostly tried to avoid the harsh and unusual lava fields. They reported seeing grizzlies and big horned sheep in a windy, barren, waterless landscape. The Bannock and Shoshone peoples left archeological evidence of their summer migrations across the lava flows to the rich Camas Prairie on the other side, but there is no evidence of any settlements. The fur trappers and traders followed the route these Native Americans took through the lava flows. These two groups left well-worn trails.

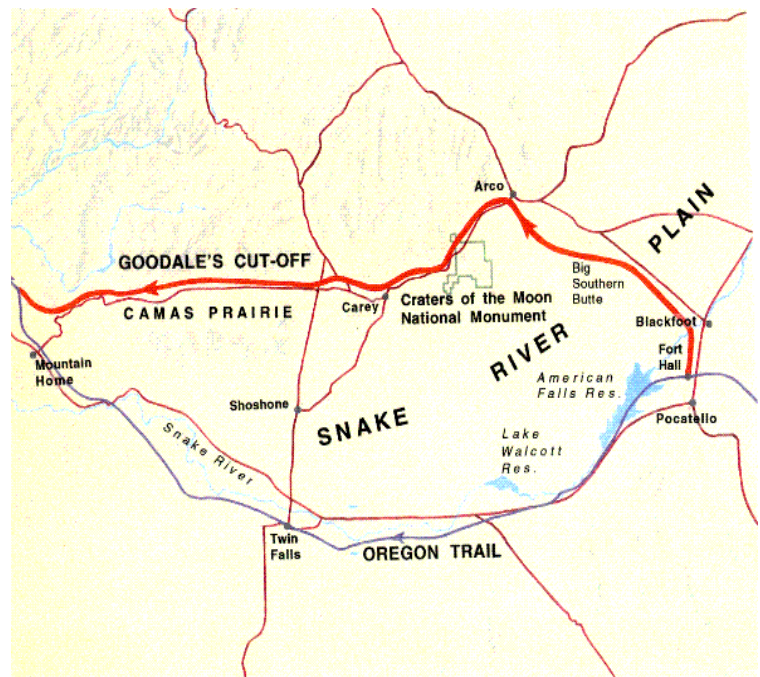
Pioneers on the Oregon Trail needed an alternate route along the Snake River because of conflict with Shoshone-Bannock warriors who were wary of emigrants settling in their hunting, fishing, and gathering grounds.⁹ So in 1862, when gold was discovered on the Salmon river, a large group of pioneers¹⁰ commissioned Tim Goodale, a trapper-trader familiar with the route across the lava fields, to guide them on an alternate route through the Snake River Plain.

Passing through the territory safely, the pioneers gave Goodale and his route credit for their safe passage. Used through the 1850s and 1860s, this piece of the Oregon Trail became known as the Goodale Cut-off. But like the Shoshoni and the



Rock rings found along a migration route

Photo: NPS



Map of two pioneer migration routes. The Oregon Trail, purple, follows the Snake River and goes around the southern end of lava flows. Goodale's Cut-off, red, goes north and cuts through the north end of the Monument. Map: NPS

⁸ B.L.E. Bonneville wrote about visiting the lava fields in his diaries in the 19th century. Washington Irving later used Bonneville's diaries to write the *Adventures of Captain Bonneville*, Louter, D. (1995). Craters of the Moon National Monument: Historic Context Statements. Seattle, WA: National Park Service.

⁹ Shoshone-Bannock warriors clashed with pioneers along the Snake River at Massacre Rocks killing 10 emigrants. Ramacher, Lennie, *Oregon Trail & Goodale's Cut-off*

¹⁰ Numbering 1,095

trappers, these settlers were just passing through to reach more friendly landscapes on the other side. The interior of the lava fields remained a formidable mystery.

In the early 1900s more intentional exploration included two Arco cattlemen, Arthur Ferris and J.W. Powell, who explored the lava fields searching for a good water source for their cattle and found none. In 1901 and 1903 federal geologist, Israel Russell explored the area for the U.S. Geological Survey, in 1910 Samuel Paisley continued his work.

In 1921 Robert Limbert, a local taxidermist and furrier, took the first recorded trek across the entirety of the Great Rift from south to north. As Limbert's articles and lectures about this trek became publicized, his promotion of the area for preservation was heard by the Department of the Interior. In 1923 they sent geologists Howard Stearns and O.E. Meinzer to provide scientific support for Limbert's fantastical claims about the landscape. In the end, Stearns recommended preserving the valuable geology and archeology of the area.



Robert Limbert's trek across the lava beds

Photo: *National Geographic* magazine

In 1924 *National Geographic*¹¹ magazine published an article written by Robert Limbert, including many photographs he had taken, documenting his multiple excursions into the lava beds. In the *National Geographic* article Limbert quoted Stearns, saying the lava beds resembled the “craters of the moon,”¹² and the phrase took hold. Stearns’ recommendation and the details and photographs in Limbert’s popular article provided enough impetus for President Calvin Coolidge to designate Craters of the Moon National Monument on May 2, 1924.¹³

Even though the volcanic features of Craters of the Moon National Monument don’t actually resemble the craters on the moon (which likely result from meteorite impacts rather than volcanic activity), in 1969 National Aeronautics and Space Administration (NASA) sent astronauts, Alan Shepard, Edgar Mitchell, Eugene Cernan, and Joe Engle to CRMO. The purpose of this excursion was to study methods of lava rock sampling in preparation for NASA’s second



Astronauts at Craters of the Moon with geologist guides, 1969

Photo: NASA

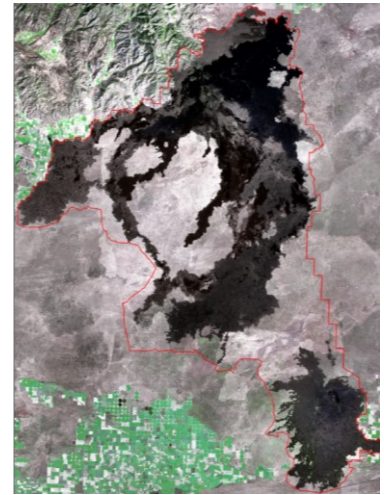
¹¹ Limbert, R. W., “Among the Craters of the Moon, An Account of the First Expeditions Through the Remarkable Lava Bed of Southern Idaho” *National Geographic* magazine, 1924, <https://www.nps.gov/crmo/learn/historyculture/upload/Natgeo%20article%20for%20web.pdf>

¹² In Stearns’ recommendation to the NPS, he wrote “the dark craters and the cold lava, nearly destitute of vegetation” are similar to “the surface of the moon as seen through a telescope.” U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 9

¹³ Presidential Proclamation #1694, 43 Statute 1947, 68th Congress, May 2, 1924

visit to the moon. On Mars, scientists have observed basalts and volcanic features such as rifts, cinder cones, and pit craters similar to CRMO.¹⁴ For this and other reasons NASA continues to study and explore this landscape.

As understanding of the geological history of the Monument grew, so did the desire to preserve lands surrounding the original monument. The first boundary expansions were to protect water sources along Little Cottonwood Creek needed to service the park, but 1970 and 2000 marked major expansions.¹⁵ Managed jointly by the NPS and the BLM the Craters of the Moon National Monument and Preserve now includes a designated wilderness area and encompasses the entire Great Rift Volcanic Rift Zone.¹⁶

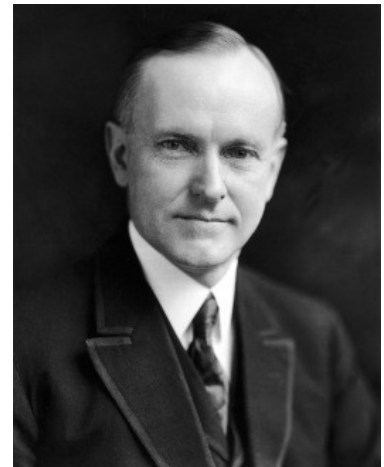


Satellite image with boundary: USGS

When President Calvin Coolidge signed the proclamation designating Craters of the Moon a National Monument on May 2nd, 1924,¹⁷ he preserved:

- ▶ geological wonders of relatively young lava features along the Great Rift
- ▶ biologically pristine plants growing in kipukas, meadows fenced in by the young lava flows
- ▶ a piece of the Bannock-Shoshone peoples' migratory history, and an alternate piece of the Oregon Trail known as the Goodale Cut-off

He was probably apprised of only a small portion of the scientific and educational value of preserving these historic wonders, but he most certainly couldn't have predicted the value of preserving the wonderful darkness of this remote monument's skies.



<http://decadeproject1920.weebly.com/calvin-coolidge.htm>

¹⁴ University of Montana, NASA, Idaho National Laboratory, NPS, U.S. Department of the Interior, "Craters of the Moon, Connections to the Moon, Mars, and Beyond"

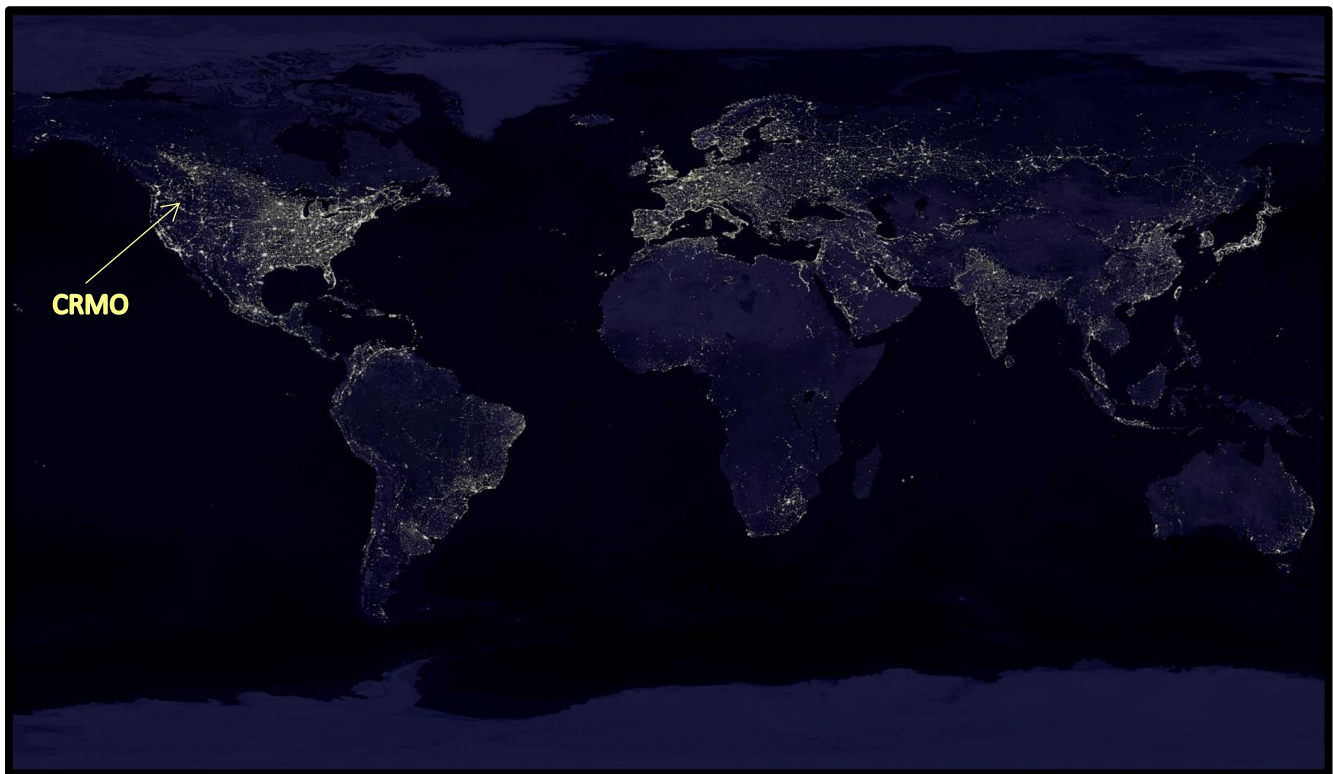
¹⁵ In 1970 Craters of the Moon Wilderness Area was added to CRMO, the first of its kind to be protected by the Department of the Interior; Presidential Proclamation 7373 in 2000 expanded the existing boundary from 53,571 acres to approximately 465,000 acres of NPS-managed land (with 273,488 acres administered by the Bureau of Land Management under the National Landscape Conservation System); in 2002 CRMO became the 750,000 acres of Craters of the Moon National Monument and Preserve. Louter, David, Craters of the Moon Administrative History, 1992, pp. 30-54; U.S. Department of the Interior, Craters of the Moon, A Guide, pp. 7-8.

¹⁶ A series of parallel cracks in the Earth's crust, fissures in the larger volcanic region known as the Snake River Plain, including Craters of the Moon, Wapi, and Kings Bowl lava fields, U.S. Department of the Interior, Craters of the Moon, A Guide, p. 13

¹⁷ Presidential Proclamation #1694, 43 Statute 1947, 68th Congress, May 2, 1924

Eligibility

- ▶ Public Land: CRMO is one of two National Monuments in Idaho (the other is Hagerman Fossil Beds NM)
- ▶ Acreage: 53,420¹⁸
- ▶ Visitorship: exceeded 247,000 in 2015
- ▶ Quality of the Dark Sky Resource: average SQM readings of 21.42
- ▶ Nomination by IDA-affiliated entity: Ogden Valley Chapter IDA
- ▶ Access: The Monument is open every day of the year, 24 hours a day. Winter snows usually prevent automobile access around the Loop Road from mid-November through mid-March. Visitors are able to access the Monument by cross-country skiing and snowshoeing in the winter. Camping in the Monument is available year-round.



Craters of the Moon is home to some of the darkest night skies remaining in the continental United States

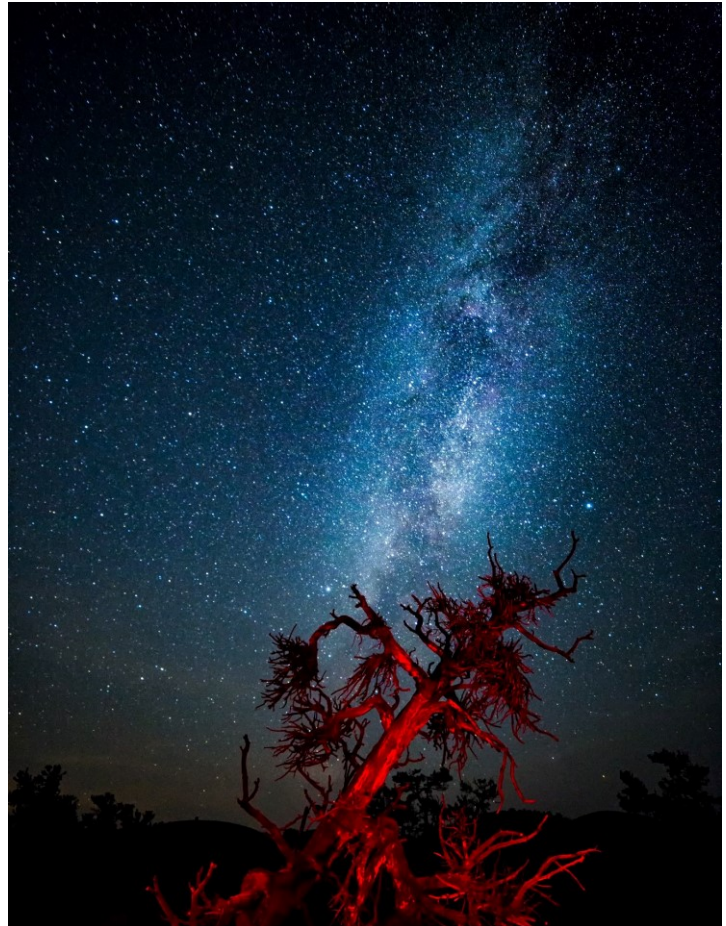
Photo: NASA

¹⁸ There are no private inholdings within the NPS Monument

Support Overview

Letters of support have been received from the following organizations and are found in the Appendices.

- ▶ BLM (Shoshone office)
- ▶ Blaine County Commissioners
- ▶ Butte County Commissioners
- ▶ Change the Name Coalition
- ▶ City of Ketchum
- ▶ Craters of the Moon Natural History Association
- ▶ Idaho Conservation League
- ▶ Idaho Falls Astronomical Society
- ▶ Lost Rivers Chamber of Commerce



Milky Way above a weathered pine in CRMO

Photo: Fred Melikian

Section 2: Night Sky Resource

Previous National Park Measurements

For this silver-tier application, synthetic SQM readings are submitted for 2004, 2008, 2009 with actual SQM readings for 2016.

2004-2009 NPS Night Sky Quality Report Results¹⁹

Synthetic SQM	Inferno Cone	Mean All-Sky
2009	21.66	21.37
2008	21.72	21.63
2004	21.56	21.37

Baseline Ground Readings 2016

65 samples were taken October 23, 2016 under a clear sky soon after darkness at 8:06 p.m. due to a forecast window for clear skies for no more than two hours. Because inclement weather had been forecast for the weekend of October 28-30 and teams from both Weber State University and Boise State University were lost, the Committee for Dark Sky Studies mustered a skeletal team that proved to be sufficient given the small public area of the National Monument.

One dimensional statistics for the remarkably consistent results:

Mean	21.42
Median	21.43
Mode	21.43
Sigma	0.08
Darkest	21.52
Brightest	21.18

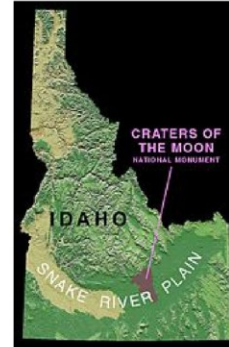
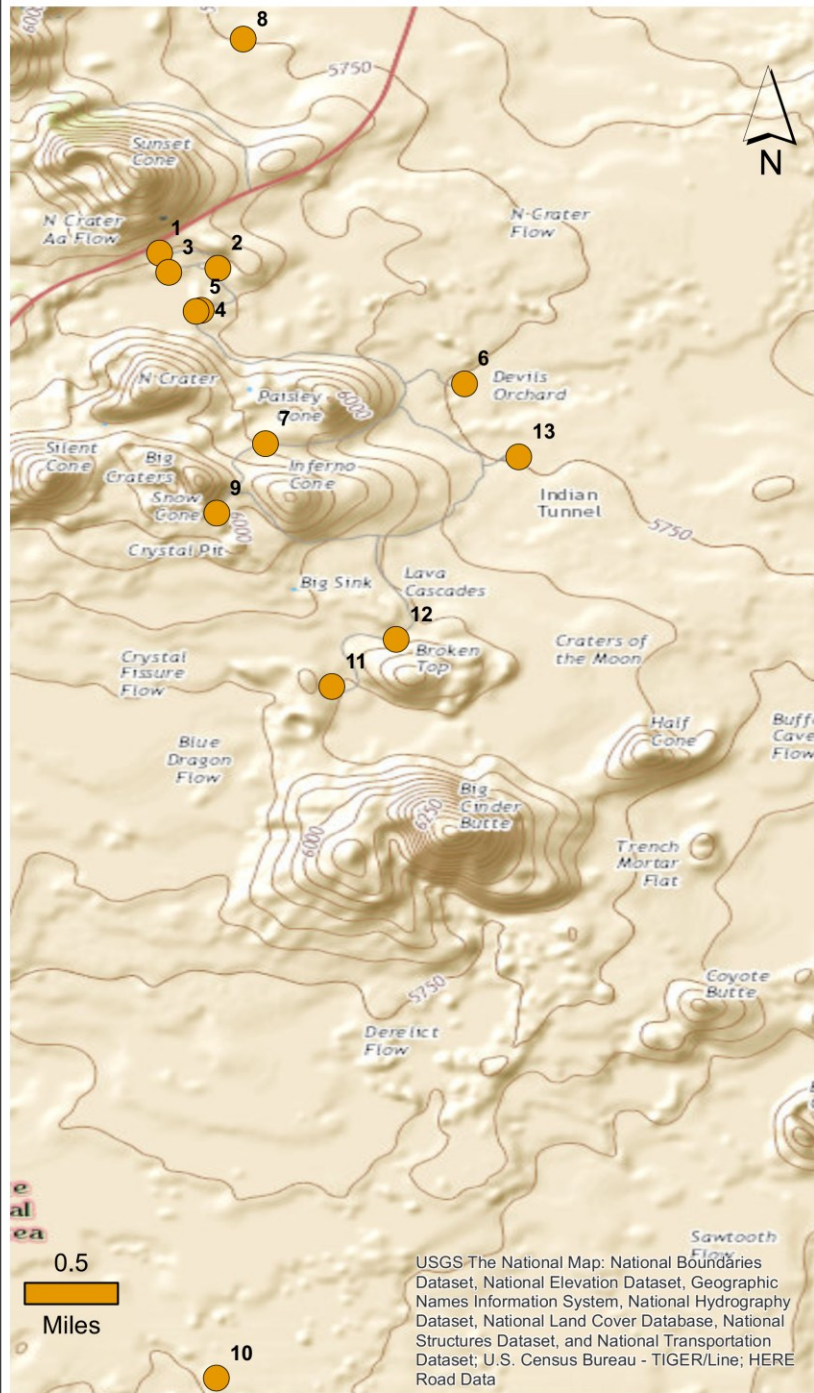
¹⁹ NPS Night Sky Quality Reports: www.sierranights.com [CRMO]

Baseline Night Sky Readings

Craters of the Moon NM		Unihedron Sky Quality Measurements					
		Date: October 23, 2016 [less than 10% cloud cover]					
Location	GPS Coordinates	SQM _{AVG}	SQM ₁	SQM ₂	SQM ₃	SQM ₄	SQM ₅
1 Visitor Center Front	N 43° 27.710 W -113° 33.724	21.21	21.18	21.20	21.22	21.23	21.24
2 Campground Entrance (by food storage)	N 43° 27.641 W -113° 33.452	21.37	21.33	21.38	21.38	21.39	21.38
3 Campground Site #25	N 43° 27.621 W -113° 33.680	21.42	21.43	21.43	21.40	21.41	21.44
4 North Crater Flow TH (parking lot)	N 43° 27.445 W -113° 33.529	21.41	21.40	21.42	21.42	21.38	21.41
5 50 ft onto North Crater Flow TRL	N 43° 27.440 W -113° 33.554	21.44	21.46	21.45	21.43	21.43	21.43
6 Picnic Area (after Devils Orchard TRL)	N 43° 27.104 W -113° 32.306	21.39	21.33	21.39	21.37	21.43	21.42
7 Cinder Garden Interpretive Sign	N 43° 26.825 W -113° 33.230	21.44	21.37	21.48	21.44	21.45	21.45
8 Inferno Cone Viewpoint	N 43° 28.705 W -113° 33.334	21.44	21.31	21.44	21.49	21.49	21.46
9 Spatter Cones/Big Craters (parking lot)	N 43° 26.502 W -113° 33.457	21.46	21.44	21.46	21.48	21.47	21.47
10 50 ft onto Spatter Cones TRL	N 43° 22.485 W -113° 33.459	21.42	21.32	21.40	21.44	21.48	21.47
11 Restroom near Tree Molds TH	N 43° 25.697 W -113° 32.922	21.49	21.42	21.51	21.52	21.51	21.51
12 Picnic Area (after Tree Molds TH)	N 43° 25.916 W -113° 32.623	21.46	21.41	21.46	21.45	21.50	21.48
13 Cave Area (parking lot)	N 43° 26.765 W -113° 32.053	21.45	21.36	21.48	21.45	21.45	21.51
Craters of the Moon NM	(65 Samples) SQM_{AVG}	21.42	The Committee for Dark Sky Studies				

Table: SQM measurements collected at CRMO on October 23rd, 2016. Measurements were taken at 13 locations within the Monument, with 5 readings collected at each location. On the night of the sampling, there was less than 10% cloud cover. Across the 65 samples taken, an average of 21.42 SQM was measured.

Craters of the Moon NM Unihedron Sky Quality Measurements



Average SQM measurements

1, 21.21	8, 21.44
2, 21.37	9, 21.46
3, 21.42	10, 21.42
4, 21.41	11, 21.49
5, 21.44	12, 21.46
6, 21.39	13, 21.45
7, 21.44	

Locations

- 1, Visitor Center Front
- 2, Campground Entrance
- 3, Campground Site #25
- 4, North Crater Flow TH (parking lot)
- 5, 50 ft onto North Crater Flow TRL
- 6, Picnic Area (after Devils Orchard TRL)
- 7, Cinder Garden Interpretive Sign
- 8, Inferno Cone Viewpoint
- 9, Spatter Cones/Big Craters (parking lot)
- 10, 50 ft onto Spatter Cones TRL
- 11, Restroom near Tree Molds TH
- 12, Picnic Area (after Tree Molds TH)
- 13, Cave Area (parking lot)

USGS The National Map: National Boundaries Dataset, National Elevation Dataset, Geographic Names Information System, National Hydrography Dataset, National Land Cover Database, National Structures Dataset, and National Transportation Dataset; U.S. Census Bureau - TIGER/Line; HERE Road Data

Map prepared by Justin Samuels

Map showing unihedron sky quality measurements for the 13 major CRMO locations

Map: Justin Samuels

Comparison to other Silver IDSPs/IDSRs

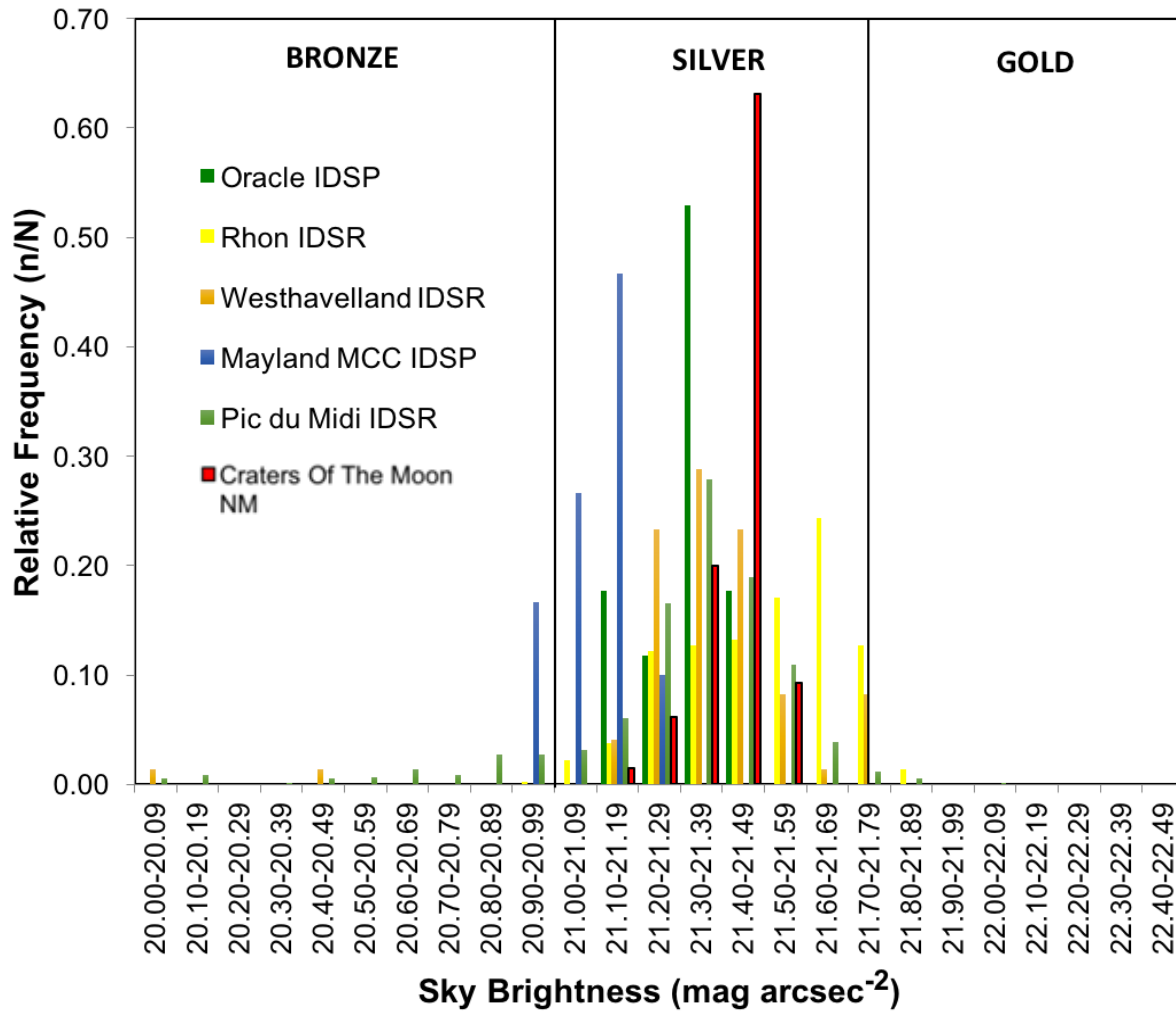


Figure: Comparison to other Silver International Dark Sky Parks/Dark Sky Reserves. Sky Brightness is measured in mag arcsec⁻² and Relative Frequency is measured in n/N. Measurements for Craters of the Moon National Monument are shown on the graph in red.

Comparison to other Gold IDSPs/IDSRs

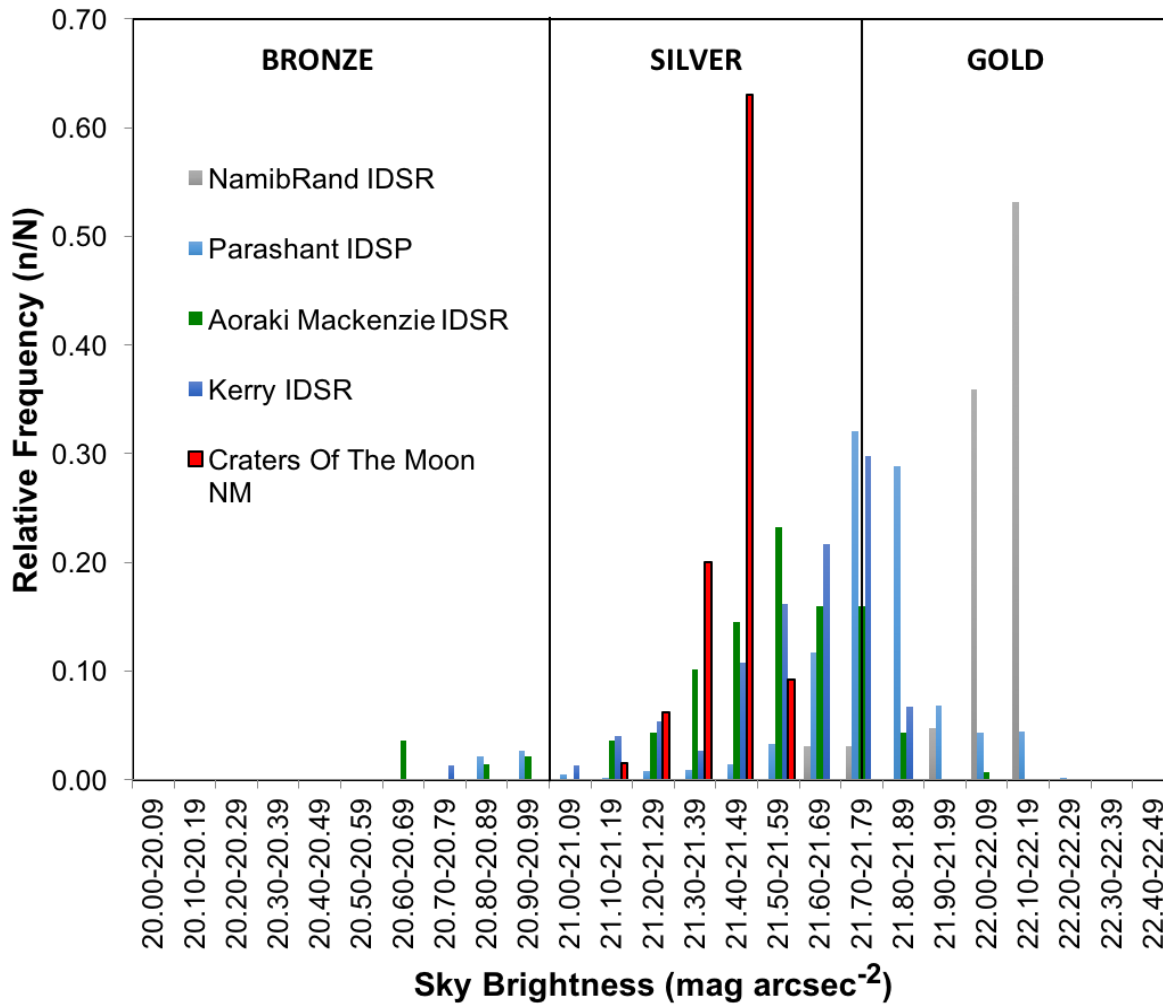


Figure: Comparison to other Gold International Dark Sky Parks/Dark Sky Reserves. Sky Brightness is measured in mag arcsec⁻² and Relative Frequency is measured in n/N. Measurements for Craters of the Moon National Monument are shown on the graph in red.

Zenith Luminance Measurements

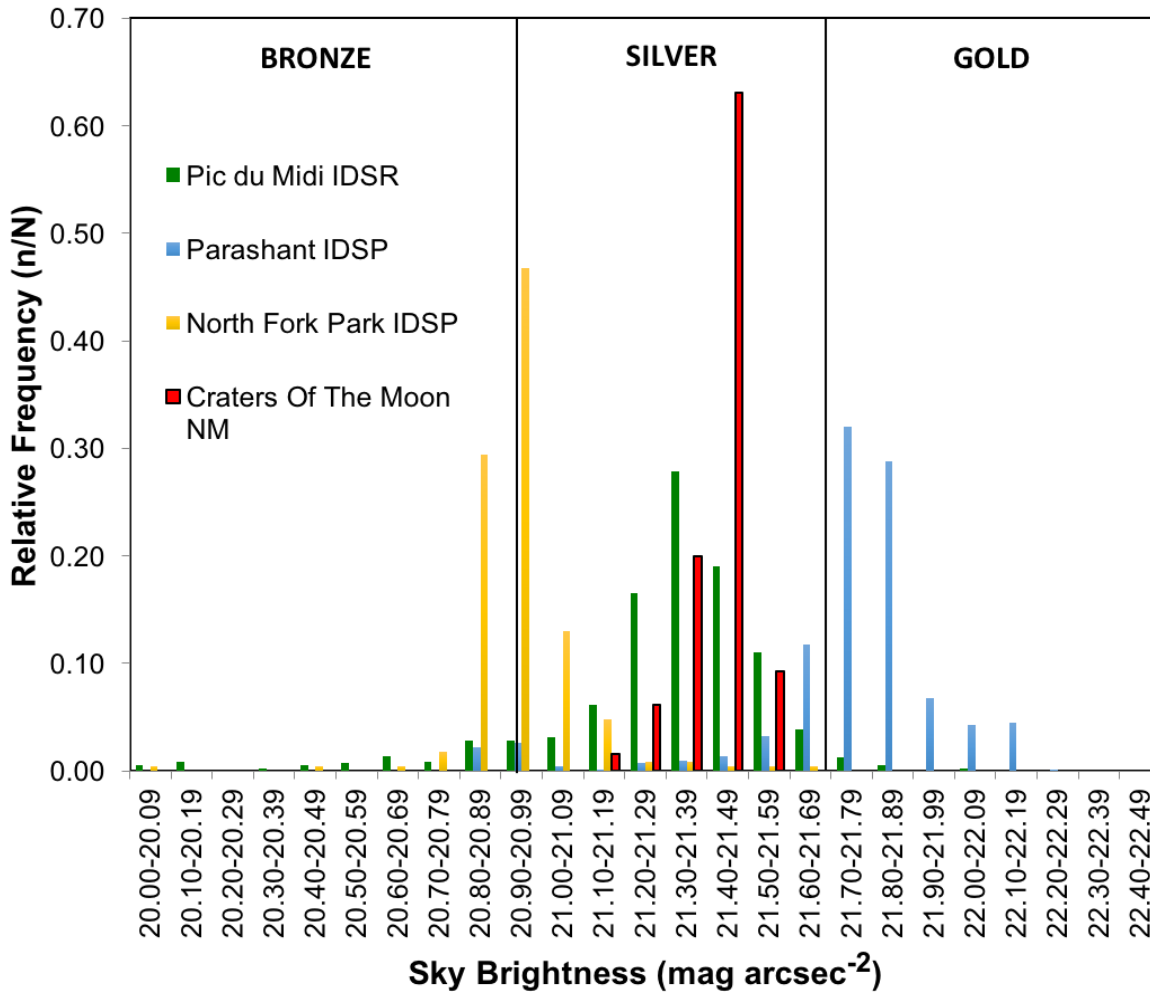
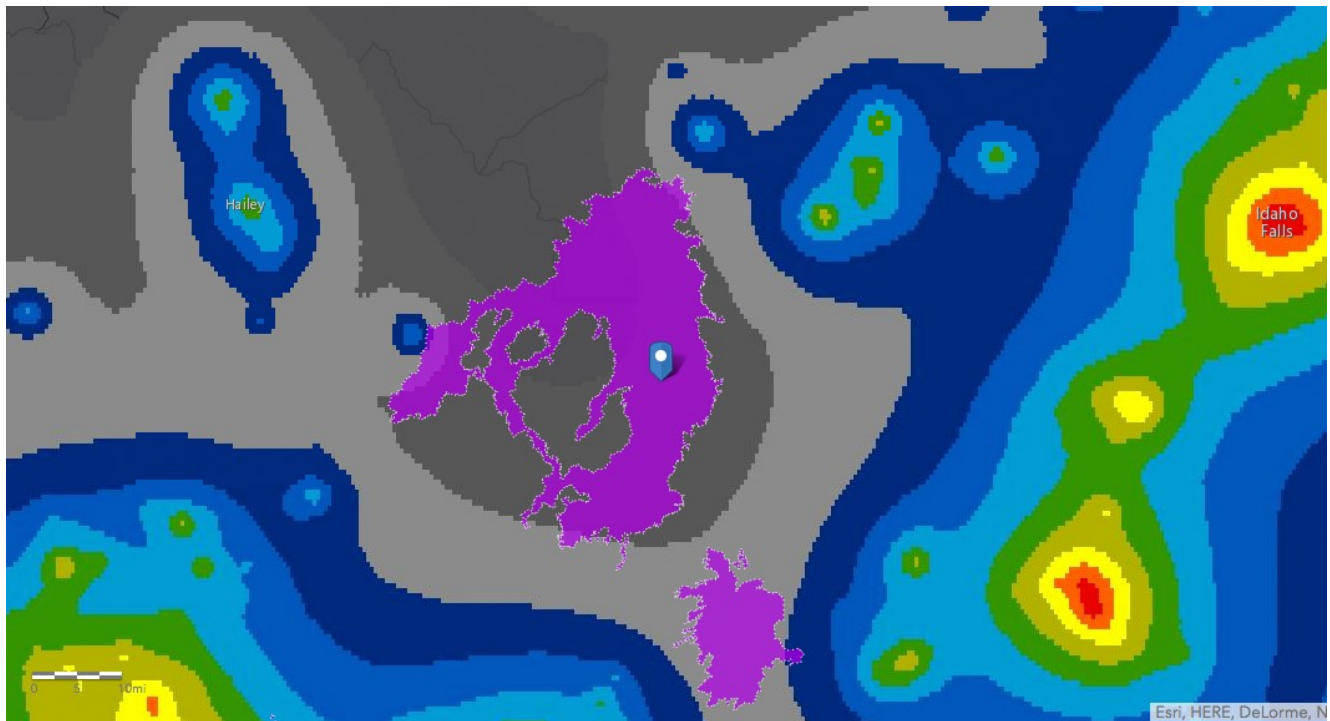


Figure: Zenith Luminance Measurements. Sky Brightness is measured in mag arcsec⁻² and Relative Frequency is measured in n/N. Measurements for Craters of the Moon National Monument are shown on the graph in red

World Atlas of Artificial Night Sky Brightness

Craters of the Moon NM is the darkest gray level of the map, indicating less than 5% artificial light at the zenith.



Map: Colors correspond to ratios between the artificial sky brightness and the natural sky brightness of: <math>< 0.11</math> (black), 0.11-0.33 (blue), 0.33-1 (green), 1-3 (yellow), 3-9 (orange), >9 (red), CRMO (purple).

Night Sky Quality Measurement Program

A measurement program will be executed by park staff on a yearly basis in the same locations around the park as the initial measurements in order to evaluate the evolution of light pollution and ensure the night sky quality does not degrade.



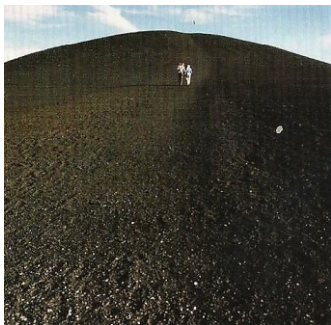
Sky Quality Meter

Section 3: Other Natural Resources

Geological

Craters of the Moon is the largest of three lava fields,²⁰ belonging to the Great Rift Volcanic Rift Zone,²¹ a series of fissures in the greater volcanic region known as the Snake River Plain. The geological heat source causing land features in Yellowstone National Park was once the source of volcanic eruptions that created the calderas making up the Snake River Plain. These eruptions, while preceding any activity at Craters of the Moon by millions of years, created a thinner crust that allowed for the formation of the Great Rift 15,000 years ago.²²

Craters of the Moon National Monument's lava fields are geologically significant because they are some of the youngest lava fields in the contiguous United States²³ and contain some of the largest and best examples of basaltic volcanism in the world. At CRMO one can see excellent examples of volcanic features such as cinder cones, spatter cones, lava tubes, lava caves, and various types of lava flows.²⁴

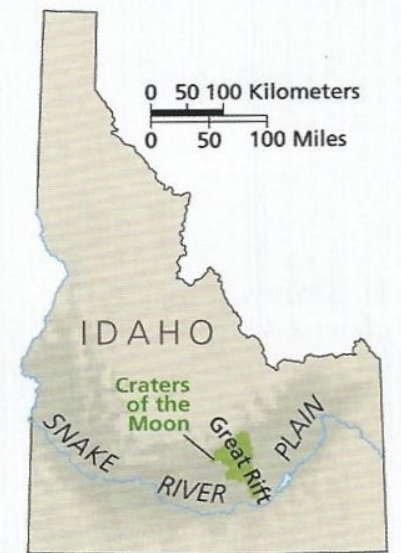


Cinder Cone Photo: Dave Clark



Spatter Cone Photo: Dave Clark

Scientists believe the lava features at CRMO are the results of multiple eruptions happening about every 2,000 years between 15,000 and 2,000 years ago. The area's geologic record suggests that future eruptions will begin along the central portion of the Great Rift in the Craters of the Moon Lava Field within the next 1000 years.²⁵



The Eastern Snake River Plain marks the path of the North American crustal plate as it moved over a heat source called the Yellowstone Hot Spot. It is believed that the heat source fueling Yellowstone's thermal features today is essentially the same one that produced volcanic episodes from the Oregon/Nevada/Idaho boundary to Yellowstone National Park.

²⁰ CRMO NM and Preserve encompasses two smaller lava fields, Wapi and Kings Bowl lava fields

²¹ A 52-mile long volcanic fissure and the surrounding lava

²² Scientists expect Yellowstone NP's landscape to resemble CRMO's in the future

²³ Active lava flows can be found in Hawaii and Iceland.

²⁴ U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 13

²⁵ U.S. Department of the Interior, *Craters of the Moon, Geology*

Biological

The environment at CRMO includes breeze-to-gale winds, scant soils, low levels of precipitation²⁶, inability of the porous cinder to hold rainwater near the surface, and ground temperatures of over 150°. Yet, living with these harsh conditions, scientists have identified more than 800 plants, 2,000 insects, 10 reptiles, over 200 birds, 59 mammals, and 4 amphibians within the park.²⁷

For animals living in Craters of the Moon, adapting to the harsh environment often means changing periods of activity. Most desert animals are nocturnal (an adaptation to hot summer daytime temperatures). Nocturnal animals at Craters of the Moon include woodrats (packrats), skunks, foxes, bobcats, mountain lions, bats, nighthawks, owls. Animals that are most active at dawn and dusk (crepuscular) include mule deer, porcupines, mountain cottontails, jackrabbits, and many songbirds. Diurnal animals include ground squirrels, marmots, chipmunks, lizards, snakes, hawks, and eagles. Some animals, like ground squirrels and marmots, have one or more periods of estivation (summer hibernation).²⁸

Migration allows some animals to come, feed, and move on when conditions are more extreme. The northern portion of the park includes part of the corridor for one of the longest known overland migrations for pronghorn in the American West. This 100-mile-long corridor traverses the park at the base of the Pioneer Mountains to the Beaverhead Mountains in Montana and is used for seasonal travel between summer and winter ranges.²⁹

The lava caves provide protection from harsh conditions for lava tube beetles, bushy-tailed woodrats, bats, violet-green swallows, great horned owls and ravens.

With the help of time and lichens, crevices in the lava collect soil and moisture. Narrow crevices support dwarf goldenweed or hairy goldenaster. Shallow crevices support scabland penstemon, fernleaf fleabane, and gland cinquefoil. Deep crevices support syringa, ferns, bush rockspirea, fern bush. Among these cracks in the lava flows, American pika find protection from predators and harsh weather. Scientists are monitoring the pikas here to determine if climate change is having an impact on them.³⁰



Pika Photo: Doug Owen

²⁶ Precipitation is between 12-16 inches per year, U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 35

²⁷ U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 16

²⁸ <https://www.nps.gov/crmo/learn/nature/animals.htm>

²⁹ "Other Important Resources and Values," NPS, U.S Department of the Interior, *CRMO Foundation Document*, March 2014, p. 7

³⁰ U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 41

Steep cinder cones provide shade and wind screens on their northeast slopes where prolonged snow accumulates and provide moisture for bitter brush and rabbit brush shrubs and limber pine and aspen groves to develop. Dwarf buckwheat plants found in these cinder gardens grow evenly spaced so their massive adaptive root systems can exploit all the available moisture from the soil.

In late spring, a period of precipitation and snowmelt, many of the park's most delicate plants complete their life cycles from seedling to dormant seed before the mid-summer heat sets in, some of them in as short a period as two weeks.³¹ Evening primrose, phlox, sego lily, Indian paintbrush, blue penstemon, blazing star, bitterroot, wild onion, and leopard lily are among the showy wildflowers seen in the spring.

Several animals are unique to Craters of the Moon and the surrounding area. Subspecies of Great Basin pocket mouse, pika, yellow-pine chipmunk, Least chipmunk, and yellow-bellied marmot are found nowhere else. Lava tube beetles and many other cave animals are found only in the lava tubes of eastern Idaho.³²

Grizzly bears, bison, and big-horn sheep were among the larger animals living in the lava beds at one time but have disappeared from the ecosystem.³³ Some of the plants and animals currently receiving special attention and protection by the park service because of their potential to disappear include obscure phacelia (one Idaho's rarest plants), Picabo milkvetch, pika, gray wolf, Townsend's big-eared bat, and the leiodid beetle.³⁴

But perhaps the most amazing biological preservation happening within the Monument is provided by the lava flows themselves. Kipukas (a variation on the Hawaiian term "puka" meaning hole) are pockets of land surrounded by, but not overrun by, younger lava flows, like islands of isolated vegetation surrounded by lava. The plant habitat



Wildflowers at CRMO

Photos: NPS

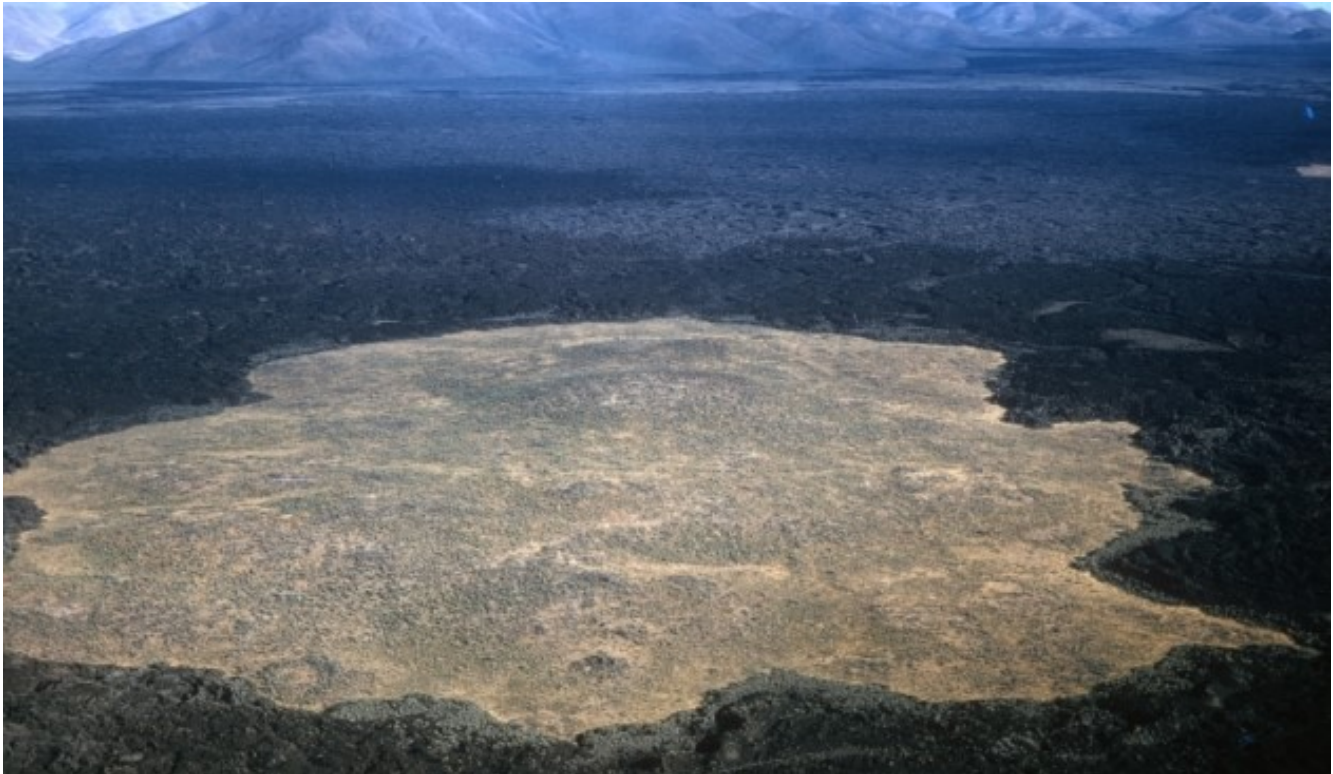
³¹ U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 35

³² NPS contributors. "Craters of the Moon National Monument and Preserve, official website". National Park Service. pp. "Animals".

³³ Bones of these large animals were found in the lava tubes; <https://www.nps.gov/crmo/learn/nature/fossils.htm>

³⁴ U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 18

of the kipukas is unaltered by grazing, invasion from non-native plants, or human influence. The 500 plus kipukas in the park provide a benchmark for comparing plant cover changes and protect some of the last remaining healthy, intact sagebrush-steppe vegetation on the Snake River Plain.³⁵



Carey Kipuka

Photo: NPS

Because the high desert steppe is losing healthy sagebrush habitat quickly (to overgrazing, wildfires, invasive species, and human development), the animals that depend heavily on the sagebrush for existence are also diminishing. At Craters of the Moon sage-brush steppe covers 340,000 acres, about half the Monument, and is protecting habitat for sage-dependent species such as Greater sage grouse, pygmy rabbit, sage thrasher, sage sparrow, sagebrush lizard, and sage vole.³⁶



Sage Grouse Photo: Doug Owen



Pygmy Rabbit Photo: Dave Clark

³⁵ U.S. Department of the Interior, *Craters of the Moon, A Guide*, pp. 39, 41

³⁶ U.S. Department of the Interior, *Craters of the Moon, A Guide*, pp. 44-45

Section 4: Cultural Resources

The archeological record indicates the intermingled Bannock and Shoshone tribes and their ancestors spent considerable time at Craters of the Moon. It's likely they witnessed eruptions along the Great Rift. The following *Serpent Legend* illustrates likely first-hand knowledge of the eruptions.



Long, long ago, a huge serpent, miles and miles in length, lay where the channel of the Snake River is now. Though the serpent was never known to harm anyone, people were terrified by it. One spring, after it had lain asleep all winter, it left its bed and went to a large mountain in what is now the Craters of the Moon. There it coiled its immense body around the mountain and sunned itself. After several days, thunder and lightning passed over the mountain and aroused the wrath of the serpent. A second time, flashes of lightning played on the mountain, and this time the lightning struck nearby. Angered, the serpent began to tighten its coils around the mountain. Soon the pressure caused the rocks to begin to crumble. Still the serpent tightened its coils. The pressure became so great that the stones began to melt. Fire came from the cracks. Soon liquid rock flowed down the sides of the mountain. The huge serpent, slow in its movements, could not get away from the fire. So it was killed by the heat, and its body was roasted in the hot rock. At last the fire burned itself out; the rocks cooled off; the liquid rock became solid again. Today if one visits the spot, he will see ashes and charred bones where the mountain used to be. If he will look closely at the solidified rock, he will see the ribs and bones of the huge serpent, charred and lifeless.³⁷

Most archeological sites occur on younger lava flows (approximately 2,000 years old), and therefore hold artifacts indicative of recent occupation by the Shoshone-Bannock. Older artifacts have been found but in smaller numbers, indicating more sites were possibly covered by recent lava flows. Artifacts found include flakes from the shaping of projectile points and sites where tachylyte³⁸ was quarried. The park museum collection holds over 5,000 worked stone artifacts, including bifaces, projectile points, manos and metates, and 85 potsherds.

³⁷ Ella Clark, *Indian Legends of the Northern Rockies*, p. 193-194

³⁸ Tachylyte was sometimes used to make projectile points in the absence of obsidian. Whereas obsidian forms from rhyolitic flows, tachylyte forms from basaltic flows, has a less glassy appearance, and is not as fine-grained as obsidian. Made from basalt, tachylyte tends to have higher iron content, as well. Of the close to eighty obsidian-related artifacts found at Craters of the Moon, at least one of the points was made

Other archeological sites include remains of hunting blinds and rock shelters. Numerous archeological sites are located in remote kipukas. Such sites indicate even remote areas were hunted, despite abundant sagebrush habitat outside the lava flows. Lava tubes that held ice year-round were used by native groups to store meat. Cut bones of bison, deer, and other animals have been found in caves throughout the Snake River Plain. Other artifacts found at these sites include tines fashioned from antlers, scrapers, knives, and mats made of sagebrush bark.³⁹



Indian Tunnel

Photo: NPS

The Monument's museum cultural collections include: archeological materials systematically collected from within the Monument's boundaries and associated field reports; historic objects associated with the areas 19th and 20th century exploration, settlements and mining; archival and manuscript collections such as those associated with Robert Limbert; photographs; and scientific and resource management records. Cultural materials obtained from

from tachylyte quarried from flows near the monument's present headquarters. Obsidian from sources throughout southern Idaho, including several artifacts from Big Southern Butte, have also been found in the monument.

³⁹ <https://www.nps.gov/crmo/learn/historyculture/native-americans.htm>

systematic surveys are housed at Idaho State University in Pocatello or in the Monument's museum storage facility along with items collected by Monument staff over the years.

Goodale's Cut-off, a section of the Oregon Trail that is listed on the National Register of Historic Places, passes through the northern section of the Monument.⁴⁰

The historic structures at Craters of the Moon date from the two main periods of National Park development—the rustic era and the Mission 66 era. Congress began appropriating money for park infrastructure, such as roads and buildings, in the mid-1920s, and funding increased during the New Deal during the 1930s. The Monument's log comfort station and log warehouse date from this era, and these structures are the only extant rustic-style buildings constructed by the National Park Service in Idaho. The second major period of park development began in 1955, when Congress allotted seven hundred million dollars for the Mission 66 program. The five housing units, the visitor center, the utility building and the brick comfort station in the campground were built during this time. The buildings are an early example of Mission 66 development, and are the only representations of Park Service Modern architecture in Idaho.⁴¹



Visitor Center

Photo: NPS

the utility building and the brick comfort station in the campground were built during this time. The buildings are an early example of Mission 66 development, and are the only representations of Park Service Modern architecture in Idaho.⁴¹

Numerous recorded cultural resources and sites in the park have yielded artifacts from a variety of chronological periods, dating from at least 8,000 years ago to the present.⁴² Less than 5% of the park has been intensively surveyed for cultural resources.⁴³

⁴⁰ <https://www.nps.gov/crmo/learn/historyculture/places.htm>

⁴¹ <https://www.nps.gov/crmo/learn/historyculture/places.htm>

⁴² "Fundamental Resources and Values" NPS, U.S Department of the Interior, *CRMO Foundation Document*, March 2014, p. 6

⁴³ "Guidance Needed for Comprehensive Cultural and Natural Resources Management" NPS, U.S Department of the Interior, *CRMO Foundation Document*, March 2014, p. 11

Section 5: Lighting Inventory

The current outdoor lighting at CRMO is 94% compliant with the IDA standards, with 4 lights out of 65 not compliant. All other lights are either a shielded fixture or are naturally shielded based on their location on the building and are less than or equal to a CCT of 3000 Kelvins. CRMO plans to bring the park to 100% compliance with all deliberate speed.








Image	Location	Description and Application	Existing Controls	Energy Use	Number in Use	Intended Updates/Changes	Compliance?
	Amphitheater/ path	In ground path & seating area	switch/timer	14w cfl	31	3 W Amber LED A19	Yes
	Residential	Rear and front door	motion, photo/inside switch	3 W Amber R16 LED	12		Yes
	Campground	log RR bollard mens/womens	photocell	14w cfl amber	2	3 W Amber LED A19	Yes

Image	Location	Description and Application	Existing Controls	Energy Use	Number in Use	Intended Updates/Changes	Compliance?
	Campground	Campground sign/reg	photo	Hubbell 5W Amber LED Nano	1		Yes
	Campground	mission66RR door womens/mens	photocell	LED 7w	2	Remove globe & install 3 W Amber R16 LED	Yes
	Maintenance	ceiling front & west wall	inside switch	10 W Amber LED Utility	3		Yes
	Maintenance	inset door twinpar LED	photocell, motion	8w 50hz LED	2		Yes
	Podium	Par base	switch	13w 4100k cfl	2	Medium Base Socket Extender and 7 W Amber LED R30	No
	Stage	single Par	switch	7 W Amber LED R30	2		Yes
	Visitor Center	Rear door	photocell, switch	3 W Amber R16 LED	2		Yes

Image	Location	Description and Application	Existing Controls	Energy Use	Number in Use	Intended Updates/Changes	Compliance?
	Visitor Center	Rear door	photocell, switch	3 W Amber R16 LED	1		Yes
	Visitor Center	West door	photocell, switch	3 W Amber R16 LED	1		Yes
	Visitor Center	VC back lot	photocell, motion/timer	12 W Sylvania BR30 LED	2		No, required for visitor/staff safety
	Visitor Center	Foyer (inside) jar w/wire	photocell	3 W Amber R16 LED	2		Yes

Section 6: Lightscape Management Plan



United States Department of the Interior

NATIONAL PARK SERVICE
Craters of the Moon National Monument & Preserve
P.O. Box 29
Arco, Idaho 83213

IN REPLY REFER TO:

1.2.A

January 25, 2017

John Barentine, Ph.D.
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

Subject: Craters of the Moon National Monument Lighting Plan

Dear Mr. Barentine,

The purpose of this letter is to outline the general exterior lighting philosophy for Craters of the Moon National Monument to ensure the high-quality dark sky resources of the park remain as uncompromised as possible and to supply relevant National Park Service policy information more broadly committing to the preservation of the night sky.

Craters of the Moon National Monument is a remote unit of the National Park Service, located in south-central Idaho, with the closest towns being 18 and 24 miles away and having a total population under 2,000 people. The park currently has a dark-sky-friendly approach to exterior lighting through the use of shaded fixtures, motion activated lighting with timers, and dark sky friendly bulb types. Because of this, the park had sustained a fantastic dark sky that remains largely unaltered.

The current management plan for Craters of the Moon National Monument and Preserve (2007) addresses lighting as it refers to preserving the natural character of the visual resources and viewscape. As the plan outlines, the goal of the park is to obtain a Visual Resource Management Class II for the developed area of Craters of the Moon National Monument and a Visual Resource Management Class I for the surrounding Wilderness Area. Visual Resource Management (VRM) classification is utilized by the Bureau of Land Management to identify and protect visual values on public lands. A VRM inventory was completed for Craters of the Moon National Monument and Preserve in 1989. The classifications assigned to the park were based on this inventory and continue to be a pertinent goal of its management. The objective of a Class I area, as defined in the Craters of the Moon National Monument and Preserve Management Plan, is

“to preserve the existing character of the landscape. Any contrast created within the characteristic landscape must not attract attention. This classification is applied to visual Areas of Critical Environmental Concern (ACEC), Wilderness and Wilderness Study Areas, Wild and Scenic Rivers, and other similar situations” (National Park Service and Bureau of Land Management, 2007, p. 59).

The objective of a Class II area is

“to retain the existing character of the landscape. Changes in any of the basic visual elements caused by management activity should not be evident on the landscape. A contrast may be seen but should not attract attention” (National Park Service and Bureau of Land Management, 2007, p. 59).

Attached is a figure (Figure 11, from National Park Service and Bureau of Land Management, 2007) outlining the aimed Visual Resource Management Classes for the entirety of Craters of the Moon National Monument and Preserve. The overarching theme between both a Class I and a Class II area is to ensure the protection and retention of the natural landscape character. Any alterations or changes made are only those absolutely necessary, with special attention paid that those changes do not attract attention and go relatively unnoticed. This is extremely applicable to lighting within the park. Our goal is to only put lighting in place that is absolutely necessary and to ensure that it has as little noticeable change as possible in order to lessen its disruption of the natural darkness.

Within Craters of the Moon National Monument, the few artificial lights in place are for staff and visitor safety. Safety, in this case, is intended to describe safely walking through a darkened area between facilities to avoid injury. It does not refer to security in the case of lighting. Many of these lights are set on motion detectors and have a limited duration timer to ensure the lights are on only as long as necessary. These timers last for 5 minutes, to ensure the individual can safely reach their destination and that the light is on for the minimum amount of time needed.

The majority of existing external lighting utilizes low-energy and low impact bulbs, with the light directed to the ground and shaded where it is needed. The few lights that do not fall within these parameters are either in the process of being updated or are the only safe option for the location. Motion detectors and timers are used to limit the timing and duration of light use to the absolute minimum.

All requests for additional lighting, both now and in the future, are required to demonstrate an absolute need for visitor/staff safety that cannot be addressed by any other means. Requests for new lighting implementation will be evaluated on a case-by-case basis. As new technologies come available that further reduces artificial lighting impacts, the park will research and implement any feasible updates to assist in the future safeguarding of this valuable resource.

Lighting within the park, now and in the future, also exceeds the local jurisdiction on lighting policy. Butte County does not currently have a policy on outdoor lighting beyond that it cannot trespass onto adjacent properties. For Blaine County, the Outdoor Lighting Regulations as listed in the County Code are as follows:

9-29A-4: OUTDOOR LIGHTING STANDARDS:

A. Outdoor Luminaires: All outdoor lighting shall not cause the lamp to shine directly on adjacent property or public rights of way. Outdoor lighting luminaires shall be one of the following:

1. Full cutoff and fully shielded.
2. Luminaires that are partially shielded provided that the lamp is not visible, and the luminaire has an opaque top or is under an opaque structure.
3. Floodlights with external shielding shall be angled provided that no light is directed above a twenty five degree (25°) angle measured from a vertical line from the center of the light extended to the ground.
4. Holiday lighting from November 1 to March 1.

B. Height Of Luminaires:

1. Parking area luminaires shall be no higher than seventeen feet (17') in height.

2. Freestanding luminaires in residential zones shall be no higher than fifteen feet (15') in height.
3. Streetlights used on arterial roadways shall be no higher than twenty feet (20') in height.
4. The height of any light fixture or luminaire shall be no higher than thirty feet (30') in height (Blaine County, County Code, Title 9- Zoning Regulations, Chapter 29A- Outdoor Lighting, 2016).

While Craters of the Moon National Monument is not subject to this jurisdiction, it is important to point out that the park is at least as restrictive, if not more so.

Our management plan is reviewed and updated approximately every five years. When the next evaluation occurs, adding more specific language with regard to lighting implementation will be addressed. For the interim period, I have issued a memo (attached) to ensure any additional lighting fall within compliance of the IDA regulations. I have included a framework for our Lighting Policy & Plan to help guide our future update. This will help ensure the dark-sky compliance of our lighting and will continue to protect this resource in the future.

Attached, along with the VRM figure and Lighting Policy Memo, I have included language regarding natural dark skies and lighting implementation from our own Management Plan and Foundation Document, as well as various National Park Service policies and endeavors to further emphasize the National Park Service's focus on protecting the night sky as an organization. Please feel free to contact me with any questions or concerns, and thank you in advance for your consideration of our application for accreditation status with the International Dark-Sky Association.

Sincerely,

WADE VAGIAS

Digitally signed by WADE VAGIAS
DN: c=US, o=U.S. Government, ou=Department of the
Interior, ou=National Park Service, cn=WADE VAGIAS,
0.9.2342.19200300.100.1.1=14001000831285
Date: 2017.01.25 16:16:01 -07'00'

Wade Vagias, Ph.D., Superintendent
Craters of the Moon National Monument & Preserve

Attachment



United States Department of the Interior

NATIONAL PARK SERVICE
Craters of the Moon National Monument and Preserve
P.O. Box 29
Arco, ID 83213

To: Division Chiefs
From: Superintendent
Subject: Interim Outdoor Lighting Policy
Date: January 25, 2017

As Craters of the Moon National Monument (CRMO) pursues International Dark Sky Park Accreditation, a definitive Lighting Management Plan needs to be codified as official Park Policy. Fortunately, the park's current outdoor lighting standards have largely taken into account night sky protection as a priority, but the International Dark-Sky Association (IDA) requires a more explicit plan (or until such plan can be developed, an interim policy). This interim Outdoor Lighting Policy Memo adopts the general stipulations set by the IDA in order to assure continued night sky-friendly outdoor lighting at CRMO, as follows:

- a) All requests for new/additional exterior lighting must demonstrate an absolute need for visitor/staff safety that cannot be addressed by any other means;
- b) No new lighting allowed under the terms of (a) shall exceed 500 initial lumens unless it fully shielded;
- c) No new lighting allowed under the terms of (a) shall exceed a color correlated temperature (CCT) of 3000 Kelvins;
- d) Exceptions to (b) and (c) will only be made in the limited circumstances where either a higher legal jurisdiction requires otherwise or for special purpose/emergency installations at the discretion of the Superintendent.

As of January 25, 2017, 61 out of 65 outdoor lighting in the park are compliant with these standards (94% compliance rate). Of the remaining 4 outdoor lighting fixtures, approximately 2 have planned adjustments that will make them compliant with IDSA stipulations. Once these outdoor fixtures are updated, the park's compliance rate will be approximately 97%.

The remaining 2 non-compliant outdoor lighting fixtures are in place for staff safety, have been mediated by utilizing motion detectors and timers, and will be readdressed down the road as technology advances.

This policy will remain in place until a revision of the park Management Plan can implement a permanent change in park lighting policy.

Statement of Craters of the Moon National Monument Lighting Policy & Plan Framework

Policy Purpose:

- The dark skies over Craters of the Moon National Monument provide a source of enjoyment and wonder for both visitors and residents. The purpose of this lighting policy is to ensure that the skies over Craters of the Moon National Monument remain dark for the benefit and enjoyment of future generations. We recognize our night sky as a critical resource in many functions:
 - a. as a natural resource from an ecological perspective, important for the success of many different species thought out the park;
 - b. as a cultural-historical resource, sharing the same sky that humans have viewed and been inspired by for thousands of years and connecting us to a vast history of cultural influence;
 - c. as an economic resource, benefiting the surrounding communities by extended park visitation and helping to reduce useless light sources by implementing more cost-effective solutions.
- It is the intent of this policy to require lighting practices and systems which will minimize light pollution and conserve energy while maintaining the safety of our staff and visitors.

As a statement of general policy related to the preservation of dark skies over the Monument portion of the unit, Craters of the Moon National Monument commits to the following:

- Reduce and reverse the destruction of our valuable dark sky resources, including air quality related values, benefitting casual observation, and astronomy, while allowing the practical use of outdoor lighting for nighttime safety;
- Limit or eliminate any outdoor lighting that is excessive, unnecessary, or misdirected in order to minimize outdoor lighting issues, including light trespass, glare, artificial sky glow, and obtrusive light;
- Help protect the park's species and natural ecosystems from the destructive nature of improper outdoor lighting;
- Delineate outdoor lighting zones within Craters of the Moon National Monument, with zones having varying degrees of visitor expectations for natural darkness/outdoor lighting and varying degrees of nighttime use and activities, following the established lighting zone parameters set by the International Commission on Illumination, as recommended by the International Dark Sky Association, as well as lighting zone guidelines created by the National Park Service Night Sky Team;
- Utilize night-sky friendly practices with future implementation of lighting retrofits, including shielding, motion detectors and timers, and appropriate lumens, as recommended by the Outdoor Lighting Retrofits guide established by the National Park Service (National Park Service and the California Lighting Technology Center, UC Davis, 2014).
- All new lighting that has demonstrated a need for visitor/staff safety will be a maximum of 500 initial lumens or will be shielded
- All new lighting that has demonstrated a need for visitor/staff safety shall not exceed a correlated color temperature (CCT) of 3000 Kelvins

Lighting Zone Guidelines:

- The original system established by the International Commission on Illumination (CIE) employed four lighting environmental zones, currently named LZ-1 through LZ-4. Recently, the CIE, the Illuminating Engineering Society of North America (IES) and the International Dark

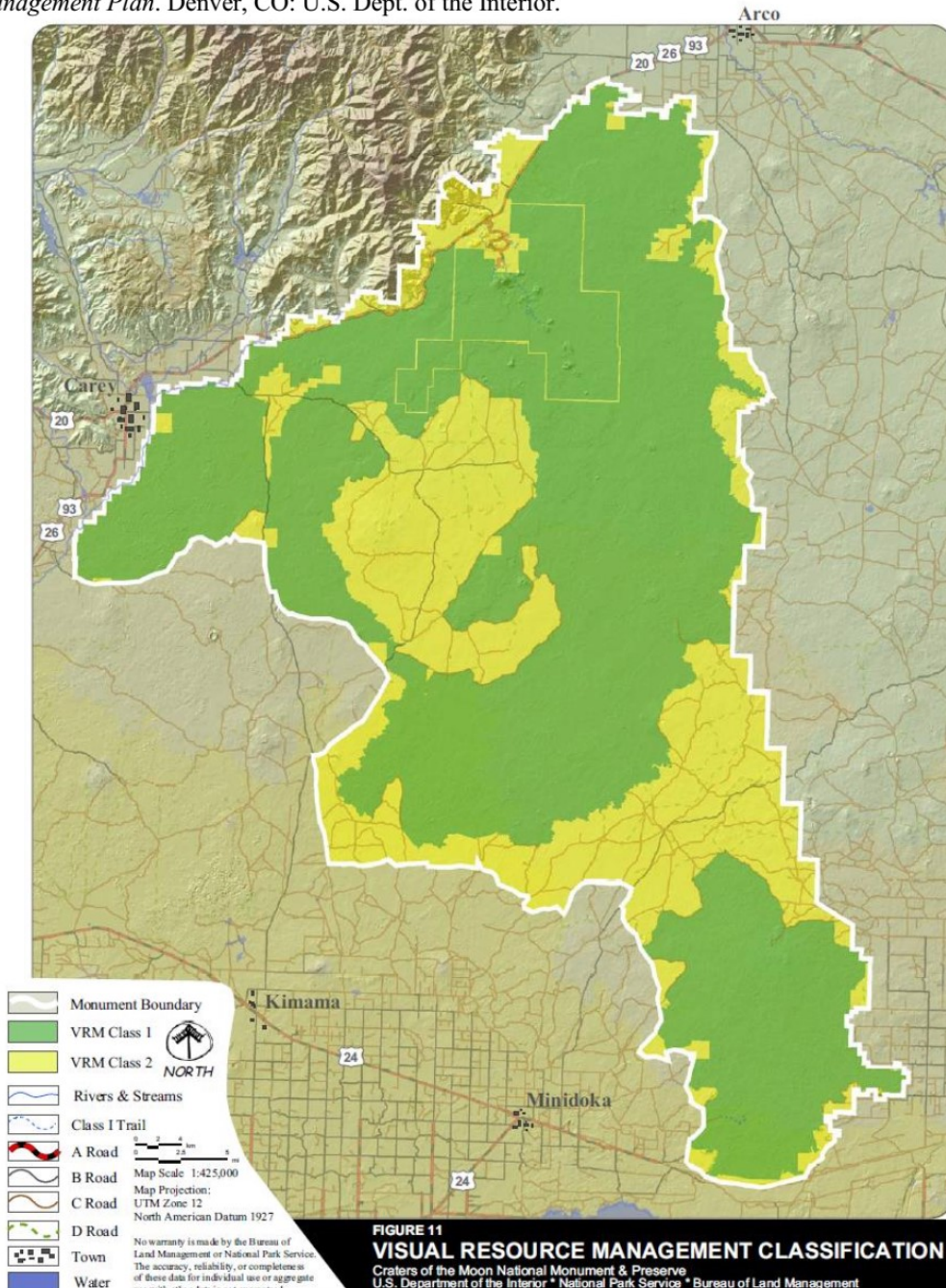
Sky Association (IDA) have all addressed a fifth zone of extreme environmental sensitivity (LZ-0) that is incorporated into the Joint IDA – IES Model Lighting Ordinance (2011).

- The National Park Service Night Skies Team proposes two additional restrictive zones throughout National Park Service units:
 - LZ-00, to articulate where lighting is generally not desired but may be allowed for specific targeted needs.
 - Naturally Dark Zone (NDZ), where no permanent lighting is allowed (National Park Service Night Sky Team, 2007).
- Additionally, LZ-3 and LZ-4 are by definition unsuitable for all NPS units.
- Established Lighting Zones for Craters of the Moon National Monument will fall within these parameters and will include a Naturally Dark Zone for the designated Wilderness Area of the park. Other zones established will follow LZ-00, LZ-0, or LZ-1 standards.

Policy Applicability:

- This policy and plan framework is applicable to all existing exterior lighting and all future proposed exterior lighting, except as listed below:
 - a. Emergency lighting by police, fire, or other authorities;
 - b. Temporary construction lighting;
- The replacement or retrofitting of existing exterior lighting in order to meet the provisions of this policy is strongly encouraged, but not immediately required;
- Communities outside of the Park are beyond the jurisdiction of this policy, but are encouraged to adopt similar policies to control light pollution;
- This policy provides guidelines for the installation of lighting, but is not intended to specify where light is required. In general, lighting should be installed and maintained only where necessary for employee and public safety;
- This policy is intended to apply to exterior lighting only.

Figure 11. Visual Resource Management Classification. Green highlighted areas refer to VRM Class I designations. Yellow highlighted areas refer to VRM Class II areas. The thin yellow line outlines the National Park Service designated National Monument area. From National Park Service and Bureau of Land Management. (2007). *Craters of the Moon National Monument and Preserve: Monument Management Plan*. Denver, CO: U.S. Dept. of the Interior.



Relevant National Park Service and Craters of the Moon-specific Statements of Policy Related to the Preservation of Dark Skies

Craters of the Moon National Monument and Preserve Management Plan

National Park Service and Bureau of Land Management. (2007). *Craters of the Moon National Monument and Preserve: Monument Management Plan*. Denver, CO: U.S. Dept. of the Interior.

Desired Future [Visual Resource] Conditions:

“Existing opportunities to experience solitude, dark night sky, and views of landscapes remain substantially free of human intrusions. A primitive and natural visual setting is retained... Management activities meet or exceed the adopted Visual Resource Management (VRM) classes” (p. 60).

[Visual Resource] Management Actions:

“VRM-1: BLM and MPS managers should seek the cooperation of visitors, neighbors, and local government agencies to prevent or minimize impacts and prevent the loss of western landscape vistas and natural dark condition” (p. 60).

“VRM-3: VRM inventory classes will be designated as management classes as shown in Figure 11” (p. 60).

Craters of the Moon National Monument and Preserve Foundation Document

National Park Service. (2014). *Foundation Document: Craters of the Moon National Monument and Preserve*. U.S. Dept. of the Interior.

Park Significance:

“Clean air offers visitors expansive scenic views of the high desert and surrounding mountain, which change dramatically with the seasons and from day to the dark night skies” (p. 5).

Fundamental Resources and Values:

“Clean air... provides panoramic views of the naturally dark night skies and safeguards ecosystem, visitor, and staff health” (p. 7).

Interpretive Themes:

“Clean air and natural darkness enhance opportunities for visitors to experience the immensity of the landscape in every season and through the star-filled skies at night” (p. 9).

Basics for Wilderness Stewardship for Craters of the Moon Wilderness, Wilderness Character Narrative, Opportunities for Solitude or Primitive and Unconfined Recreation:

“Isolation from sources of light pollution, such as major urban areas, has protected the dark night sky. This is particularly true in the designated wilderness and most of the northern portions of the Great Rift wilderness study area” (p. 75).

National Park Service Management Policies

National Park Service, U.S. Dept. of the Interior. (2006). *Management Policies*. Washington, D.C.: U.S. Government Printing Office.

Natural Resource Management, 4.10 Lightscape Management:

“The Service will preserve, to the greatest extent possible, the natural lightscapes of parks, which are natural resources and values that exist in the absence of human-caused light... Improper outdoor lighting can impede the view and visitor enjoyment of a natural dark night sky. Recognizing the roles that light and dark periods and darkness play in natural resource processes and the evolution of species, the Service will protect natural darkness and other components of the natural lightscape in parks. To prevent the loss of dark conditions and of natural night skies, the Service will minimize light that emanates from park facilities, and also seek the cooperation of park visitors, neighbors, and local government agencies to prevent or minimize the intrusion of artificial light into the night scene of the ecosystems of parks. The Service will not use artificial lighting in areas such as sea turtle nesting locations where the presence of the artificial lighting will disrupt a park’s dark-dependent natural resource components.

The Service will

- restrict the use of artificial lighting in parks to those areas where security, basic human safety, and specific cultural resource requirements must be met;
- use minimal-impact lighting techniques;
- shield the use of artificial lighting where necessary to prevent the disruption of the night sky, natural cave processes, physiological processes of living organisms, and similar natural processes.

The decision about whether or not to install artificial lighting in particular circumstances is left to the discretion of the superintendent and is made through the planning process” (p. 57).

National Park Service Green Parks Plan

National Park Service. (2012). *National Park Service Green Parks Plan: Advancing Our Mission through Sustainable Operations*. U.S. Dept. of the Interior.

“The NPS will minimize the impact of facility operations on the external environment. Outdoor experiences can be adversely affected by facility operations. Exterior lighting can reduce dark night sky quality and vehicle traffic can diminish the natural silence and sounds of an ecosystem. Reducing the impact of NPS operations on the environment will improve the visitor experience and protect natural and cultural resources through the preservation of night skies, natural sounds, water quality, ecosystems, and viewsheds.

Objectives

- The NPS will reduce light pollution from park facilities with the goal of dark night sky preservation.
- The NPS will minimize sound pollution in the outdoor environment.
- The NPS will ensure that all facilities and operations are sustainably integrated into the park landscape to minimize impact on the natural and cultural environment” (p. 12).

National Park Service Interim Outdoor Lighting Guidelines

National Park Service Night Sky Team. (2007). *Interim Outdoor Lighting Guidelines* (Ver. 1.0). Dept. of the Interior, National Park Service.

“The objectives of this lighting guideline are to provide parks a planning strategy and best management practices for outdoor lighting. An important consideration in this document was balancing the need for safety with the sensitivity of the park nocturnal environment. The

guideline focuses on ‘off the shelf’ solutions, though development of new technologies like LEDs will soon allow parks to more precisely manage outdoor lights; however, for now only mainstream technologies have been included in this document. Simplicity of understanding and implementation of these guidelines was given greater weight than the details of lighting design, visibility research, and energy efficiency.

- Curtail and reverse the degradation of the nighttime visual environment and the night sky, including casual observation, astronomy, and air quality related values.
- Minimize glare, light trespass, obtrusive light, and artificial sky glow by limiting outdoor lighting that is misdirected, excessive, or unnecessary.
- Insure ‘good neighbor lighting’ by minimizing light trespass.
- Help minimize suspected health risks to humans from adverse exposure to light at night.
- Help protect natural ecosystems from the damaging effects of night lighting.
- Permit reasonable and rational use of outdoor lighting for nighttime safety, utility, security, and productivity.
- Help to conserve energy and resources.
- Minimize maintenance and operating costs.
- Provide some flexibility for architectural and artistic lighting within the above constraints” (p. 3).

National Park Service Outdoor Lighting Retrofits

National Park Service and the California Lighting Technology Center, UC Davis. (2014). *Outdoor Lighting Retrofits: A guide for the National Park Service and other federal agencies*. Davis, CA: Regents of the University of California, Davis campus, California Lighting Technology Center.

“Lighting constitutes a large portion of energy use at national parks. This guide provides assistance to facility managers who want to reduce lighting energy use while making parks safer and more visually appealing for visitors. Proper outdoor lighting increases safety and security, minimizes light pollution, and makes visitors’ experience of national parks more memorable. Illuminating key attractions with the right luminaires, equipped with the right lighting controls, can also reduce energy consumption. This guide is intended to make the selection of appropriate, energy-efficient outdoor lighting solutions easier and improve project outcomes” (p. 5).

Minimal Light Pollution and Light Trespass:

“Light pollution and light trespass occur when nighttime lighting strays from its intended target, spreading into the sky or intruding on surrounding areas. Research continues to indicate the adverse effects of light pollution on people and wildlife. An important reason for completing an outdoor lighting retrofit is to reduce the negative environmental impacts of an existing lighting system” (p. 10).

Part 6: Preserving Dark Skies

“In the United States today, most residents seldom experience truly dark skies, no matter what time of night they find themselves outdoors. This is because light pollution is now a common problem around cities and towns. The expansion of urban environments has made the problem more acute in recent decades, diminishing the visibility of stars and planets in the night sky for astronomers and casual observers alike. Light pollution can also adversely affect the health and well-being of people and animals.

Light pollution is arguably the easiest environmental hazard to remedy. Simple retrofits and changes to lighting designs can dramatically limit the amount of light spilling into the atmosphere and surrounding ecosystem—with immediate results. And advanced lighting controls

make it easy to further minimize light pollution without compromising safety or security” (p. 47).

National Park Service Natural Sounds and Night Skies Division

National Park Service. (2016). *Natural Sounds and Night Skies Division*. Retrieved from <https://www.nps.gov/orgs/1050/index.htm>

“America’s national parks contain many cherished treasures; among them are captivating natural sounds and awe-inspiring night skies. The joy of listening to the quiet symphony of nature or the beauty of seeing the Milky Way stretching overhead have become rare experiences in our lifetimes, but they can still be found in many of our national parks. Natural sounds and natural darkness, though often overlooked, are essential in keeping our national treasures whole. They are magnificent in their own right, but also inspirational to the visitors who come to national parks, vital to the protection of wilderness character, fundamental to the historical and cultural context, and critical for park wildlife.”

“The Natural Sounds and Night Skies Division uses science, engineering, and technology to understand and better manage these spectacular resources. We pioneer innovative techniques to measure the impact of noise and light pollution, develop new approaches to safeguard natural sounds and natural darkness, and identify management solutions to restore these public resources.”

“The Natural Sounds and Night Skies Division works to protect, maintain, or restore acoustical and dark night sky environments throughout the National Park System... We welcome your interest in learning about these sublime resources of our national parks and the efforts you can take to help us preserve them for future generations. Whether it’s simply talking a little softer or turning off an outdoor light, you too can make a difference in the protection of these vital resources. Most of all, we encourage you to experience for yourself the natural soundscapes and lightscapes of your national parks.”

National Park Service, The Director’s Call to Action Report

National Park Service. (2015). *A Call to Action: Preparing for a Second Century of Stewardship and Engagement*. Dept. of the Interior.

“Starry, Starry Night, Action 27: Lead the way in protecting natural darkness as a precious resource and create a model for dark sky protection” (p. 18).

Section 7: Issue Leadership

Lighting Project

A highly prominent informational shelter, between the Visitor Center and entrances to the campground and loop road, features attractive, well-designed dark sky lighting.

When the Spring (2017) thaw allows access (and, in no event later than May 31)⁴⁴, interpretive signage will be added (wording may shift slightly to accommodate dimension necessities but content to be as follows):

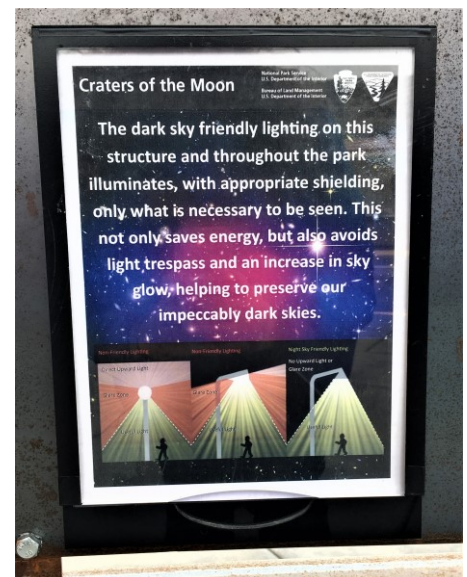
“

The dark sky friendly lighting on this structure illuminates, with appropriate shielding, only that which is necessary to be seen, saving energy while avoiding light trespass and increase in skyglow. Craters of the Moon National Monument is actively engaged in preserving the quality of its night skies.



Kiosk Lighting

Photo: NPS



Dark Skies Signage at Park Kiosk

Photo:NPS

External Partners

CRMO is working closely with the City of Ketchum, a nearby scenic gateway community, on dark sky issues. The dark sky efforts of CRMO have been instrumental in inspiring the City (through its Planning and Building Director who is also an affiliate member of the Committee for Dark Sky Studies, based at the University of Utah) to work towards its own IDA designation as a Dark Sky Community.

⁴⁴ Update: signage installed April 11, 2017

As both City and CRMO work towards their respective designations, CRMO functions as both a point of contact during the City's application process, as well as a partner for the designated Dark Sky Community. A cooperative plan to present jointly at community education roundtables about the importance of dark skies and common sense, energy-saving, night-sky friendly lighting has been undertaken.

Cooperation

Over the past several years, CRMO has built an increasingly strong partnership with the town closest to the Monument — Arco (18 miles northeast). CRMO is involved in the local school district working with teachers to prompt student visits to CRMO, as well as working in the classrooms and presenting after school programs. Some community partnerships and events have been focused on space science, including a town hall with astronauts from the Apollo missions for the park's 75th anniversary and a NASA Community Day as part of the park's NPS Centennial Celebrations.

Currently, CRMO is engaged in further strengthening community involvement for the August 2017 solar eclipse (for which the Monument is ideally situated), including daytime programming in the town and nighttime programming in the Monument.

Additionally, CRMO looks forward to helping the community with lighting restoration efforts and presenting night-sky friendly education efforts as the partnership strengthens, and, further, is committed to assisting the town to capitalize on the dark sky economic development opportunities that will be possible with designation of the Monument.



Field Trip at CRMO

Photo: NPS

Future Plans for Inventorying and Monitoring Outreach

With designation, CRMO will begin in Summer 2017 to involve visitors in its required night sky monitoring activities, that will be headed by NPS staff. This includes:

- ▶ using the annual night sky quality measurements to educate on the importance of natural darkness in programming, and
- ▶ giving demonstrations on the use of an SQM and how to interpret the resulting measurement.

With the new dark sky platform provided by designation, CRMO will work to inspire at-home citizen science for visitors to measure the quality of their own skies and teach ways to remediate their own home lighting to become more night sky friendly.



Big Southern Butte and Moon

Photo: NPS

Section 8: Education and Outreach



Star Party

Photo: NPS

Most visitor and educational opportunities are located in the northern part of the park near U.S. 20/26/93 between the gateway communities of Carey and Arco, Idaho. In addition to guided walks and programs by NPS staff, the park has several self-guided trails with wayside exhibits and a seven-mile loop drive. Park facilities include a visitor center complex, which consists of a campground, museum, and bookstore, as well as the park headquarters.⁴⁵

- ▶ National Park Service rangers present evening programs at the campground amphitheater at least once a week in the summer.
- ▶ The Idaho Falls Astronomical Society provide telescopes and knowledge of the stars and galaxies at star parties, held twice each year at Craters of the Moon.⁴⁶

⁴⁵ "Brief Description of the Park" NPS, U.S Department of the Interior, *CRMO Foundation Document*, March 2014, p. 4

⁴⁶ <https://www.nps.gov/crmo/learn/nature/night-sky.htm>

- ▶ Rangers host solar-viewing activities in the summer with specially designed telescopes that allow safe viewing of the sun.
- ▶ Ranger-led full moon hikes have been offered in the summer.
- ▶ A Lunar Ranger program enables children to earn an embroidered patch in a few hours. The work booklet teaches about the park and its connections to space and other planets.
- ▶ The Junior Ranger badge program for kids of all ages allows kids who meet at the campground amphitheater during the summer months to become a junior ranger and help take care of the park.⁴⁷
- ▶ Kids of all ages can learn about the Night Sky and earn a patch at the park by completing the Junior Ranger Night Explorer booklet.



In 1959 the Craters of the Moon Natural History Association was formed to assist the Monument in educational activities. Craters of the Moon was selected to receive a 2016 field trip grant from the National Park Foundation, the official charity of America's national parks, supporting *Every Kid in a Park*. The grant is part of the Foundation's *Open Outdoors for Kids* program and is administered locally with the support of the Craters of the Moon Natural History Association. The \$9,000 grant will provide transportation for fourth grade students from local school districts to visit the park as part of the park's *A Trip to the Moon* program. This program also includes a ranger visit to each fourth-grade class. Thanks to the grant, approximately 1,000 students from Southern Idaho complement their classroom experience with an in-person park visit.⁴⁸

The Monument's museum of natural history collections include:

- ▶ an herbarium of vascular and nonvascular plant species
- ▶ geological specimens from throughout the Monument
- ▶ some mammal and reptile specimens
- ▶ associated project documentation and reports

Scientific research in the park is diverse and includes ongoing investigations of the geology and kipukas to better understand these as benchmarks for study. The park focuses interpretive and educational programs on geology,

⁴⁷ <https://www.nps.gov/crmo/learn/kidsyouth/index.htm>

⁴⁸ <https://www.nps.gov/crmo/learn/news/every-kid-at-craters.htm>

the prehistoric and historic value of the park, ecosystems, and adaptation. The park possesses highly valued qualities of wilderness character, including untrammeled, natural, and undeveloped areas with outstanding primitive and unconfined recreation, and unique scientific and educational opportunities.⁴⁹



Hiking by moonlight at Craters of the Moon. Ranger-led full moon hikes are offered in the summer.

Photo: NPS

⁴⁹ "Brief Description of the Park," NPS, U.S Department of the Interior, *CRMO Foundation Document*, March 2014, p. 6

Afterword



CRMO night skies are both spectacular and known to be spectacular. In the National Park Service's brochure *Tips for Stargazing in National Parks*, the NPS singles out the night sky experience at CRMO.

“

Some parks, like Death Valley National Park in California and Craters of the Moon National Monument & Preserve in Idaho, are famous for their clear night skies⁵⁰

FIND YOUR **PARK**

⁵⁰ "Tips for Stargazing at National Parks," *Find your Park*, <http://findyourpark.com/news/tips-for-stargazing-at-national-parks>

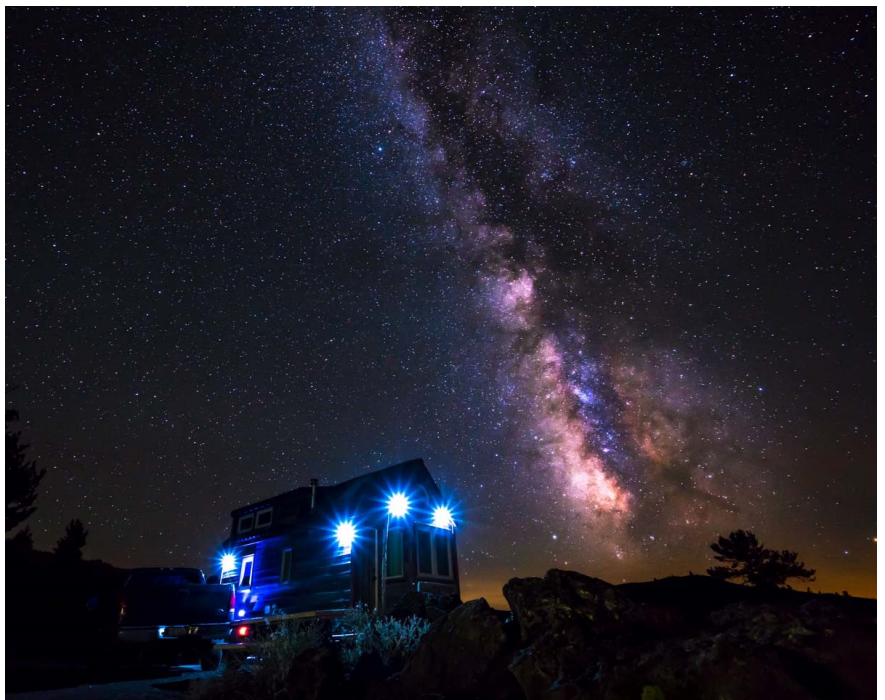
The Star Parties at CRMO made *U.S.A Today's 10 Best* list for 2016 in the category *Best National Park Night Experience*.



On select nights in June and September, representatives from the Idaho Falls Astronomical Society host star parties at Craters of the Moon National Monument and Preserve. The evening starts with a night sky presentation at the campground amphitheater, followed by telescope viewing in the Caves Area parking lot.⁵¹

Jenna from HGTV's "Mighty Tiny Houses" and the popular blog TinyHouseGiantJourney.com traveled in her tiny house to Craters of the Moon. Her travel companion took photos of the night sky.⁵²

The night sky sparkled over charred earth ... Gaze up at the moon ... at Craters of the Moon! Guillaume spent an evening exploring the park at night, snapping gorgeous photos of the Milky Way ... If you plan on night hiking at Craters, be sure to bundle up! Similar to a desert climate, the park can get hot during the day and frigidly cold at night.⁵³



Milky Way above Jenna's tiny house in CRMO

Photo: tinyhousegiantjourney.com

⁵¹ *USA Today's 10 Best*, "Night Sky Program," <http://www.10best.com/awards/travel/best-national-park-night-experience/>

⁵² which showed the magnificent Milky Way in spite of the numerous unshielded lights on the Tiny House.

⁵³ <http://tinyhousegiantjourney.com/2015/10/16/craters-of-the-moon-national-monument-in-two-days/>

Robert Limbert, the first person of record to explore CRMO, vividly described why Craters of the Moon National Monument deserves IDSP designation.

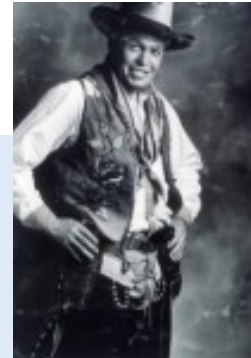


Photo: NPS

“It is the play of light at sunset across this lava that charms the spectator. It becomes a twisted, wavy sea. In the moonlight its glazed surface has a silvery sheen. With changing conditions of light and air, it varies also, even while one stands and watches. It is a place of color and silence.”⁵⁴



Sunset at CRMO

Photo: NPS

⁵⁴ Robert Limbert on viewing the Blue Dragon Flows: U.S. Department of the Interior, *Craters of the Moon, A Guide*, p. 7

Acknowledgments

Jeremy Bryson, Assistant Professor (Geography), Weber State University

Bureau of Land Management

The Committee for Dark Sky Studies, University of Utah

Craters of the Moon Natural History Association

Alan and Vickie Eastman, volunteers

Monica Hubbard, Assistant Professor (Public Policy and Administration), Boise State University

Rhonda Morris, Craters of the Moon Natural History Association

George Muller, volunteer

Ogden Valley Starry Nights (IDA Chapter - Janet Muir)

Photographers: Ronald Bend, Daniel George, Fred Melikian, Wally Pacholka, Ron Pugh, Julia Schostak

Justin Samuels, student, Weber State University (mapping)

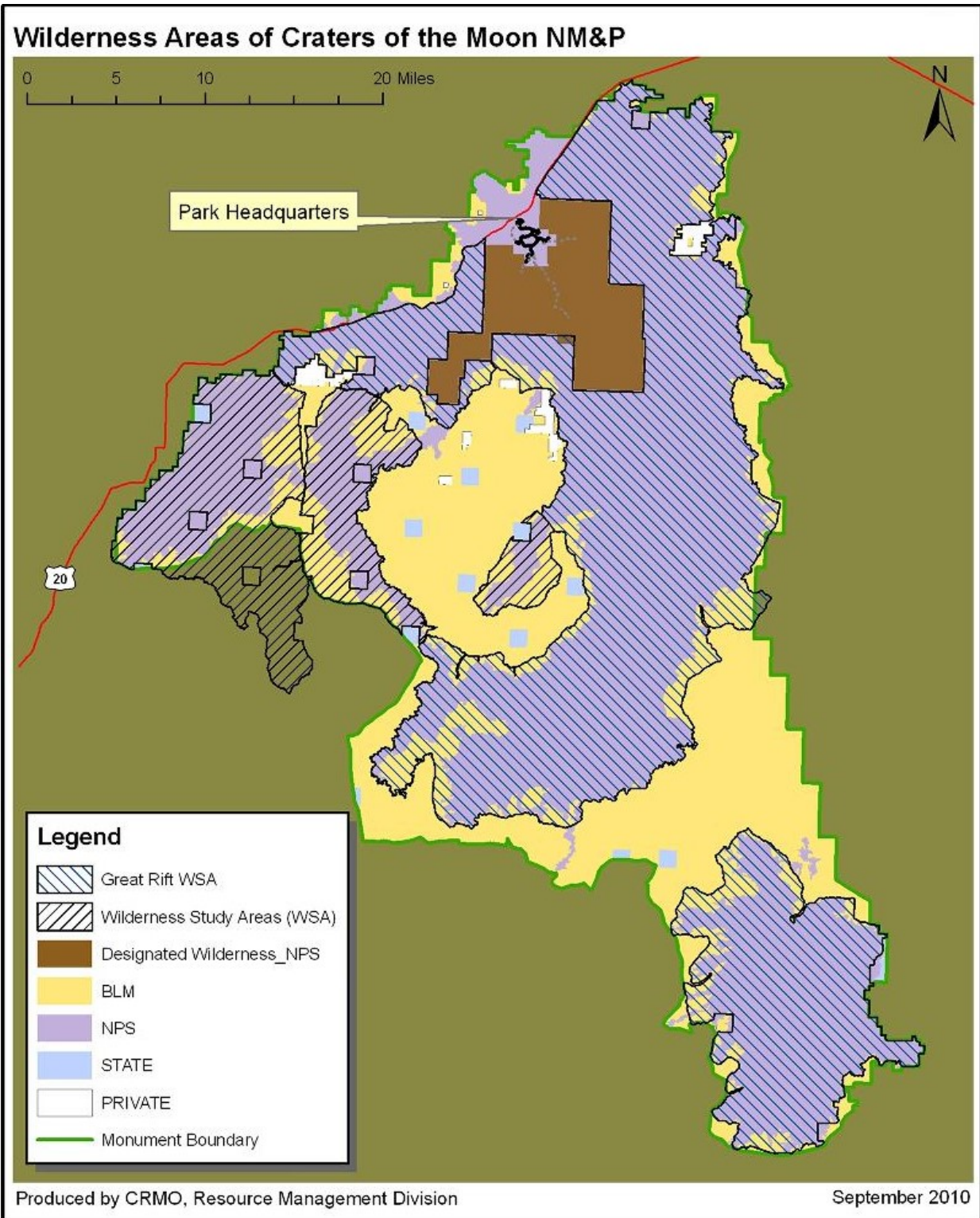
Julia Schostak, Centennial Volunteer Ambassador, Craters of the Moon National Monument and Preserve

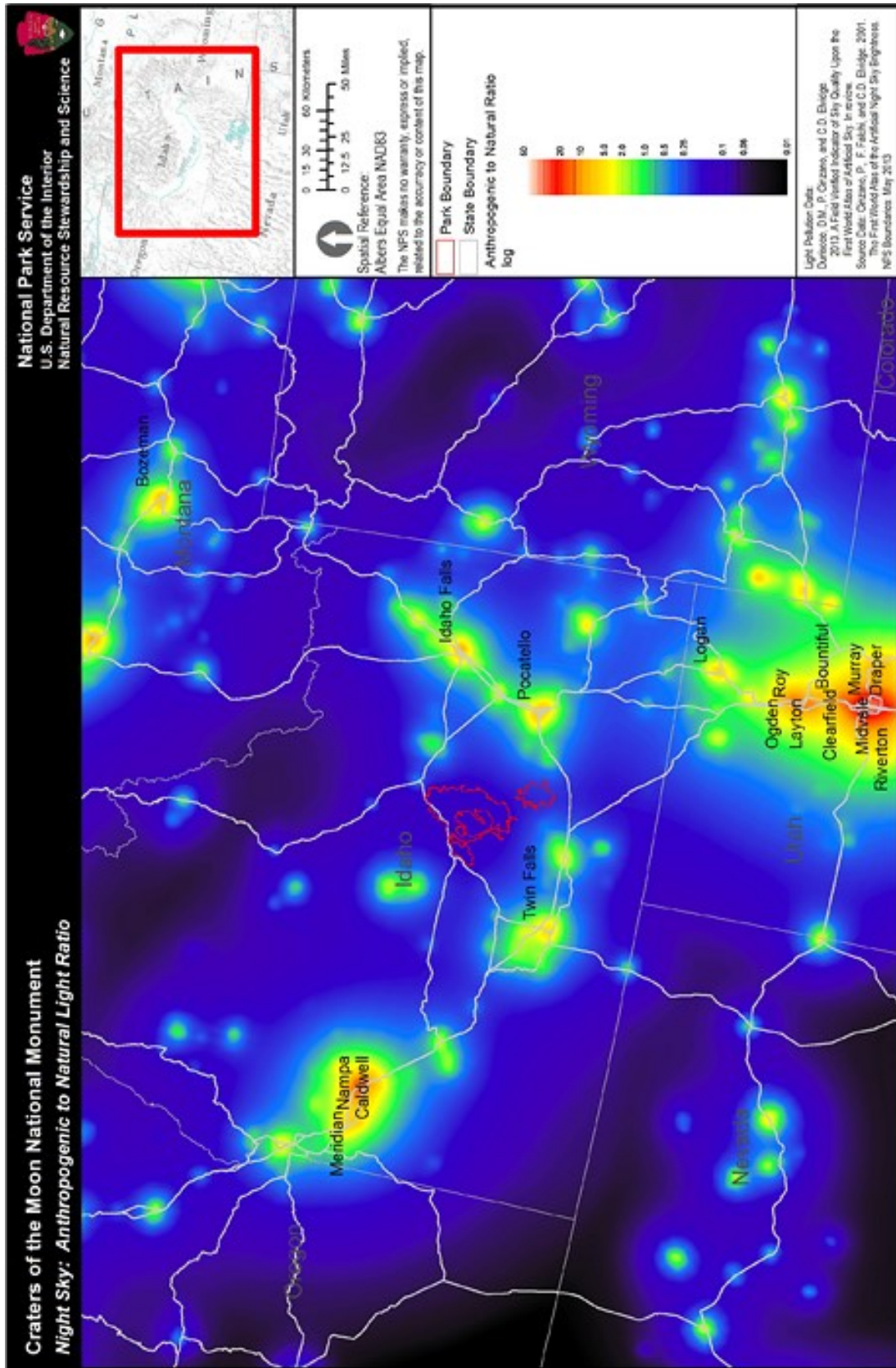
David Suehsdorf, volunteer

Vicki Voros, writer and editor

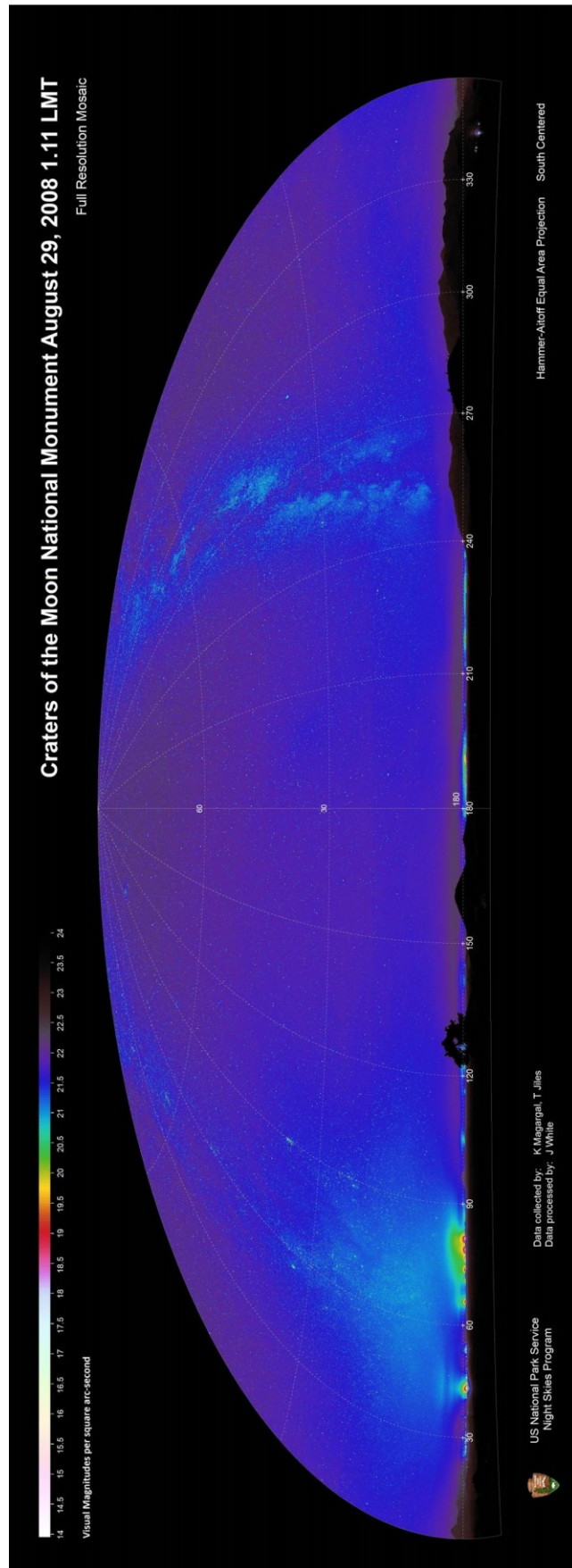
APPENDICES

Maps





Map: CRMO Anthropogenic to Natural Light Ratio



Map: CRMO Night Skies mosaic 2008

NPS Night Skies Division

Letter of Nomination



Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation of Craters of the Moon National Monument

December 1, 2016

To the IDA Board Members:

Our Northern Utah IDA chapter is honored to nominate Craters of the Moon National Monument (created in 1924 by President Calvin Coolidge) as an International Dark Sky Park.

Located on the Snake River Plain, the Monument includes volcanic cones and lava flows - one of the latter of which, including the Preserve acreage (not a part of this application), is the largest in the U.S.

"(Earth) says little, and in a language that no one has yet understood. Through time, her secret codes have gradually been broken. Her mud and lava is a message from the past."¹ Nowhere in the United States, is that more evident than in Craters of the Moon NM.

The Monument has also been used as a way to deal with the uncertainties of the future. Astronauts have trained there, expecting some resemblance of its surface to that of the moon. Explorers of all kinds have experienced the silence, solitude and dark skies of this singular piece of land.

In our work with the National Park staff, and particularly its supervisor, Wade Vagias, and with the fine people of the associated Natural History Association, we found a dedicated, organized, visionary effort to interpret and make available to the American people, this extraordinary place. It has been a pleasure to be part of the team effort behind this current IDSP endeavor.

We would be pleased to answer any questions the Board may have.

Sincerely,

Janet Muir

¹Weight: *The Myth of Atlas and Hercules*, Jeannette Winterson (2005)

Research Endorsement

1 of 1

.....
ENDORSEMENT OF DESIGNATION OF CRATERS OF THE MOON NM
AS INTERNATIONAL DARK SKY PARK
.....

Under the Antiquities Act of 1906, authority was given to the President to designate areas of outstanding scientific interest *where research could be conducted* while allowing flexibility in use. Craters of the Moon National Monument was designated in 1924 by President Calvin Coolidge.

.....
Craters of the Moon NM may be viewed as an outdoor laboratory for the study of ecological and climatic changes, the interactions between humans and their environment, improved land management practices and achieving a properly functioning, healthy and biologically diverse landscape that, with night sky quality monitoring, can build global-agenda knowledge about the impact of the disappearing dark and the effects of utterly unspoiled night skies.
.....

We represent a range of scholarly disciplines and endorse the designation, for research purposes, of Craters of the Moon NM as an International Dark Sky Park.

University of Utah

David Kieda, Professor, Physics and Astronomy

Stephen Goldsmith, Associate Professor, City & Metropolitan Planning

Kelly Bricker, Professor and Director, Parks, Recreation and Tourism

Weber State University

Stacy Palen, Professor, Physics; Director Ott Planetarium

Jeremy Bryson, Assistant Professor, Department of Geography

Southern Utah University

Kelly Goonan, Assistant Professor, Outdoor Recreation in Parks

Letters of Support

1



United States Department of the Interior
BUREAU OF LAND MANAGEMENT
Shoshone Field Office
Craters of the Moon National Monument
400 West F Street
Shoshone, Idaho 83352



Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson AZ 85719

Re: IDSP Designation of Craters of the Moon National Monument

January 17, 2017

To the IDA Board Members:

Presidential Proclamation 7373 of November 9, 2000, expanded the boundary of the Craters of the Moon National Monument to 737,000 acres of federal land (from about 53,000 acres) to include many more of the area's volcanic features than the original National Monument – including the 60-mile-long Great Rift. The Bureau of Land Management (BLM), under the direction of the Secretary of the Interior is responsible for management of a portion of that expanded area, in coordination with the National Park Service (NPS). As partners, the BLM and NPS manage the public lands within Craters of the Moon National Monument to enhance protection of nationally significant natural and cultural resources while retaining many of the traditional uses of the land.

The BLM supports and echoes the NPS's goal of education, exploration, and protection of the dark sky resource above this Monument. We agree that this accreditation will bring additional positive attention to our surrounding communities and to the Monument itself. And we pledge to continue to do our part in stewardship of this irreplaceable resource.

Sincerely,

A handwritten signature in blue ink that reads "Holly Crawford".

Holly Crawford
Monument Manager



THE BOARD OF BLAINE COUNTY COMMISSIONERS

206 FIRST AVENUE SOUTH, SUITE 300

HAILEY, IDAHO 83333

PHONE: (208) 788-5500 FAX: (208) 788-5569

www.blainecounty.org bcc@co.blaine.id.us

Jacob Greenberg, Chairman * Angenie McCleary, Vice-Chairman * Lawrence Schoen, Commissioner

Board of Directors
International Dark Sky Association
3223 North First Avenue
Tucson, AZ 85719

December 14, 2016

Re: IDSP Designation of Craters of the Moon National Monument

To the IDA Board Members:

Craters of the Moon National Monument and Preserve is worthy of an International Dark Sky accreditation. Partially situated in Blaine County, the Monument already has one of the darkest skies in the lower 48 states. Craters of the Moon National Monument and Preserve encompasses the Great Rift, the deepest known, land-based, open volcanic rift, exhibiting a tremendous diversity of well-preserved, purely basaltic volcanic features including craters, cones, lava flows, fissures, caves and tubes, as well as abundant, relatively pristine sagebrush steppe.

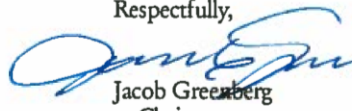
The Monument and Preserve's diverse, continually changing habitats harbor more than 800 plant species, 200 insect species, 10 reptile species, 200 bird species, 63 mammal species, four amphibian species, some endemic species and undoubtedly more species yet undiscovered. Given its special geological and biological characteristics, exploration, scientific research and education has occurred within the NPS Monument for over 100 years.


The NPS Monument typically hosts over 200,000 visitors annually and presents a variety of educational and participatory events for people of all ages. This would complete the landscape for educating the public about resources on the ground as well as the sky. Blaine County is the jumping off point for many of these visitors, who are local residents or tourists visiting the south central Idaho region.


Blaine County supports the Monument's effort to gain this accreditation. Coincidentally, Blaine County has joined neighboring counties to apply for a Dark Sky designation of its own. Our County Comprehensive Plan refers to Dark Sky as one of the attributes that residents appreciate and consider as part of the quality of life offered in our County. Blaine County building permits require down cast lighting. This is an environmentally conscious community that strongly favors your support.

We hope that you consider our comments and vote favorably to accredit Craters of the Moon National Monument and Preserve as an International Dark Sky Park.

Respectfully,


 Jacob Greenberg
 Chairman


 Angenie McCleary
 Vice-Chairman


 Lawrence Schoen
 Commissioner

Cc: Julia Schostak, Centennial Volunteer Ambassador
Wade M Vagias, Ph.D., Superintendent
Craters of the Moon National Monument & Preserve



BUTTE COUNTY COMMISSIONERS

COURTHOUSE
P.O. BOX 737
ARCO, IDAHO 83213
(208) 527-3021
FAX (208) 527-3295

SETH E. BEAL
BRIAN HARRELL
ROSE BERNAL

Board of Directors
International Dark Sky Association
3223 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation of Craters of the Moon National Monument

Friday, January 6, 2017

Dear IDA Board Members,

The Butte County Board of Commissioners would like to inform your board that we support the dark sky accreditation of Craters of the Moon National Monument. Butte County appreciates the relationship we have with Craters of the Moon, and we recognize the benefits that being close to Craters affords us. For example, Craters of the Moon National Monument brings millions of tourist dollars to its surrounding communities which includes our county seat Arco, which is just 18 miles from the visitor center. During the spring, summer and fall months our restaurants, gas stations, hotels, and campgrounds are full of people who are spending time exploring this wondrous National treasure.

As a board, we also recognize the unique splendor and beauty that Craters of the Moon National Monument has to offer. This unusual landscape provides an unmatched educational opportunity that students all over Eastern Idaho, and college students from across the country take advantage of. Currently, there are many people who enjoy star gazing at Craters, and during the summer there are various star gazing events that people can and do enjoy. As we understand it, Craters of the Moon offers dark skies that are better than just about any park in the country. We believe that this accreditation will promote more tourism, and put a national spotlight on our area that we could certainly benefit from. In Butte County, we see Craters of the Moon as an important asset, and we wish to support its various attractions in any way we can.

Sincerely,

Rose Bernal
Acting Chairman
Butte County Board of Commissioners

Craters of the Moon Name Change Committee Support for Dark Sky Designation

The goal of the name change committee is to get the original Craters of the Moon National Monument designated as a National Park. The committee is a coalition of citizens that recognize the intrinsic scientific, scenic, and educational value of the monument and its role as a significant economic stimulus and benefit to the gateway communities. The monument is literally an outdoor classroom for studying basaltic volcanism and draws scientists, students, and visitors from across the country and the world. It currently attracts about 250,000 visitors a year. The monument also preserves a vast swath of sagebrush steppe ecosystem and attendant species, which also affords dark sky protection. As the name "Craters of the Moon" implies, it has from its inception been recognized for its analogs to space and most recently by NASA in a five-year research project in the monument investigating analogs for Mars.

For over two decades the monument has partnered with local astronomical societies to support star parties because of the dark skies it affords and the attendant astronomic learning opportunities. Such dark sky conditions as found in the monument are becoming increasingly scarce. The number of people around the world getting to experience quality dark sky is decreasing every year. This increases the need to let people know where they can find the remaining dark sky. One of the criteria for "Dark Sky" designation is facilitating the utilization of the resource by as large an audience as possible. It is a proven fact that National Parks have greater visibility than National Monuments. Therefore, "Dark Sky" designation dovetails with the name change committee's goals and we the undersigned committee members whole heartedly endorse it.

Karen Owen
Committee Member

Rose Bernal
Butte Co. Commissioner

D E Owen
Retired Park Ranger
Board Member Nat. Hist. Assoc.

[Signature]
Dr. Helen Merrill, D.C.
Chamber of Commerce
President

Nolan C. Olson
BOARD CHAIR, CMMNHA
ASTRO RANGER VOLUNTEER

Marie Cummins
Butte County School Board
Chairman
Executive Director of
Craters of the Moon
Natural History Association

Rhonda F Morris

Rhonda F Morris



City of Ketchum

January 5, 2017

Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

RE: IDSP Designation of Craters of the Moon National Monument

Dear Board Members:

The City of Ketchum is pleased to support Craters of the Moon National Monument in their endeavor to become an accredited International Dark-Sky Park through the International Dark-Sky Association.

Our City is a dedicated, responsible steward of our natural environment and preserving our dark skies is an imperative and longstanding component of our efforts. The City of Ketchum adopted one of the first dark sky ordinances in the state of Idaho in 1999 and is currently in the midst of amending our own Dark Sky ordinance that will augment our protection of the night sky. We are proud to recognize our regional neighbor, Craters of the Moon National Monument, in their efforts.

Craters of the Moon National Monument is an important educational and cultural resource to all of the communities in the surrounding region. With the Park being located just 70 miles from Ketchum, we share the same starry night sky. In 2016, the Wood River Valley community benefited from the partnership between the Sun Valley Center for the Arts and Craters of the Moon National Monument that brought the Craters of the Moon Exhibition to the Center from May – July 2016. Sculptors John Grade and Jason Middlebrook created new works representing the geology and landscape of Craters of the Moon and the City of Ketchum is proud to display the Jason Middlebrook sculpture, *Homage to the Limber Pine (1000 Years of High Winds, Heavy Snow and Countless Gazes)*, in our Little Park adjacent to city hall. Our community is also pleased to host John Grade's large-scale sculpture, *Spur*, adjacent to the Wood River Trail near the southern entrance to city limits.

Our city looks forward to furthering unity in the darkness of the skies in our region and the City of Ketchum fully supports the efforts of Craters of the Moon National Monument in their endeavor to be recognized as an International Dark-Sky Park. The Park's effort to preserve dark skies will be an invaluable resource for the enjoyment, education and inspiration to future generations of people who will live, work and visit our region.

Should you have any questions about our support for Craters of the Moon National Monument's application, please contact me at mayorsoffice@ketchumidaho.org or (208) 726-7803.

Sincerely,

Nina Jonas
Mayor



Craters of the Moon
Natural History
Association, Inc.

P.O. Box 29 ♦ Arco, Idaho 83213 ♦ FAX (208) 527-3073 ♦ Phone (208) 527-1360
Park Support Organization

Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

RE: IDSP Designation of Craters of the Moon National Monument

December 9, 2016

To the IDA Board Members:

Craters of the Moon Natural History Association (Association) is a private not-for-profit corporation established in 1959 by a group of local citizens interested in protecting and promoting Craters of the Moon National Monument. The current Board of Directors has 8 members from the surrounding communities of Arco, Mackay, Idaho Falls and Pocatello. The Association has one full-time staff and 4-6 seasonal and part-time staff which manages a bookstore housed within the visitor center. The bookstore grossed over \$380,000.00 in sales in FY16, and provided \$20,000.00 in direct cash aid and over \$70,000.00 in indirect aid in the form of personnel staffing the visitor center desk. Our mission statement: "Craters of the Moon Natural History Association provides financial and physical support to the National Park Service (NPS) to educate and inspire the public to preserve and explore Craters of the Moon National Monument and Preserve." Our association over the years has provided over \$490,000.00 in aid to the NPS.

The Association fully supports the Craters of the Moon National Monument is its endeavor to achieve dark-sky accreditation. We believe that continuing to preserve this wonderful resource (the NPS has already taken many steps towards preserving the magnificent night sky) can only make Craters an even more spectacular park. We will continue to work side-by-side with NPS staff to achieve their goal and give any financial support necessary.

I would be pleased to answer any questions the Board may have.

Sincerely,

Rhonda F. Morris
Executive Director
Craters of the Moon Natural History Association, Inc.
rhonda@cratersofthemoonaha.org



Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

January 4th, 2017

Re: IDSP Designation of Craters of the Moon National Monument

Dear IDA Board Members,

Since 1973, the Idaho Conservation League has been Idaho's voice for clean water, clean air and wilderness—values that are the foundation for Idaho's extraordinary quality of life. The Idaho Conservation League works to protect these values through public education, outreach, advocacy and policy development. As Idaho's largest state-based conservation organization, we represent over 25,000 supporters, many of whom have a deep personal interest in protecting human health and the environment.

I am writing on behalf of the Idaho Conservation League and its members to express support for dark sky accreditation of Craters of the Moon National Monument. ICL members visit and enjoy this wonderful National Monument throughout the year to hike, cross-country ski and enjoy the beautiful night sky. By achieving Dark-Sky Accreditation, Craters of the Moon can develop a plan to help ensure superb night skies. Having Craters of the Moon become a Dark Sky Park will strongly complement the Central Idaho Dark Sky Reserve once it is established.

I would be pleased to answer any questions the Board may have.

Sincerely,

A handwritten signature in green ink that reads "Betsy Mizell".

Betsy Mizell
Community Engagement Associate

Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation of Craters of the Moon Monument

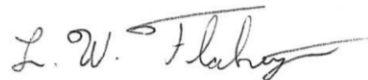
December 31, 2016

To the IDA Board Members:

The Idaho Falls Astronomical Society is a non-profit organization dedicated to educating the public about the Night Sky and general astronomy. Our main avenue for outreach is through the Craters of the Moon National Monument. Since 1991, our members have setup their equipment in the Caves Area parking lot for visitors to participate in an educational experience of the Night Sky. Members are willing and eager to participate in these Star Parties, two to three weekends a year, June through September. We educate the public on various topics including constellations, planets and deep sky objects. In order to properly point out and view these objects it is important that there is no interference from nearby lights, which is what makes Craters of the Moon so great. It would be helpful for Craters to achieve Dark-Sky Accreditation to improve our viewing situation and ensure that the Dark Skies out there stay dark. With the increased popularity of the Craters Star Party comes an increase in the amount of car lights that stray directly into the eyes of observers. I am hopeful that the Dark-Sky Accreditation will give the Park the resources to reduce car lights which is one of our biggest complaints out there. Also, since the Star Party is becoming more popular, a Dark-Sky Accreditation may help the Park with resources to expand the Star Party into multiple parking lots which would help us educate more visitors and attract more amateur astronomers. Finally, I am hopeful that a Dark-Sky Accreditation will provide the Park with enough resources to provide visitors with educational demonstrations or activities intended to further increase their knowledge of the Night Sky.

We would be pleased to answer any questions the Board may have.

Sincerely,



Wescott Flaherty, President
Idaho Falls Astronomical Society



Board of Directors
International Dark-Sky Association
3223 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation of Craters of the Moon National Monument

January 12th 2017

To the IDA Board Members:

Our Mission Statement: *The Lost Rivers Chamber of Commerce promotes and fosters a favorable business climate through networking, advocacy, tourism and educational opportunities for the benefit of Chamber members and our community.*

To this point, we as a Board of the Lost Rivers Chamber of Commerce speaking for our membership, would like to encourage and support the dark sky accreditation of the Craters of the Moon National Monument.

Craters of the Moon National Monument is closely linked to the Lost Rivers Valley and we the residents and businesses of the valley not only frequent the abundant landscape of our Craters, but it's literally our backyard. There is a draw card for visitors to the area from the Monument which helps all our local economies and we believe the designation will enhance the visitor numbers and increase the work we do hand in hand with Craters to have viable gateway communities.

We would be pleased to answer any questions the Board may have.

Sincerely,



Dr. Helen Merrill D.C.

President LRCC