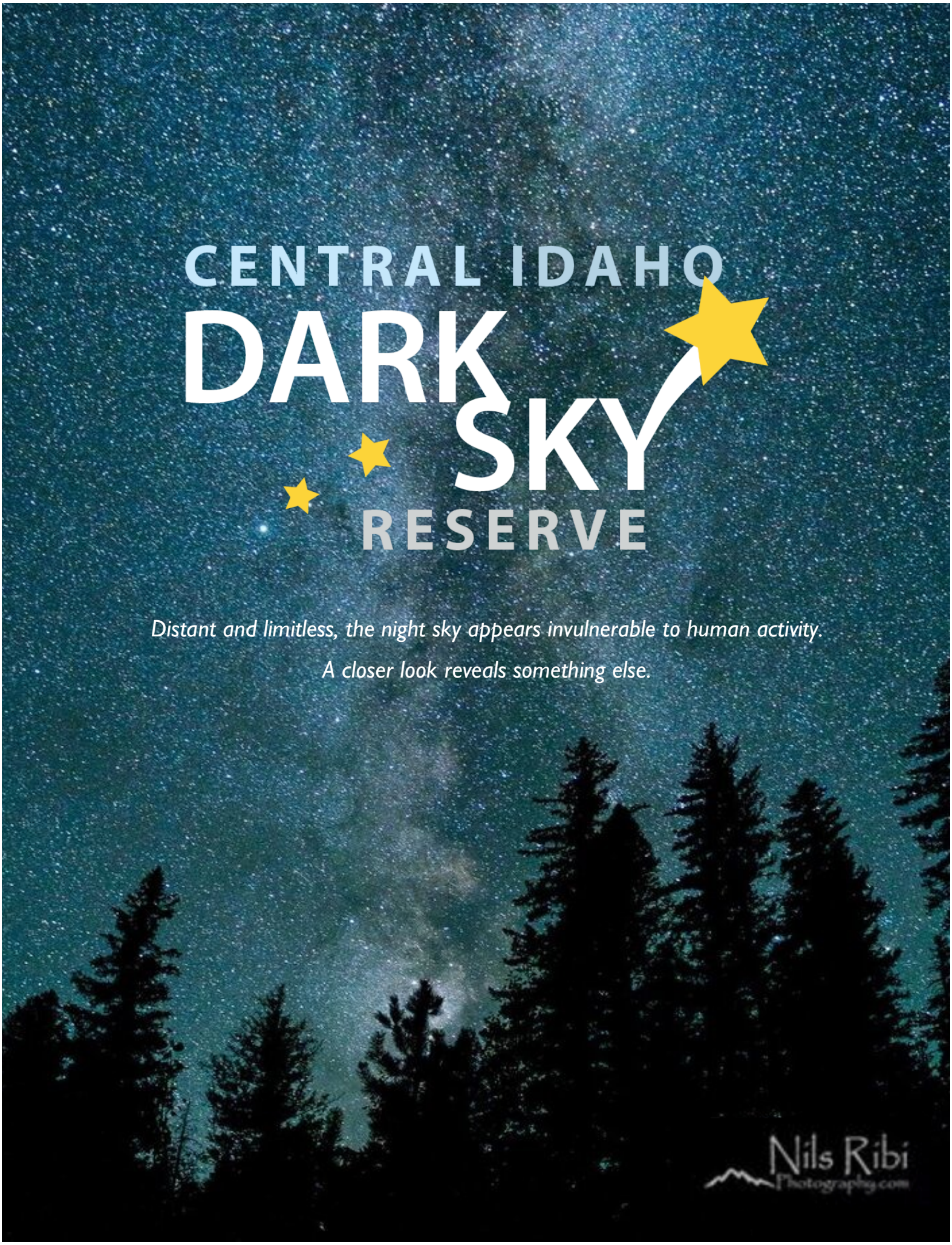
CENTRAL IDAHO
DARK SKY
RESERVE
Distant and limitless, the night sky appears invulnerable to human activity.
A closer look reveals something else.
Nils Ribi
Photography.com

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Executive Summary

Due to increasing urbanization and population growth, the central Idaho region is one of the last remaining sanctuaries for nearly pristine dark night sky in the United States. Sky quality meter measurements confirm that at times the night sky in the Sawtooth Valley is essentially completely free of artificial light pollution. Preserving this remarkable sanctuary is essential to support the natural ecosystem and wilderness areas within the Sawtooth National Recreation Area, a 756,000-acre (306,000 ha.) federally protected area within the National Forest System.

Additionally, protecting the quality of the night sky and reducing light pollution is considered an important quality-of-life value by residents and visitors.

To achieve this protection, the towns and counties within the region have partnered with the U.S. Forest Service to create an International Dark Sky Reserve under the auspices of the International Dark Sky Association. This Central Idaho Dark Sky Reserve will encompass 906,000 ac. (366,800 ha.), including the darkest core areas within the Sawtooth Valley. The primary population centers within the Reserve, Ketchum and Sun Valley, have taken steps through regulation and education to reduce and shield outdoor lighting, and require warmer colors and light frequencies to protect the nocturnal ecosystem. The existence of this Reserve will provide excellent opportunities for education and interpretation related to the dark night sky experience, and will support scientific research into the importance and function of nocturnal ecosystems.

Sawtooth Wilderness

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White Cloud Mountains by night and by day, Central Idaho Dark Sky Reserve. Flaviu Grumazescu photos.

Introduction

The Central Idaho Dark Sky Reserve (CIDSR) encompasses about 906,000 ac. (366,800 ha.) in the northern Rocky Mountains of central Idaho. The dual core encompasses 140,000 ac (57,000 ha.) adjacent to the Sawtooth Valley, within the darkest areas of the Sawtooth National Recreation Area. The CIDSR includes three Congressionally designated Wilderness areas: the Sawtooth (217,000 ac. [87,800 ha.]), the White Clouds (91,000 ac. [36,800 ha.]), and the Hemingway-Boulders (68,000 ac. [27,000 ha.]. Designated Wilderness is defined as:

A wilderness, in contrast with those areas where man and his own works dominate the landscape, is hereby recognized as an area where the earth and its community of life are untrammeled by man, where man himself is a visitor who does not remain. An area of wilderness is further defined to mean in this Act an area of undeveloped Federal land retaining its primeval character and influence, without permanent improvements or human habitation, which is protected and managed so as to preserve its natural conditions and which (1) generally appears to have been affected primarily by the forces of nature, with the imprint of man's work substantially unnoticeable; (2) has outstanding opportunities for solitude or a primitive and unconfined type of recreation; (3) has at least five thousand acres of land or is of sufficient size as to make practicable its preservation and use in an unimpaired condition; and (4) may also contain ecological, geological, or other features of scientific, educational, scenic, or historical value.[1]

White Clouds Wilderness and Castle Peak

The CIDSR contains the entire 756,000 ac (306,000 ha.) Sawtooth National Recreation Area (Sawtooth NRA), a federally protected area managed by the U.S. Forest Service. The three Wilderness areas are included within the Sawtooth NRA.

The purpose of the Sawtooth NRA is:

"…to assure the preservation and protection of the natural, scenic, historic, pastoral and fish and wildlife values and to provide for the enhancement of the recreation values associated therewith . . ."[2]

[1] P.L. 88-577; The Wilderness Act of 1964, Section 2

[2] P.L. 92-400; Sawtooth National Recreation Area Act of 1972, Section 1

White Clouds Wilderness.
Flaviu Grumazescu photo

South of the Sawtooth NRA, the CIDSR includes the cities of Sun Valley (population 1,406) and Ketchum (population 2,689) and adjacent parts of Blaine County, Idaho. These three areas produce the most significant amount of the light pollution within the reserve area that affects the Dark Sky Reserve cores. Sun Valley, Ketchum and Blaine County have enacted outdoor lighting ordinances that require shielding outdoor lights.

Despite the rapid population growth in southern Idaho, the CIDSR remains one of the darkest places in the western United States. Preserving the dark night sky resource is essential to preserving the values enumerated in the Wilderness Act and the Sawtooth National Recreation Area Act. In particular, the Reserve will preserve the primeval character of the area and ensure that the imprint of man's work is substantially unnoticeable. Protecting the dark night sky resource helps preserve the natural, scenic, historic, fish and wildlife, and recreation values of the Sawtooth NRA. The Sawtooth NRA and wilderness areas include relatively intact natural ecosystems that depend on a night sky unpolluted by sky glow and localized light pollution.

Two state highways, routes 21 and 75, provide access through the heart of the Reserve. About 657,000 people visit the Sawtooth NRA annually using these highways[3]. The three iconic natural wonders of Idaho--Redfish Lake, Sawtooth Lake, and Castle Peak--lie within the NRA. Substantial portions of highways 21 and 75 cross vast subalpine meadows within the Sawtooth Valley, providing panoramic views of the Sawtooth Range and the White Cloud Mountains. These open meadows provide excellent vantage points for viewing the dark night sky. Many visitors arrive from the cities of Twin Falls and Boise in southern Idaho. Significant light pollution from outdoor lighting in these cities obscures the Milky Way, providing an incentive for increasing astro-tourism within the CIDSR.

[3] U.S. Forest Service National Visitor Use Monitoring Survey, 2005

Foundational Research[4]

Wildlife and Ecosystems

The importance of natural light cycles for the healthy regulation of biological and ecological processes can hardly be overstated. Diurnal rhythms drive and coordinate many physiological states and behaviors across the plant and animal kingdoms. Plant responses to seasonal variations are largely initiated by seasonal changes in light patterns. Artificial light confuses these natural systems, causing plants to behave dis-seasonally, ultimately affecting the wildlife that rely on flora for their natural habitat (Gaston 2013).

Research shows that light pollution affects all manner of wildlife, including insects, turtles, birds, fish, reptiles, large predators and prey; changes have been recorded in feeding and breeding behaviors in response to nighttime light pollution, in both urban and rural areas (Chepesiuk 2009). "It has been argued that the biological world is organized largely by light" (Gaston, 2013). Against these ancient, predictable, and reliable cycles, evolution and ecology developed and sustain themselves. Disruptions to breeding and feeding behaviors pose a meaningful threat to wildlife and ecosystems and should be avoided whenever possible.

Before the enormous growth of human-driven light pollution, the lunar cycle was the regular disrupter of the dark sky. Even this natural light changes wildlife behavior and interaction. "Moonlight-driven cycles in predator-prey activity have been observed in such taxonomically diverse species as zooplankton and fish, predaceous arthropods, blue petrels and brown skuas, owls and rodents, and lions and humans" (Gaston 2013). Imagine, then, the widespread effects of human-caused nocturnal light pollution on natural cycles, given the interdependence of the natural world and that many seeing organisms alter their behaviors at levels well within the spectrum of anthropogenic light pollution. It "raises the likelihood that disruptions to the rhythms of individual species by nighttime lighting can ramify widely" (Gaston 2013).

Light is a key environmental cue that regulates many key processes within the natural world. It is also a growing area of concern, particularly for the National Park Service that operates under the mandate to protect natural processes. "Almost all small rodents and carnivores, 80 percent of marsupials, and 20 percent of primates are nocturnal. 'We are just now understanding the nocturnality of many creatures,' says Chad Moore, Night Sky Program manager with the National Park Service. 'Not protecting the night will destroy the habitat of many animals'" (Chepesiuk 2009).

[4] *Foundational research text was provided by Boise State University, School of Public Service. Text was authored by Dawn Brockett, Diane Donald, Dani Dunstan, Kirstin Mann, Kevin Richert, and Kim Young. Project was advised by Monica Hubbard.*

Protection of habitat is fundamental to conservation, a priority of many agencies and communities:

The idea of adequate protection around sensitive areas is widely accepted in ecology. An increasing number of communities near areas of exceptional night sky quality have taken steps to protect this valuable resource. Of the many factors that degrade wilderness character, wasteful or excessive outdoor lighting is the easiest to remedy, and the resource is 100 percent recoverable (National Park Service 2016).

The great news is that light pollution can be reduced and regulated. Attention to this pollutant can benefit entire ecosystems, from the smallest plant to the largest creature, allowing them to remain in step "with their climate (and) with the timing of other organisms (such as pollinators or food sources)" and better able to adapt to other environmental threats (Gaston 2013).

Energy Waste

In a 2001 essay, Joe Sovick of the National Park Service's Intermountain regional office in Santa Fe, New Mexico, argued ardently for the aesthetics of the unspoiled night sky. He made a bottom-line appeal; "Sky glow does not have to be accepted as an unavoidable impact of growth and development. Appropriate lighting measures are available, and these measures are more energy efficient and less costly to operate than inappropriate ones."

Nonetheless, the use of costly, consumptive lighting has become a widespread problem with far-reaching financial implications. The direct costs add up as poorly designed fixtures disperse wasted light into the night sky. "'Wasted light' is defined as light that shines up into the sky where it does no good – or pretty much any light that doesn't shine directly on the ground," (Filmer 2013).

Thirty percent of light falls under this definition. According to the International Dark Sky Association, this wasted light translates to $3.3 billion in wasted cost annually, and the release of 21 million tons of carbon dioxide per year. "To offset all that carbon dioxide would require planting 875 million trees annually" (IDA, Light Pollution Wastes Energy and Money n.d.).

However, the indirect, upfront costs of wasted energy are also considerable. Utilities generate 65% of electricity by burning fossil fuels — nonrenewable resources that must be extracted from the earth[5]. Wasted light squanders these finite fuels; Filmer (2013) estimates the impact at 3.6 millon tons of coal or 12.9 million barrels of oil per year. "By simply shielding lights and lowering bulb wattage to a reasonable level, the consequences of light pollution could be easily avoided and we would save quite a bit of money that could be used for scientific research and to solve problems elsewhere" (Filmer 2013).

[5] U.S. Energy Information Administration, April 18, 2017

Night Sky Heritage & Culture

"A grizzly bear (Cygnus) climbed up a tall mountain to go hunting in the sky. As he climbed, snow and ice clung to the fur of his feet and legs. Crossing the sky the ice crystals trailed behind him forming the Milky Way." – *Shoshone-Bannock Tribes*

Collected from American Indian Starlore
Brad Snowder, Western Washington University 7

Night skies are a connection between all humans and all time. The myth quoted above is from the Shoshone-Bannock Native Americans, who lived in the area now proposed as the Central Idaho Dark Sky Reserve. The night sky is "...intimately connected with cultural history… and bear(s) witness to such activities throughout the ages" (UNESCO Astronomical Heritage 2016). Astronomy has and continues to play this important role in religion, history, and culture. Night skies have been relied upon for timekeeping, worship, navigation, landscape recognition, and storytelling, yet do not enjoy universal protections. The cultural significance of astronomy in myths, legends, and science is being lost as the dark night sky is lost to more and more people due to increasing light pollution.

It is important that humans begin to recognize night skies as an asset. Currently, most protection for astronomical-related history comes through the preservation of historic sites — UNESCO protections of Stonehenge, for example.

Many communities are individually working to establish lighting plans that protect dark skies, but they are site-specific and rarely uniform. While UNESCO is working to establish astronomical heritage partnerships and goals, many of these are still preliminary and largely unenforceable. Dark sky initiatives are widely recognized as one of the best methods of preservation of our astronomical heritage. The International Dark Sky Association (IDA) provides the benefit of expert oversight, ongoing monitoring, and long-term recognition.
IDA dark sky designations are the most effective way to protect night sky visibility and ensure that this cultural resource remains available for future generations (UNESCO Astronomical Heritage 2016).

Human Health

The dark at night is critical to the natural biological processes that facilitate human health. The arguments regarding the relationship between artificial light at night and human health tend to focus on sleep (disrupted sleep and reduced sleep quality), melatonin production (or reduced production without the natural diminution of light into the evening), and the circadian rhythm (the natural 24-hour light-dark cycle shared by nearly all organisms). Drs. Richard Stevens and Yong Zhu (2015) address the relationships among these three factors and the critical importance of the dark.

Light during the night, even at very low levels, may help cause disrupted sleep. While sleep is deeply important to well-being, so too is exposure at night to dark. The importance of sleep has finally entered mainstream thinking and practice; however, the importance of dark is still greatly underappreciated. Without dark, sleep is difficult and compromised. Without dark, circadian rhythmicity, as reflected in nocturnal melatonin productions, is disrupted. Both sleep disruption and circadian disruption have been shown to have profound effects on physiology. Absence of dark at night can lead to both, which many then have negative effects on long-term health in a vast array of maladies.

Dr. Paolo Sasson-Corsi, chair of the pharmacology department at UC Irvine, focuses his research on the human circadian clock and the biological effects of its disruption. In an article written by Chepesiuk (2009), Sasson-Corsi explains why such a parade of maladies can follow something so seemingly simple as exposure to artificial light at night.

The 24-hour day/night cycle, known as the circadian clock, affects physiologic processes in almost all organisms. These processes include brain wave patterns, hormone production, cell regulation, and other biologic activities. Disruption of the circadian clock is linked to several medical disorders in humans, including depression, insomnia, cardiovascular disease, and cancer. Studies show that the circadian cycle controls from 10 to 15 percent of our genes, so the disruption of the circadian cycle can cause a lot of health problems.

Dr. Sasson-Corsi is in good company in his concern — extending the length of the day with artificial light, a seemingly practical human habit, has serious health implications. Dr. Falchi et. al., issued this warning: "There is reliable evidence that this artificial extension of the day produces serious adverse consequences to human health and environment" (Falchi et. al. 2011). Further, "alteration of the circadian clock may cause performance, alertness, sleep and metabolic disorders" (Falchi 2011). Add to that list reduced cell-cycle regulation, impaired DNA damage response, changes to the hormonal regulation of leptin and ghrelin, which affects obesity, and reduced glycemic control, which affects diabetes (Stevens 2015).

Years of research led to a decision in 2007 by the International Agency for Research on Cancer (a component of the World Health Organization) to classify "shift work that involves circadian disruption" to be a probable carcinogen, putting it in a category with "anabolic steroids, vinyl fluoride, nitrogen mustard and 62 other agents" (Stevens 2015; Pauley 2004; Blask 2003; and Fritschi 2009).

Clearly, artificial light at night is not simply a nuisance but a real concern for human health. The dark night communicates something fundamental to our human biology.

Light is a key environmental cue. The natural biological processes that provide the foundation for good health — for humans and wildlife alike — rely on the dark night and uninterrupted circadian rhythms.

Artificial light impacts feeding and breeding behaviors, disrupting cycles developed over the duration of evolution of both flora and fauna. Light pollution also carries an exorbitant financial cost, as finite resources are squandered to produce wasted and harmful light. Light pollution also comprises a cultural heritage shared across traditions, religions and storytelling. This is a universally shared experience that does not enjoy universal protection.

To combat these many problems, communities across the country and across the world have taken steps to preserve the night sky and limit light pollution. The preservation options are as varied as the communities themselves.

The Central Idaho Dark Sky Reserve Region

Little Redfish Lake at Sunset. Charles Knowles Photo.

The Central Idaho Dark Sky Reserve will encompass the communities of Stanley, Lower Stanley, Smiley Creek, Ketchum and Sun Valley. The combined population of these communities and land area is approximately 4200 year-round individuals. The summer months are peak for visitation, often tripling the number of people living within the area during this time.

Communities

Stanley, Idaho (Pop. 63)

Located in Custer County, the City of Stanley is a quaint town that sits at the scenic base of the Sawtooth Mountain range and is located at an elevation of 6,260 feet (US Climate Data 2016).

Stanley is surrounded by the Sawtooth National Recreation Area, and is unable to grow beyond its current 308 acres (125 ha.)

Founded in 1890, the City of Stanley was named for Civil War veteran Capt. John Stanley, who discovered gold at the base of the Sawtooth Mountains while passing through the area on his way to Idaho City (Historic Stanley 2016). Stanley has a year-round population of 63 individuals. During the summer months, Stanley is a mecca for recreation, bringing in visitors from around the world who are seeking adventure activities such as hiking, camping, boating, fishing, and mountain biking.

Smiley Creek and the Sawtooth Valley, Idaho

Upstream from Stanley is the Sawtooth Valley, a region surrounded by snow-capped mountains, spectacular scenery and abundant wildlife. The unincorporated community of Smiley Creek, located in Blaine County, sits near the headwaters of the Salmon River and at the top of the basin.

Smiley Creek boasts the Smiley Creek Lodge, a year round destination for visitors. With the Sawtooth, White Cloud, and Smoky Mountain Ranges surrounding Smiley Creek Lodge, it provides the perfect base camp for hiking, biking, hunting, snowmobiling and skiing. Near Smiley Creek is also the historic mining town of Vienna.

Lower Stanley

Lower Stanley is an unincorporated community within Custer County, located about one mile (1.6 km) downriver from Stanley. Lower Stanley also provides an array of recreation and tourism services, such as motels, restaurants, outfitter/guides, and a general store.

Ketchum, Idaho (Pop. 2,689)

The city of Ketchum, located within Blaine County, sits at an elevation of 5,853 feet (Ketchum 2016). The city lies beneath Bald Mountain, the area ski resort which offers skiing in the winter along with breathtaking mountainous views. In the summer months, Bald Mountain offers opportunities for hiking and downhill mountain biking.

Ketchum's scenic water attractions are also notable. The Big Wood River runs through the city and provides swimming, fishing, kayaking, and boating opportunities for its residents (Hansen 2009). A variety of natural hot springs also offer excellent settings for watching the night sky, especially during the cold winter months.

History

Named after trapper and guide David Ketchum, the city of Ketchum was supported economically by the mining boom and became one of the richest mining districts in the Northwest. However, this lasted only from 1880 to 1890, ending once the price of silver declined. Thus the city's new industry of sheepherding was born and became its economic focus. By 1920, Ketchum had the largest sheep and lamb shipping station in the United States and second in the world (History of Ketchum 2016).

The city began to flourish in 1935 as the Union Pacific Railroad came to town, bringing with it gambling opportunities until 1954 when the practice became banned (History of Ketchum 2016).

Famous American author and Nobel Prize winner, Ernest Hemingway, lived and died in Ketchum and often found inspiration for his writings from Idaho's landscapes (Ketchum U.S. History 2016).

"Best of all, he loved the fall, the leaves yellow on the cottonwoods, leaves floating on trout streams and above the hills the high blue windless skies . . . Now he will be a part of them forever."

-Ernest Hemingway

In 1973, the Sawtooth Recreation Area opened its doors north of Ketchum, making Ketchum one of the gateways to the Sawtooths. Ketchum is now a year-round resort and recreation area (History of Ketchum 2016).

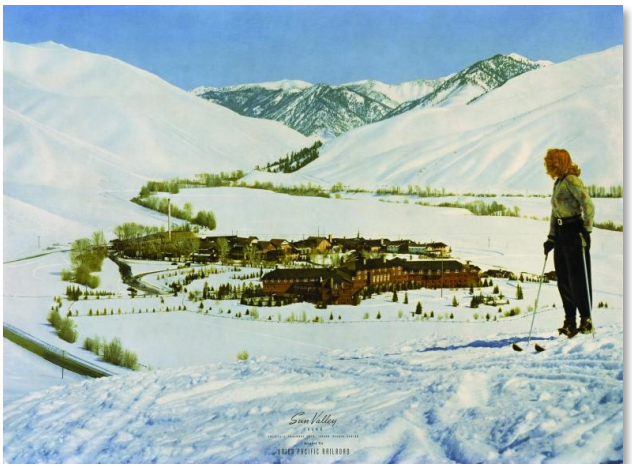
Sun Valley, Idaho (Pop. 1609)

The City of Sun Valley sits at the edge of the Sawtooth and Challis National Forests. Located in Blaine County, Sun Valley enjoys a pleasant mountain-desert climate and sits at an elevation of 5,750 feet" (About Sun Valley 2016). Sun Valley is home to the area's first resort skiing opportunities. Today, skiers still enjoy the slopes adjacent to the Sun Valley Lodge on Dollar Mountain and on Bald Mountain.

History

Sun Valley was born out of the depression when W. Averell Harriman, chairman of the board of Union Pacific Railroad, came to the region looking to develop industry and passenger travel in the west (Sun Valley, US History 2016). "In his travels to Europe, Harriman had visited fine ski resorts and in the United States, skiing was quite limited — largely confined to the icy trails of New England where sub-zero temperatures and gloomy skies made the sport hard to promote" (Sun Valley, U.S. History 2016).

"Harriman had his idea, but no idea of where to build his dream. He called upon the services of Austrian Count Felix Schaffgotsch, whom he had met somewhere in European society.



Original Marketing Poster for Sun Valley Skiing

He brought the count to the United States in the fall of 1935 and gave him a simple set of instructions — search the American West and find an area where the powder is dry, the sun shines all day, and the harsh winds of winter don't penetrate. There was one stipulation: Harriman wanted the resort on or close to the Union Pacific line" (Sun Valley, U.S. History 2016).

Thus Sun Valley was on the map. The name "Sun Valley" was thought up by a New York public relations agent, Steve Hannigan, who thought the name appropriate for a place that receives 250 days of sunshine a year (Sun Valley Fun Facts 2016).

Sawtooth National Forest

In addition to the communities of Stanley, Lower Stanley, Smiley Creek, Ketchum and Sun Valley, the Central Idaho Dark Sky Reserve would include a notable amount of public lands administered by the Sawtooth National Forest's Ketchum Ranger District and Sawtooth National Recreation Area.

Both Forest Service districts are known for their accessible trail systems and spectacular scenery. Recreational pursuits include camping, hiking, backpacking, fishing, boating, canoeing, rafting, nature observing, motorcycle trail riding, photography and bicycling.

Ecosystem

Climate

Because the CIDSR includes within its boundaries a variety of geography, river drainages, altitudes, and geology, the climate conditions differ. The primary themes they share are clear dark skies and accessibility.

Wood River Valley, including Ketchum, Sun Valley and Galena Pass.

The altitude ranges from 5,580 feet to 8,701 feet, with the lowest point in Ketchum and the highest the Galena Pass summit, the source of the Big Wood River drainage. (The Boulder and Smoky Mountains lie in this area as well, but are not included in the base climate averages or altitudes.) Annual average snowfall ranges from 112 inches in Ketchum to considerably more at Galena. Rainfall averages 13 inches, reflecting the high desert climate. Unlike many other mountain climates, the average days of sunshine and nights of starry skies in the Wood River Valley are 205 days for clear weather and only 84 days of precipitation. The remainder of the days and nights often feature clearing skies after either rain or snow, primarily in the fall and spring.

Stanley Basin, Sawtooth and White Cloud Mountains

The base altitudes in this Salmon River Drainage range from 6,253 feet at the town of Stanley to 5,253 feet near Challis, just outside the CIDSR. The mountain range peaks range from 10,751 feet (3,277 m) in the Sawtooths and 11,815 ft (3,601 m) in the White Clouds. Multiple lakes dot both ranges, formed from glacier action in millennia past and snow run-off every year. The Stanley Basin's alpine subarctic climate produces 290 mornings with frost and 60 nights at 0 degrees F or lower. Stanley lies at the intersection of state highways 21 and 75. H 21 connects Stanley to the urban center and state capital Boise, while H 75 connects Stanley with Ketchum, Challis and the urban center of Twin Falls. These highways provide access through the heart of the Central Idaho Dark Sky Reserve both winter and summer. This town is often the coldest location in the United States during the winter. Average snowfall is 75 inches, rainfall is 13 inches and the record high has been 98 degrees and the record low, -54 degrees. These cold temperatures result from cold air pooling at night in the Stanley Basin from the surrounding Sawtooth and White Cloud mountain ranges. This creates a strong inversion with very cold, clear nights ideal for viewing the night sky. The Basin enjoys 202 sunny days a year, with precipitation at 71 days—hence many nights of starry skies. The mountains often create their own weather.

Flora and Fauna

The varying climate and geography of the CIDSR affects the kinds of flora and fauna to be found in the two main river drainages.

A multitude of wildflowers in season color the meadows, riparian areas, hills and mountains of the high desert features in the *Wood River* drainage. These include: Indian paintbrush, arrowleaf balsamroot, mule's ear, various shades of lupine—lavender, white, pink, combinations; mountain bluebells, pussytoes, pearly everlasting, false solomon's seal, several varieties of dandelions and yellow daisies, camas lilies (both death and blue), sego lilies, catmint, multiple varieties of penstemon, scarlet gilia, yarrow, buckwheat, bitterroot lilies, gallardia or blanketflower, orange mallow, wild blue flax, phlox, fireweed, and wild peony. This is just a small listing of the flowers in the CIDSR.

Trees and shrubs shade the north sides of the hills and mountains and river and creek beds in the *Wood River* drainage. Trees include quaking aspen and cottonwoods, as well as large stands of lodgepole pine and Douglas fir. Other varieties are western white pine, whitebark pine, subalpine fir, Jeffrey pine, mountain hemlock, spruce and juniper. Shrubs and grasses range from sagebrush, bunch grass, Great Basin rye grass, bitterbrush, rabbitbrush, rice grass, and some cheat grass. The grasses flourish in the spring and are an alchemist's dream in the fall, turning all the hills to gold. This drainage has escaped the pine beetle plague found in the northern drainage, but does suffer from white pine blister rust and other beetles. Nevertheless, most of the area flourishes with many species.

The *Salmon River* drainage and the *Stanley Basin* grow many of the same wildflowers and trees and shrubs. The lodgepole pines suffer from pine beetle outbreaks and huge stands have been ravaged and appear red in seas of green. Because of the subarctic clime, the flowers appear later and disappear earlier. Most of the mountain peaks are granite and their rocky spires do not support much plant life, although mountain sheep and goats find sufficient forage to survive.

Fauna for both drainages are similar. Freshwater fish include several varieties of trout and salmon for which the northern river valley is named and steelhead. Rainbow, cutthroat, brown and brook trout fill the rivers and lakes of the area. Salmon spawn and are introduced by a major fish hatchery in the Salmon River area. The salmon follow the drainages to finally reach the Pacific Ocean. They are anadromous and return to the mountain rivers from whence they came, surmounting unbelievable obstacles such as dams on the Columbia and Snake Rivers, but return they do. For a number of years, the returning salmon numbered in the single digits, but in recent years the numbers have increased.

Mountain lions, bears, wolves, coyotes, and even wolverines live in the forested areas as the largest predators. Both areas also support white tail and mule deer, moose, elk, mountain goats, bighorn sheep, and pronghorn antelope, both in the back country and in the

populated areas. Lynx and wildcats, weasels and fox comprise the smaller predators who feed on snowshoe rabbits, cottontails, red squirrels, ground squirrels and a variety of mice and voles. Beaver, otters and muskrats live in and around the various water sources: creeks, rivers, lakes, ponds, marshes. Birds either live in the two drainages or spend seasonal times. The fly-bys and seasonal birds include sandhill cranes, red-winged and yellow-headed blackbirds, meadowlarks, mountain bluebirds in the summer; a variety of ducks such as Barrow's and common goldeneyes and trumpeter swans over-winter, leaving for the north in the spring. Year-around birds include great blue herons, bald and golden eagles, any number of hawks such as red-tailed, Swainson's, harriers, rough-legged and kestrels. Falcons sometimes stay all year although some species leave for warmer climes along with the sandhill cranes. Other birds that live in the area all year include American goldfinch, rosy-headed finches, house and Cassin's finches, black-capped chickadees, juncos, great horned- and barn owls and turkey vultures. Magpies, ravens and crows are ubiquitous in all seasons.

Nocturnal Life

Nearly all of the predators and ungulates and many of the smaller rodents lead nocturnal lives. In the winter, elk, moose, and deer are visible during the day as they forage for food under the snow. This in turn draws wolves, coyotes and cats to follow them, seeking food as well. Winter roads can be dangerous at night because of the active animals—crossing to get to water, foraging near roads that provide easier traveling in the day or at night.

Geography and Geology

The CIDSR is rife with mountain ranges and river valleys separating the mountains. From Ketchum to Galena Pass, lie the complex mountain ranges of the Boulders and the Smokys, backed by the Pioneers. The older mountain rocks are Paleozoic sedimentary formations. These folded structures broke along faults and granite intruded the Idaho batholith during the late Cretaceous age, between 70 and 90 million years ago. About 50 million years ago, more granite and volcanic rocks covered the older bedrock. The Paleozoic sedimentary formations tend to be dark or black in color because they contain organic matter. The volcanic rocks in the same area are mostly rhyolite, which tends to be pale (Alt and Hyndman 2006).

In the Sawtooth Valley, north of Galena, lie deep deposits of sediment from glacial outwash. Moraines from this glacial activity can be seen around Redfish Lake as in other areas of the Basin. The Sawtooth Mountains, as well as the Boulders, White Clouds, and Smokys are mostly granite from the various intrusions over the eons and make up a large part of the central Idaho batholith. The scarp of the Sawtooth fault creates the steep front of the Sawtooth Range. Movement along that fault lowered the Stanley Basin while it raised the mountains. A complex of metamorphic and igneous rocks can be found in outcrops in the mountain front facing the Basin (Alt and Hyndman 2006).

The serrated ridgeline and gouged valleys of the Sawtooths provide evidence of mountain glaciation. Glaciers traveled just beyond the mouths of the valleys but not onto the floor of the Basin. There, the deposits of gravel resulted from the meltwater from the glaciers on both sides of the Basin. The lower lakes—Stanley, Redfish, Pettit, and Alturas—all nestle within the moraines along the fault scarp at the front of the Sawtooths. The White Clouds stand as tall as the Sawtooths, but are glaciated only in their upper reaches (Alt and Hyndman 2006).

Existing Land Protections and Conservation

The U.S. Congress established the Sawtooth National Recreation Area (SNRA) in 1972 with the passage of Public Law 92-400 which sought to preserve and protect the Area's "natural, scenic, historic, pastoral, and fish and wildlife values and to provide for the enhancement of the recreation values associated therewith." Public Law 92-400 also established the Sawtooth Wilderness which exists on the western boundary of the CIDSR. Congress' effort to protect the SNRA was in part aimed at preventing the development of high-density subdivisions that were beginning to spread throughout the area and mar its scenic beauty. Because of this forethought, public lands existing within the SNRA are a critical component for maintaining high quality night sky.

In August 2015 U.S. President Barack Obama signed into law Congressman Mike Simpson's legislation creating three new Wilderness areas in this region. The legislation, The *Sawtooth National Recreation Area and Jerry Peak Wilderness Additions Act (H.R. 1138),* created the White Cloud Wilderness and the Hemingway-Boulder Wilderness areas proposed for inclusion in the CIDSR.

Cultural History

This section places the CIDSR in a cultural context to reflect the inhabitants and their customs and works over the many years in which the area has been populated.

The area included in the CIDSR is the traditional home of the Shoshone native tribes. Although these tribes once dominated the high deserts from Oregon to Wyoming, taking in most of central Idaho, their only official homeland now is the Fort Hall Reservation near Pocatello. Their customs and Uto-Aztecan language classify them in the Great Basin native tradition. The Bannocks share this reservation, and previously occupied eastern Idaho. All of these natives shared similar lifestyles as semi-nomadic hunters and gatherers. Some of the earliest peoples probably arrived as Eurasian hunters who crossed the Bering land bridge from Siberia during one or more of the Ice Ages, although new studies posit other origins.

Over time, early humans progressed from nomadic to semi-permanent residences. They hunted deer, elk and mountain sheep. They relied on salmon, both winter and summer, and also dried and ground into foodstuffs. They

harvested camas bulbs, bitterroots and biscuit roots. An abundance of rock art can be found in areas south of the CIDSR. Europeans invaded the central Idaho area in search of beaverskins and then gold and finally lead and silver.

Following the western migration of pioneers, many coming for the minerals or on their way to Oregon, but stopping in Idaho instead, mines filled the area around Ketchum and Galena and up into the Stanley Basin into Smiley Creek, Obsidian, and Sawtooth City, among others. Gold played out first, but not after major destruction to the water courses north of Stanley. Hard rock mines for lead and silver lasted longer, but eventually, all of the gold, silver and lead mines in the CIDSR area closed. The next occupants of the area were sheep and sheepherders. Sheep ranchers grazed their bands in the upper reaches of both the Wood River Valley and the Stanley Basin, employing Basque sheepherders and sheep dogs to keep the animals grazing all summer. In the fall, the sheep were herded back to warmer weather south of the CIDSR area. Ketchum itself became one of the largest sheep transport stations in the country, shipping out millions of sheep every fall. The towns, however, lost much of their populations with the closing of the mines.

Some agricultural activities, in addition to sheep, have continued over the years, including cattle, alfalfa farming, rye, and a few other crops. The economic impact is not significant in this day and age, although organic farming is making a comeback in the area.

The economic base of Ketchum and the surrounding Wood River Valley changed again with the coming of winter sports and the establishment of the Sun Valley Resort in 1936. Tourism has become the mainstay of the Wood River Valley and the Salmon River Valley and the Stanley Basin. Sun Valley is a four seasons resort, supporting skiing and other snow sports in winter and golf, fishing, biking, camping, and hiking in summer. Stanley draws summer tourist traffic for river running, fishing, camping, and hiking, surrounded by the stunning scenery. Hunting attracts hunters from around the world during the appropriate seasons. Fishing is also world class for trout—rainbows, browns, cutthroat, and brooks—and for salmon and steelhead.

Ketchum has become home to a Summer Symphony, free to all; a Writers' Conference; numerous lecture and arts events; artists, writers, and musicians. Art galleries support local and outside artists, and music venues bring in bands and solo acts. A large number of nonprofit organizations are headquartered in Ketchum and several in Stanley to support the arts, social services, health and safety, and education. Each town has an active library. Public and private schools support the children of the valleys, as well as providing opportunities for sports, environmental resources, and nature activities.

Central Idaho Dark Sky Reserve

The goal of the Central Idaho Dark Sky Reserve is to limit light pollution in a pristine part of south central Idaho, by day one of the most beautiful places in the world, and by night one of the darkest places in the USA.

Community Vision

The Central Idaho Dark Sky Reserve is an expression of a collective commitment by communities, private landowners, and public land managers to support the dark sky experience. Together we will preserve and enhance our superior nighttime ambience and its benefits on health, tourism, and the environment. The Central Idaho Dark Sky Reserve will be the first of its kind in the United States and will set the standard for other regions to follow. Through this effort we hope to:

- Preserve and enhance the natural nighttime experience to improve quality-of-life.
- Highlight the economic benefits associated with dark sky compliant lighting–from energy savings to tourism revenue.
- Conserve our robust nocturnal ecosystems and support the needs of wildlife.
- Enhance local scientific and education opportunities through astronomy and other natural studies.
- Promote our dark skies as a unique community asset and part of our national heritage

Collaborators

- City of Stanley, Idaho
- City of Ketchum, Idaho
- City of Sun Valley, Idaho
- Blaine County, Idaho
- Sawtooth National Recreation Area, United States Forest Service
- Idaho Conservation League
- The Sawtooth Society
- The Sawtooth Interpretive and Historical Association

Dark Sky Commitment

The concept of dark sky preservation is not new to this area —the city of Ketchum passed a municipal dark sky ordinance in 1999, followed by Hailey in 2002, Sun Valley in 2004, Blaine County in 2010, and Custer County in 2010[6]. Recently (April 2017), the City of Ketchum passed a revision to their original1999 dark sky ordinance. At the time of this writing, the City of Sun Valley was also reviewing their ordinance for potential revisions. Within the CIDSR, ninety-nine percent (99%) of the non-Wilderness land area and ninety-nine percent (99%) of the incorporated city area is regulated by existing outdoor lighting ordinances. Night sky quality can also be attributed to the sparse population and lack of development within the area. There are no large shopping centers, no used car lots, no fast food drive-through stores, and no outdoor stadiums. Population density within CIDSR is about 3 people per square mile.

Commitment to maintaining high quality night skies goes beyond the passage of

[6] Central Idaho's dark sky ordinances are included in Appendix A.

community ordinances and is evidenced by existing federal laws, ongoing area astronomy and dark sky efforts, and the willingness of local communities to support night sky preservation.

SNRA: Foundational Laws and Long-Term Planning

The U.S. Congress established the Sawtooth National Recreation Area (SNRA) in 1972 with the passage of Public Law 92-400. This act sought to preserve and protect the "natural, scenic, historic, pastoral, and fish and wildlife values and to provide for the enhancement of the recreation values associated therewith." To date, this foundational law has largely achieved the goal of preserving these values.

In 2006 the Sawtooth Society and the U.S. Forest Service spearheaded a strategic planning effort known as Vision 20/20. Vision 20/20 represents an important and collaborative effort by a broad array of stakeholders and resulted in long-term shared strategies to best manage the SNRA now and into

the future. The planning effort, which is now in implementation, addresses desired conditions in the SNRA in 2041 and means to achieving these goals. The steering committee and collaborative partners meet every few years to re-evaluate goals and assess progress. The 2011-2013 action plan identified the following historical, pastoral and scenic desired conditions:

"Visitor and residents of the Sawtooth NRA experience a tangible sense of place when they cross the NRA boundaries. Open, diverse and relatively natural scenic vistas are dotted by buildings and other developments consistent with the historic scale and design that characterize the area. Scenic view corridors include traditional, sustainable land uses such as ranches, with the visible presence of livestock and agricultural equipment. Clean air and water, along with a dark night sky, are valued characteristics of this area. Recreational and commercial activities and transportation corridors within the Sawtooth NRA generally reflect a quieter and slower pace. Private lands afford reasonable access to public lands. Preserved historic building and sites offer both a glimpse into the past and an educational opportunity for residents and visitors."

Objectives and measurements of success related to night sky preservation were also established:

Priority	Objective	Action (2011-2013)	Action Leader(s)	Measurement of Success 2013
B (0)	Protect critical scenic resources	Enact dark sky ordinance	**Herb Mumford**	Reflected in city/county ordinances and FS implementation
B (1)	Protect critical scenic resources	Develop dark sky educational booklet Focus on Education Develop understanding of Dark Sky effort	**Sue Orb** (SREC Dr Stephen Pauley)	Development and distribution of booklet

In late 2014, many of same participants of the Sawtooth 20/20 group, along with representatives from the Cities of Ketchum and Sun Valley and other interested citizens, began to meet to discuss the idea of pursuing a dark sky reserve accreditation for the area. By spring of 2015 staff from the Sawtooth National Recreation Area had been approached about the concept and were asked to be a supportive partner in the effort.

In mid-February, 2017 the Sawtooth National Recreation Area provided information regarding the proposed Central Idaho Dark Sky Reserve (CIDSR) to the general public and stakeholders. This information was sent to provide general background information regarding the proposal, the majority of which would occur on Forest lands. Included in the information associated with the proposed CIDSR were links and a contact for further information. There was also a request for the public to provide comment on the proposal by March 22, 2017.

By the end of the scoping period, the Forest had received 75 comments total. Of these, 65 (87%) were in full support of the proposal. Of the remaining ten, five offered conditional support and five opposed the proposal. A majority of the conditional support and opposition was focused-on a belief that the proposed Reserve should not add an additional layer of rules, regulations and/or requirements on landowners.

Craters of the Moon

Craters of the Moon National Monument and Preserve (Craters), located roughly 140 miles (225 km) southeast of the proposed Reserve area, is managed by the National Park Service with certain areas overseen by the Bureau of Land Management (Management, NPS, 2016). In the spring of 2017, Craters submitted an application to become an accredited Dark Sky Park through IDA. The rugged landscape at Craters of the Moon, created more than 15,000 years ago from lava eruptions, has almost zero light pollution and is the only national park unit named for a celestial body. Each spring and fall, the Park Service hosts "star parties" where visitors can learn more about seasonal astronomy. The Idaho Falls Astronomical Society also hosts popular events and provides telescopes and sky viewing expertise. During the summer, ranger-led full moon hikes take advantage of the natural lightscape to explore connections between this 'unearthly landscape' and our closest celestial neighbor, the moon. A successful Dark Sky Park application at Craters of the Moon would benefit Central Idaho, creating opportunities for collaboration between the dark sky areas.

Boise State University: Collaboration in Dark Sky Research

In support of the Central Idaho Dark Sky Reserve, a group of students associated with Boise State University's Master of Public Policy program completed a report as part of a

capstone course that informed this Dark Sky Reserve application by analyzing dark sky preservation efforts around the world.

This analysis includes several components. First, the authors reviewed successful reserve applications and annual reports posted on the International Dark Sky Association (IDA) website. Authors focused on the process applicants used to garner support for their efforts and scrutinized the applicants' responses to the IDA's technical requirements. Authors also reviewed media coverage of the dark sky places designation processes and public response to such designations.

The authors then conducted extensive interviews with dark sky advocates across the country and around the world. They contacted 71 advocates: applicants who worked on reserve applications abroad, applicants who wrote Dark Sky Park and Dark Sky Community applications in the United States, and nonprofit advocates. They received 35 responses, via telephone, Skype or email. The authors tailored their questionnaire to seek the most useful guidance possible to the Central Idaho application, focusing on the benefits of the designation, the process of building coalition support, the obstacles to securing a dark sky designation, and advice to new applicants.

Infrastructure

Central Idaho's economy relies heavily on tourism. Historically, the region has derived as much as 25 percent of its revenue directly from tourism (lodging and retail), and that does not account for jobs created as a result of tourism (construction, planning, etc.). The infrastructure within Blaine County, and particularly the Sun Valley-Ketchum area, has the capacity for an influx of visitors that a Dark Sky Reserve would bring.

Blaine County in particular has continued to grow. From 2000 to 2014, the county has seen a 13 percent population increase (Sun Valley Comprehensive Plan 2015). Due to this population increase and a tourism-driven economy, the county has continually relied on resort-related infrastructure and housing development (Sun Valley Comprehensive Plan 2015). Summer tourism has also grown consistently over the past decade (Sun Valley Comprehensive Plan 2015). Based on the 2015 Comprehensive Plan for Sun Valley, the area will continue to work on the following:

- Vibrancy: Addressing all aspects of visitors' experience with attention to resort redevelopment.
- Community: Affordable housing alternatives and community facilities are key.
- Transportation and connectivity: Convenience and innovation are key to the success of the Sun Valley area.

While not as large as Sun Valley or Ketchum, the city of Stanley also provides necessary tourism infrastructure for the proposed reserve's core area. As a small city, Stanley's tax base is drawn primarily

from summer tourism and its infrastructure has a long history maintaining its rural spirit while continuing development to support its draw in visitors during the summer months (Stanley Comprehensive Plan 2010). However, because of its proximity to the Sawtooth National Recreation Area, the city has access to a large number of forest roads and trails that provide opportune dark sky sightings for visitors. As camping continues to become popular for tourists who visit Stanley, an emphasis on seeing the night sky outdoors provides a more rural experience that larger cities, such as Ketchum and Sun Valley, cannot offer. Preserving and enhancing the dark night sky through appropriate night sky protection measures is a stated goal in Stanley's Comprehensive Plan (2010).

Marketing Capacity

The Sun Valley-Ketchum area, because of its large resort infrastructure, also has a sizeable marketing budget. This marketing infrastructure could help inform incoming visitors about the importance of maintaining the area's night skies. Visitor services for the area include social media and website resources with a live chat, a "contact us" form providing real-time answers to questions, and a physical visitor center (Strategic and Operational Plan Summary 2014-15).

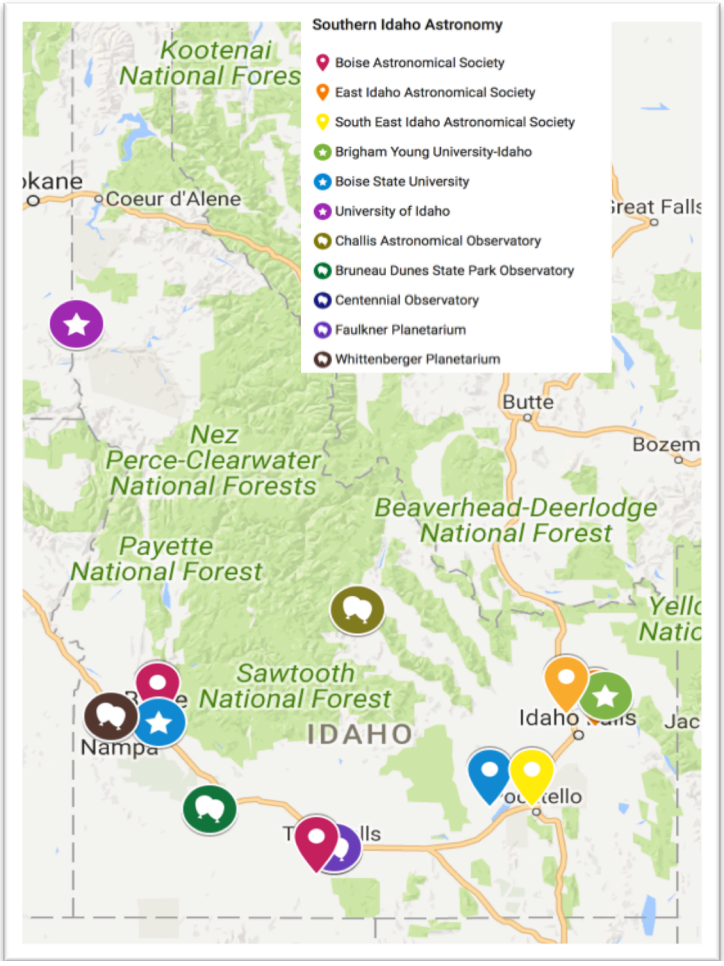
The city of Stanley consists of only 308 acres of private land, and as a smaller city, its marketing budget is considerably less than that of Ketchum and Sun Valley (Stanley Comprehensive Plan 2010). With the city's sizable base for visitors, the local-option, non-property tax (or the local option tax, as it is commonly referred to) would provide a good base to support marketing materials when promoting dark skies. In FY 2017-18 the local option tax is proposed to produce total revenue of $275,000 (City of Stanley, 2017-18 proposed budget ordinance). In addition to supporting the city's critical municipal services, Stanley provides option tax revenue to the Stanley Sawtooth Chamber of Commerce to promote tourism in the Stanley area. The Stanley Chamber is actively marketing the exceptional quality of the dark night sky experience and the benefits of the Dark Sky Reserve in preserving that experience.

The Sawtooth Interpretive & Historical Association (SIHA), a local organization incorporated in 1972, provides excellent opportunities for visitors to gain insights into the area's rich history through its programs and services. SIHA could play a substantial role in helping to inform visitors about the dark sky resource in and around Stanley and the Stanley Basin. SIHA already has begun offering public educational programs about astronomy and nocturnal ecosystems as part of its annual Forum and Lecture Series at the Stanley Museum.

Area Astronomy

The establishment of a Dark Sky Reserve in Central Idaho will increase awareness, protect existing resources, and serve as a model and resource for other Idaho areas seeking a similar designation.

Idaho enjoys a relatively high rate of astronomical engagement. The Central Idaho area is surrounded by astronomical societies based in Twin Falls, Idaho Falls, Rexburg, Boise, Moscow, and Pocatello. In addition, the state has three observatories, two of which are in Central Idaho.



Southern Idaho Astronomical Entities and Observatories

Formal designation of a Dark Sky Reserve will further cement Central Idaho's commitment to astronomy and will provide enhanced astronomical opportunities for existing and future stargazers.

The Magic Valley Astronomical Society is a 501 (c)(3) nonprofit located in Twin Falls. Past events have included stargazing in the Sawtooth Botanical Garden in Ketchum (Astronomy in the Garden 2016). The society hosts monthly star parties, free to the public at the Herrett Center at the College of Southern Idaho, and "serves as a source of astronomical phenomena, history and lore by providing educational and observing opportunities and information" (Magic Valley Astronomical Society 2016).

The Idaho Falls Astronomical Society hosts star parties at Craters of the Moon National Monument, a lava hiking trail star party, and Camas star party (Idaho Falls astronomical Society 2016).

The Boise Astronomical Society is a 501(c)(3) nonprofit that hosts annual star parties at Bogus Basin, a ski and recreation area located 26.5 kilometers north of Boise. Additionally, the society hosts monthly meetings (Boise Astronomical Society 2016).

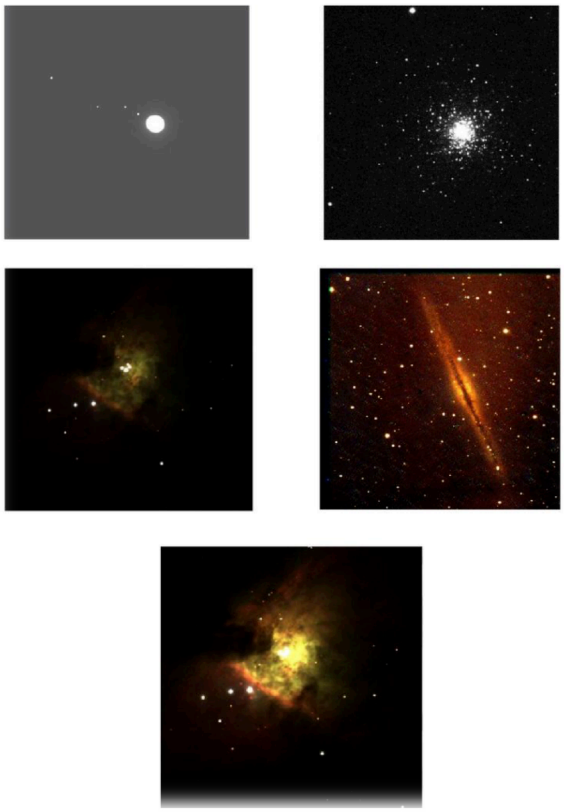
The BAS held a star party, attended by over 1,000 people, in Stanley on August 19 and 20, 2017 in conjunction with the solar eclipse on August 21

Twelve large telescopes were available for public viewing and the BAS members provided lectures on astronomy and the benefits of a dark sky reserve.

The South East Idaho Astronomical Society meets monthly and hosts star parties in surrounding cities (South East Idaho Astronomical Society 2016). The Pocatello Astronomical Society also serves Southeast Idaho, although there is relatively little information about the programming they offer.

Additionally, three Idaho universities, Brigham Young University-Idaho, Boise State University, and the University of Idaho, have astronomy clubs.

Idaho is also home to three observatories:



Images of Jupiter and other celestial activity taken from the Challis Observatory.

The Challis Astronomical Observatory (CAO) is located in Central Idaho eight kilometers west of the city of Challis at 7,103 ft (2,165 meters) elevation. (Home 2016) The CAO facility was constructed and instrumented over the last five years, in collaboration between Boise State University, Custer County, and the Bureau of Land Management (Home 2016).
Established in 2010, the observatory was designed for "community involvement, educational use, and professional research. The research program currently emphasizes nightly optical photometry of flaring blazars — supermassive black holes detected up to Tera electron-volt energies. The scientific research program is designed to be integrated with educational programs" (Home 2016).

The Bruneau Dunes State Park Observatory has a 25-inch Newtonian reflector telescope and provides educational opportunities for Idahoans to learn about the night sky and how to preserve its darkness (Star Gaze 2016).

The Centennial Observatory, hosted through the College of Southern Idaho, houses one of the world's largest fully wheelchair-accessible public telescopes (Herrett Center 2016). According to the Herrett Center, the main instrument is the Norman Herrett telescope, a 24-inch Ritchey-Chrétien reflector on a computer-controlled fork mount. The ARE-125, an optical "periscope," allows unprecedented access to the telescope for wheelchair-bound or limited-mobility visitors. An Apogee Alta E47+ CCD camera is available for imaging. The observatory also offers monthly star parties on the second of every month that are free to the public. There are astronomy talk nights and summer solar sessions and Telescope Tuesdays on the second and fourth Tuesdays of each month, all free to the public.

The College of Southern Idaho also hosts the Faulkner Planetarium, which is the largest planetarium theater in Idaho, seating 144 under a 50-foot dome (Herrett Center, 2016). It features a state-of-the-art Digistar 5 fulldome projection system, 10,200-watt Dolby 5.1 surround audio, and programmable LED dome lighting.

The College of Idaho's Whittenberger Planetarium seats 50 people under a 24-foot dome (Whittenberger Planetarium, 2016). The facility features an astronomy day with a variety of astronomical activities, such as how to use and read a sky chart; planet and stargazing through telescopes; photo opportunities with replicas of the Eagle (a famous landing capsule from the

1960s) and re-entry capsule; and a variety of additional indoor and outdoor activities (Whittenberger Planetarium, 2016; Tilmouth, 2016).

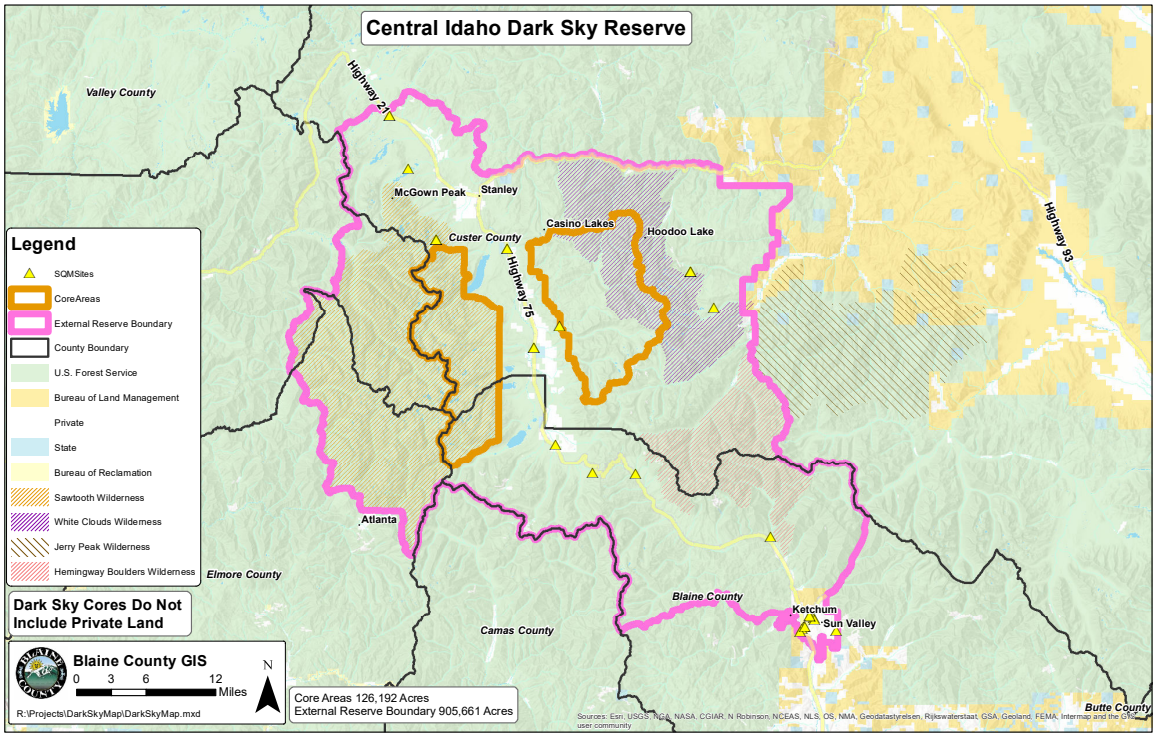
With an already rich background in astronomical interest, a CIDSR designation will make the astronomical societies and educational opportunities flourish in Idaho and provide value to a region that already treasures dark skies.

Proposed Boundaries and Core Zones

The Central Idaho Dark Sky Reserve (CIDSR) will encompass approximately 906,000 acres within Custer, Blaine, Elmore, and Boise counties, Idaho. The CIDSR includes three Congressionally designated Wilderness areas: the Sawtooth, the White Clouds, and the Hemingway-Boulders. It also encompasses the entire 756,000 ac. Sawtooth National Recreation Area (Sawtooth NRA), a federally protected area managed by the U.S. Forest Service. The Wilderness areas and the SNRA provide large areas of land protected in perpetuity by the federal government of the United States.

The CIDSR boundaries include the cities of Stanley (Custer County), Ketchum (Blaine County), and Sun Valley (Blaine County), and the unincorporated communities of Lower Stanley in Custer County and Smiley Creek (Sawtooth City) in Blaine County. The CIDSR lands within Elmore County are all within the Sawtooth Wilderness, and those within Boise County also are within the Sawtooth Wilderness except for about 6,400 acres (2591 ha.) encompassing Grandjean Lodge and summer homes.

Two separate core zones totaling 140,000 acres (56,700 ha.) are proposed. The core zones are designed to capture the darkest parts of the Central Idaho Reserve while also providing public access for viewing and enjoyment. Core zones are comprised of public lands managed by the Sawtooth National Recreation Area, a district of the Sawtooth National Forest. No private land is included in the core zones. The cores are located on the east and west sides of the Sawtooth Valley, and include portions of two



Wilderness areas. State Highway 75 bisects the cores providing excellent night sky viewing as it traverses the open meadows and pastures in the Sawtooth Valley. Both cores are accessible by many Sawtooth NRA-maintained trails, and the eastern core is accessible by the Boundary Creek Road, the Fisher Creek Road, and the 4th of July Creek Road.

The cores were selected because they are among the darkest areas within the Sawtooth NRA that are accessible year-round to large numbers of people. In addition to the three Forest Service roads that access the eastern core, several trails in the eastern core are open to bicycles and some motorized all-terrain vehicles and snowmobiles.

In the future, additional areas within the Sawtooth NRA may be evaluated for inclusion within the cores.
The evaluation will be based on further assessments of sky quality, accessibility, and reduction of light pollution from peripheral areas within the Reserve.

Night Sky Quality

The greatest concentration of artificial light in the CIDSR is located at the southern boundary in the cities of Ketchum and Sun Valley.

From areas near Galena Pass, north of these two communities, the light dome from the cities of Ketchum and Sun Valley may be visible a few degrees above the horizon. The light dome from Boise, Idaho's capital about 78 miles away, is at times faintly visible near the horizon southwest of the Sawtooth Mountains.

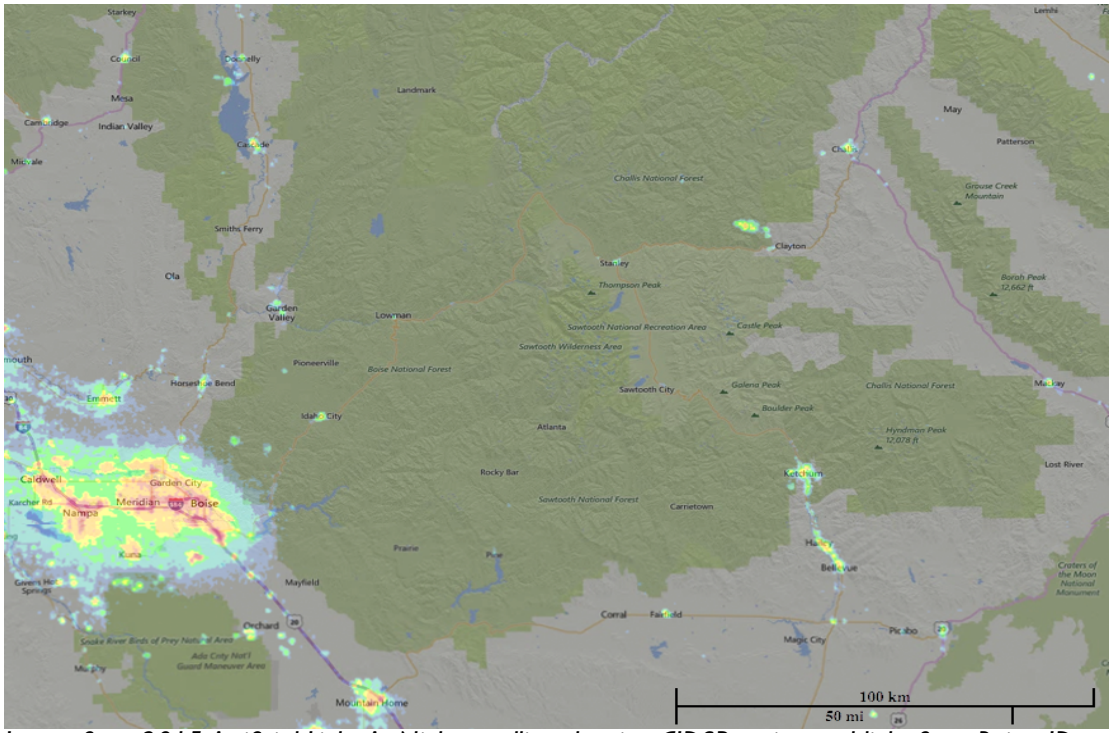


Image from 2015 Artificial Light At Night satellite, showing CIDSR region and light from Boise, ID

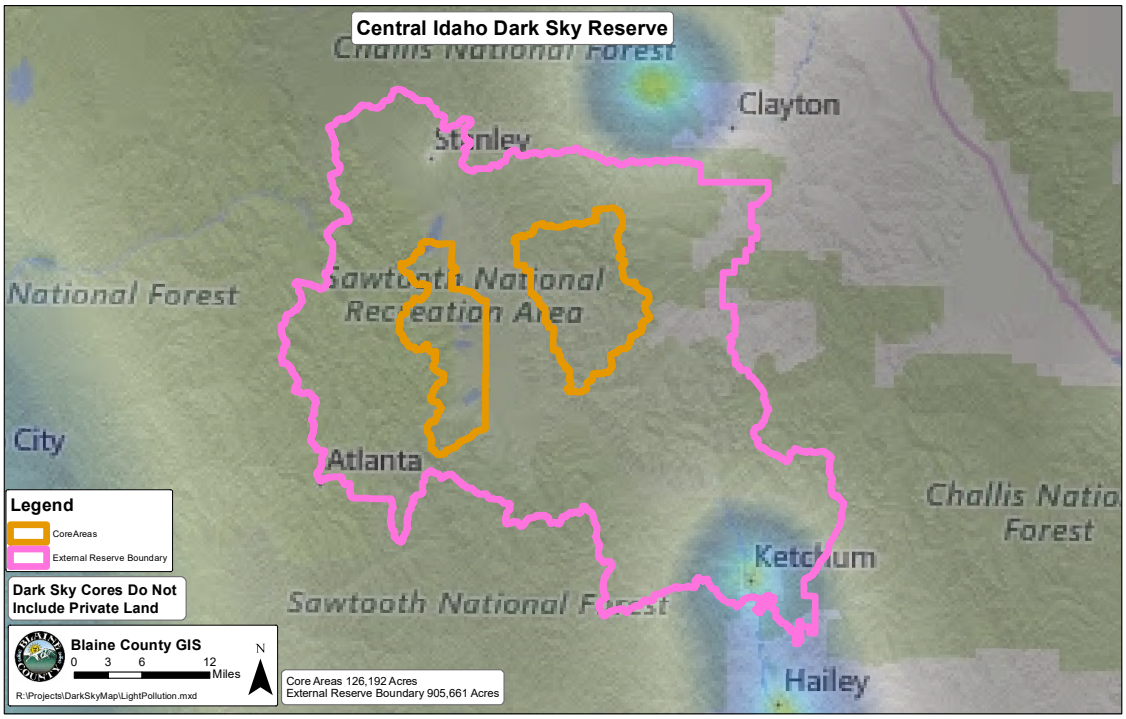


Image from 2015 Artificial Light At Night satellite, showing light from Ketchum/Sun Valley at the southern end of the Reserve

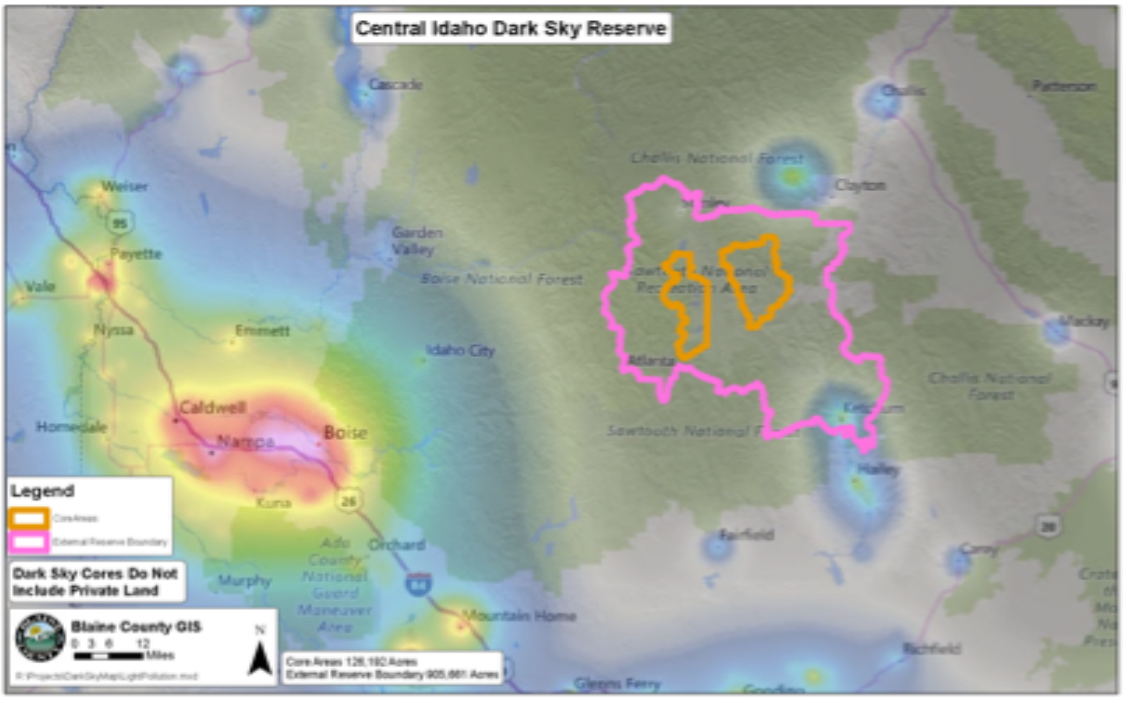


Image from 2015 Artificial Light At Night satellite, showing light from Boise area.

The CIDSR core areas contain no electrified structures and adjacent areas in the Sawtooth Valley have only very sparse houses, many of which are occupied only seasonally. Consequently, visitors are largely unaware of artificial lights, and the natural night darkness permits nocturnal ecosystems to function unimpaired. Opportunities to expand electric lighting near the core areas are extremely limited. The U.S. Forest Service has obtained conservation easements on about 95% of the 20,000 acres (8,100 ha.) of private land within the Sawtooth Valley.

These easements restrict the number, size, and appearance of structures that may be built. They also prohibit the subdivision of large tracts of land.

Private land parcel under conservation easement. Sawtooth Valley near Stanley, Idaho. Mark Gobel image

Sawtooth Valley from the Galena Overlook. Mark Gobel image.

Night Sky Brightness Measurements

(SQM- L) readings)

Unihedron Sky Quality Meter (SQM-L) readings have been recorded from seven sites in the Sawtooth Valley adjacent to the core areas, from two sites within the core areas, and from several other sites within Ketchum and Sun Valley and on the Wood River side of Galena Pass. These readings span the fall of 2016 and the winter and summer of 2017. Readings from the nine sites within and adjacent to the cores fell into the following Dark Sky Reserve categories:

Category	Number of Readings	IDA Dark Sky Tier
21.0-21.49	10	Silver
21.50 – 21. 59	15	Silver
21.60 – 21.74	17	Silver
21.75 – 22.0	19	Gold

Readings in all seasons may exceed 21.75 adjacent to core areas, but are especially prevalent in the winter during very cold, high-pressure inversions. Summer night sky also can achieve this degree of clarity during periods without forest fires. Typically, most clear nights are within Bortle Class 1-3, with great clarity of structural detail in the Milky Way. M31 is clearly visible, and the outline of clouds is sharply defined against the black sky by starlight.

Zodiacal light is clearly defined across most of the sky. Active areas within the communities themselves also exhibit exceptional dark sky quality. For example, SQM readings as dark as 21.93 have been recorded within the city limits of Stanley, demonstrating the effectiveness of shielding its outdoor lights. Full monitoring data is included in Appendix C.

Community	Highest SQM Reading	Date	Location
City of Stanley	21.93	8-Dec-17	Pioneer Park 44.211435, -114.940021
City of Ketchum	20.83	21-Oct-16	Rember St. & Byrd 43.676108, -114.370137
City of Sun Valley	20.98	21-Oct-16	Keystone Road in Elkhorn 43.676748, -114.307945

Night Sky Imagery

Pioneer Park near Stanley. Wally Pacholka photo. View is toward the southwest, and reveals skyglow low on the horizon from the city of Boise, 76 miles (122 km) away.

Milky Way over the White Cloud Peaks in the White Cloud Wilderness. Flaviu Grumazescu photos

Stanley Lake, northern area of Sawtooth Valley. Wally Pacholka photo. View is toward the southwest. Skyglow from the city of Boise, 76 miles (122 km) away, is visible low on the horizon.

Redfish Lake, looking into Sawtooth Mountain Core Area. Wally Pacholka photo.

View from Redfish Lake Lodge, Sawtooth Mountains Core Area in Background. Wally Pacholka photo.

White Cloud Core area. Flaviu Grumazescu photo

Milky Way from Galena Overlook, Highway 75. View is toward the south, showing light domes from Boise and Mountain Home. Matt Benjamin photo

Outdoor Lighting Inventory

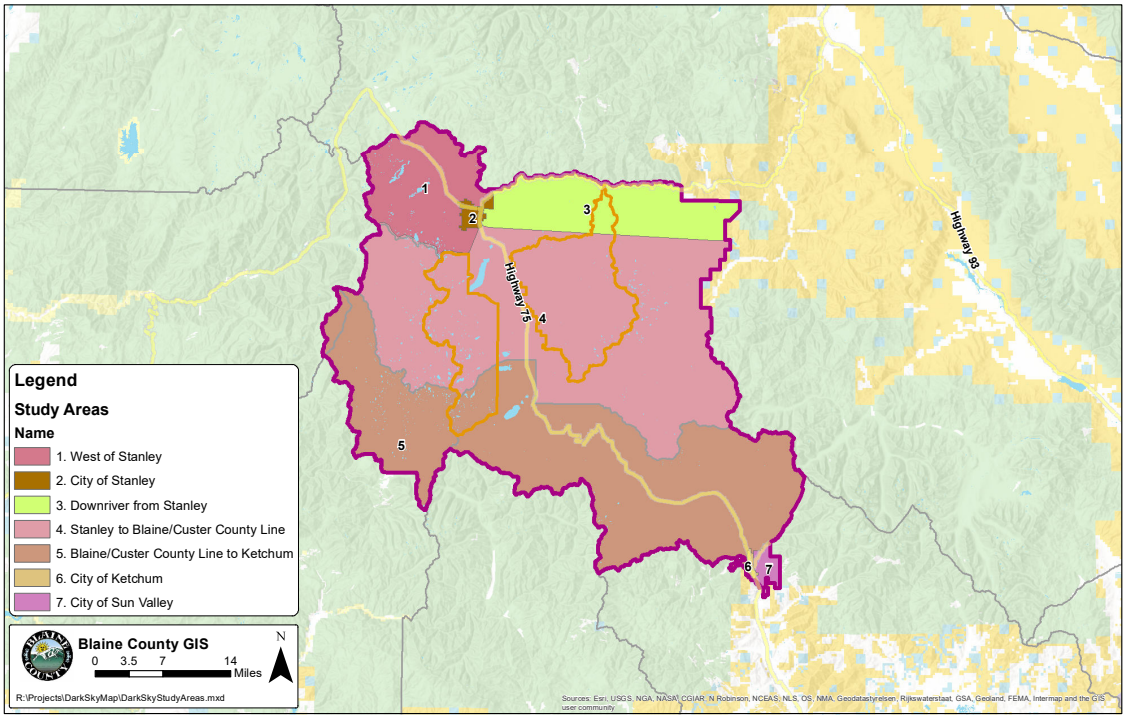
An inventory of existing outdoor lighting within the proposed CIDSR was conducted from March to September of 2017. This information provides baseline data for the Lightscape Management Plan and future monitoring efforts. Due to the Reserve's size, the area was divided into 7 zones.

Each area within the zone is indicated as either a border area (meaning the area borders a community) or active area (meaning inventory was taken within the communities themselves).

The CIDSR core zones do not have any existing light structures, thus an inventory was not conducted in the core zones themselves.

Fourteen volunteers conducted the inventory on existing lights, acceptable and unacceptable light fixtures, and temperature output within the CIDSR.

Unacceptable lighting was defined as unshielded light fixtures (see Appendix B). It should be noted that this data represents light fixtures that were visible during the date and time inventory was conducted. Some light fixtures were not "on" and others were difficult to determine because of visibility constraints. Future lighting inventory will be used to compare results to this baseline data, in time improving the overall accuracy. The inventory forms used by the volunteers with additional information on inventory criteria and process are included in Appendix B.



Study areas within the Central Idaho Dark Sky Reserve

Zone: (1) From City Limits of Stanley, west along Hwy 21					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
April 18, 2017	2	10	9	3	Border area; Along Hwy 21, and Iron Creek
April 18, 2017	0	5	3	2	Border area; County Shed
April 18, 2017	0	2	1	1	Border area; Crook Creek; observed Christmas lights still on
April 18, 2017	0	3	1	2	Border area; Elk Mountain and West
Totals	**2**	**20**	**14**	**8**	
Percentages	9%	91%	64%	38%	

Zone: (2) City of Stanley					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
August 29, 2017 (8:30 – 10:30pm)	414	50	427	18	Active area; detailed notes are captured in the actual inventory forms
Totals	414	50	427	18	
Percentages	89%	11%	96%	4%	

Zone: (3) Down River from Stanley					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
September 14, 2017 (8:30 – 8:45pm)	30	1	22	9	Active area and Border area; Lower Stanley to Gateway
September 14, 2017 (8:45 – 9:50pm)	12	23	25	10	Border area and Active area; Gateway to Clayton
Totals	42	24	47	19	
Percentages	64%	36%	71%	29%	

Zone: (4) South of Stanley to Blaine/Custer County Line					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
September 1, 2017 & September 3, 2017 (8:30 – 10:15pm)	67	3	63	7	Border area; Additional information on locational breakdown and detailed notes are captured in actual inventory forms.
Totals	67	3	63	7	
Percentages	96%	4%	90%	10%	

Zone: (5) Blaine/Custer County Line to Ketchum					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
August 29, 2017 (9:00 to 9:45 pm)	41	43	46	27	Border area; Hulen Meadows. Detailed notes are captured in actual inventory forms. Did not capture warm/cool output for all lights. Most were warm-ish or neutral but recorded obvious cool and white output. 3 homes had Christmas lights still up.
August 30, 2017 (9:00 to 10:00 pm)	36	91	64	45	Border area; Hulen Meadows to North Fork. Detailed notes are captured in actual inventory forms. Did not capture all warm/cool output. 3 homes still had Christmas lights up.
August 31, 2017 (9:00 to 10:30 pm)	28	11	27	11	Border area; SNRA N. Fork ranger station to Galena Summit. Detailed notes are captured in actual inventory forms.
September 3,	20	16	21	13	Active area; Smiley

2017 (8:30 to 10:45 pm)					Creek. Did not capture warm/cool output for all lights.
September 3, 2017 (8:30 to 10:45 pm)	0	3	0	3	
Totals	125	164	158	99	
Percentages	43%	57%	62%	38%	

Zone: (6) City of Ketchum					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
April 20, 2017 (8:30-10pm)	343	51	375	19	Active area; Warm Springs Road from 10th St to FS boarder and all side streets; 21 houses still had Christmas lights up. Detailed notes in actual inventory form.
April 20, 2017 (9:30-10:45pm)	471	309	357	133	Active area; West Ketchum; recorded obvious warm/cool light differences. Could not make determination on all lights. 11 houses still had Christmas lights up. Detailed notes in actual inventory form.
April 21, 2017 (9:00-9:45pm)	742	164	377	131	Active area; Industrial Zone, Hulen Meadows S. to Hwy 75 and 9th Street (on east and west sides). Recorded obvious warm/cool light differences. Could not make determination on all lights. Many homes and businesses did not have lights on. Observed 8 houses with Christmas lights still up
April 19th (7:30pm-9:00pm) and April 23 (8:00pm –	1778	595	2293	80	Active area; City core area, east of main street from 9th Street on the N end to Garnet street on South end. Only tracked

9:00pm)					cool light
Totals	3334	1119	3402	383	Temperature output was not recorded for all light fixtures
Percentages	75%	25%	90%	10%	

Zone: (7) City of Sun Valley *see note on inventory process below					
Date, Time information Collected	Acceptable Light Fixtures	Unacceptable Light Fixtures	Warm Light Output	Cool Light Output	Notes
March 16, 2017	Not recorded	115	Not recorded	Not recorded	Active area.
Note on Inventory Process: City staff conducted an inventory of existing lighting within Sun Valley city limits that compared existing light fixtures with the City's current dark sky ordinance (found in Appendix A). Only non-compliant lighting was documented.					

Lightscape Management Plan

The Central Idaho Dark Sky Reserve (CIDSR) will encompass approximately 906,000 acres within Custer, Blaine, Elmore, and Boise counties, Idaho. The CIDSR boundaries include the cities of Stanley (Custer County), Ketchum (Blaine County), and Sun Valley (Blaine County), and the unincorporated communities of Lower Stanley in Custer County and Smiley Creek in Blaine County. Areas of the CIDSR that overlap Elmore County and Boise County are all within the Sawtooth Wilderness with the exception of a small area of approximately 6,400 acres (2591 ha.) encompassing Grandjean Lodge and summer homes.

The Wilderness areas and the SNRA provide large areas of land protected in perpetuity by the federal government of the United States.

Outdoor Lighting Standards

Blaine County (2010) and Custer County (2010) have adopted outdoor lighting ordinances. The City of Ketchum (1999, revised 2017) and the City of Sun Valley (2002) in Blaine County have adopted outdoor lighting ordinances that are more restrictive than the county requirements. Although Stanley (population 63) does not yet have an outdoor lighting ordinance, it has achieved voluntary shielding of almost all of its outdoor lights, and is drafting an outdoor lighting ordinance that will assure continued compliance with minimum IDA requirements for the Dark Sky Reserve. Stanley's voluntary efforts to shield outdoor lights have been so successful that SQM readings as dark as 21.93 have been recorded within the city limits.

Although Elmore and Boise counties do not have outdoor lighting ordinances, almost all of these lands are within designated wilderness in which there are no electric lights. Within the four counties that comprise the CIDSR, ninety-nine percent (99%) of the non-Wilderness land area and ninety-nine percent (99%) of the incorporated city area is regulated by existing outdoor lighting ordinances.

The Lightscape Management Plan recognizes and incorporates the outdoor lighting ordinances that apply to the cities and counties within the boundaries of the CIDSR. It also incorporates the policy direction from the Sawtooth NRA summarized in this section, and contained in the letter of support submitted by the Forest Supervisor of the Sawtooth National Forest.

The ordinances all require fully shielded luminaries, with some exceptions, and the Ketchum ordinance, which applies to more than 50% of the population within the CIDSR, requires luminaries less than 2,700 K. The signatories of this plan will work to bring at least 90% of outdoor lighting into compliance with their respective ordinances within five years of CIDSR designation, and work towards 100% of lighting compliance within ten years of designation.

Although outdoor lighting in different areas within the CIDSR will be regulated by municipal and county ordinances, the common goal is to achieve at least the minimum requirements for the

International Dark Sky Association's Dark Sky Reserve Program through a set of unified guidelines.

The provisions of the Ketchum, Sun Valley, Blaine County, and Custer County outdoor lighting ordinances are provided in Appendix A.

Guidelines for CIDSR Lightscape Management Plan

1. New, current and retrofit lighting must meet the requirements of applicable ordinances.
2. The ordinances will establish policies for determining whether an area should or should not be lighted, at what times an area should or should not be lighted, and appropriate illumination levels. Standards may vary among the ordinances.
3. The core areas are on Sawtooth NRA lands that have no outdoor electric lights. The goal is to maintain this situation to prevent any light pollution emanating from within the core areas.
4. Fully shielded fixtures are standard throughout the Reserve. Any lighting fixtures above 500 initial lumens are required to use fully shielded fixtures emitting no light at or above the horizontal. Unshielded fixtures are only allowed with the use of timers and/or curfews.
5. The correlated color temperature (CCT) of lamps installed within the Reserve will not exceed 3000 K.
6. All jurisdictional entities within the Reserve have cooperated in completing a lighting inventory, with the goal of bringing 90% of outdoor lighting into compliance with jurisdictional requirements within five years of receiving IDA designation
7. The jurisdictional entities establish a goal of bringing the Reserve into 100% compliance with their outdoor lighting regulations within 10 years.
8. The CIDSR will establish an advisory group to oversee lightscape management plan implementation, including monitoring to measure the trends in light pollution in the Reserve core. The goal of monitoring is to prevent any degradation of night sky quality and to bring non-compliant lighting identified in the 2017 lighting inventory into compliance with IDA guidelines within 10 years. Lighting on the approximate 1200 private structures that exist on private inholdings within the Sawtooth National Recreation Area will be the focus of monitoring because these structures lie in proximity to the core areas.. This advisory group will consist of representatives from each municipality in the CIDSR, educational representative, local agencies, and interested citizens. The advisory group will also develop incentive programs to further compliance.
9. Each municipality within the Reserve will have at least one

highly visible demonstration project with night sky friendly lighting consisting of at least 10 fixtures for each 5000 residents, or approximately 10% of fixtures within the Reserve (outside the core) will be retrofitted or brought into compliance.

10. Municipalities within the Reserve will have programs, either through education, economic incentives, permitting or regulation, to encourage all new outdoor lighting fixtures to conform to municipal or county standards.
11. Municipalities, management entities, and partners within the Reserve agree to establish interpretive outreach programs to support the goals of the Reserve, and educate visitors and residents about the importance of preserving the dark night sky resource.

Sawtooth National Recreation Area

Eighty-three percent of the CIDSR is administered by the Sawtooth National Recreation Area (NRA), which is part of the Sawtooth National Forest. There are approximately 1200 private structures on about 20,000 acres of private land inholdings within the boundaries of the Sawtooth NRA (excluding the incorporated city of Stanley). In addition, there are 124 private recreation residences managed under special use permits located on land the Sawtooth NRA has administration over. Other facilities within the Sawtooth NRA are used for management and visitor services, such as administrative headquarters, ranger station complex, employees housing, a work center, and campgrounds. Galena Lodge, Redfish Lake Lodge and cabins, the Redfish Visitor Center, and the Stanley Museum are some of the other facilities operated by special use permit from the Sawtooth NRA. Also, there are eight organization camps within the Sawtooth NRA.

Collectively, these structures represent sparse development within the boundaries of the CIDSR and many of these structures are used only intermittently. Consequently, the outdoor lights from these structures have minimal impact on the darkness of the night sky. However, all of them are included in the lighting inventory and their light pollution impact will be monitored periodically.

The outdoor lighting requirements for these structures are controlled by Blaine and Custer county ordinances, for the lands within their respective jurisdictions. All activities on the Sawtooth NRA are guided by Public Law 92-400 and the Sawtooth National Forest Land and Resource Management Plan, as amended in 2012. Neither of these includes management actions directly relating to the CIDSR, and do not specifically address actions that may be necessary to mitigate threats to the CIDSR from National Forest System lands. It is not anticipated that the Forest Service would use the private land regulations, as authorized by PL 92-400, to regulate dark sky conditions on private lands.

The Sawtooth NRA is committed to working with CIDSR partners to authorize and/or permit CIDSR associated research and interpretive and outreach programs/projects. Projects requiring formal environmental planning (NEPA) will be evaluated on a case-by-case basis.

The Sawtooth NRA will strive to meet the outdoor lighting requirements of the CIDSR lightscape management plan on federally owned facilities within the ten (10) year timeframe. Newly constructed facilities will comply with CIDSR if at all possible, given specific needs and available funding. Lighting modifications associated with CIDSR requirements to existing facilities will likely depend on available funding, other priority projects, and support from our partners and engaged stakeholders.

Dark Sky Demonstration Projects

Stanley

In 2013 the City of Stanley replaced all 13 of its streetlights with fully shielded LED lamps and fixtures that were dark sky compliant at the time. Twelve of these are Clearlight 40 W LED luminaires contained inside NEMA dusk-to-dawn fixtures. Although these lamps are fully shielded, they emit a bluish-white light rated at 6500 K, which causes unacceptable impacts on the nocturnal ecosystem and human vision. The other streetlight is an Evluma Areamax 40 W solid state LED luminaire rated at 3000 K. Two other streetlights owned by a local business also were converted to the Evluma Areamax 40 W luminaire. In addition, Stanley has converted the two area illumination lights on its maintenance buildings, and the two area illumination lights at the city parking lot to dark sky compliant luminaires.

Evluma Areamax 40 W

Stanley has budgeted funds for fiscal year 2018 to replace all of the 6500 K luminaires with the Evluma Areamax luminaires in order to meet the current IDA and RASC Guidelines for Outdoor Lighting.

Also in 2018, Stanley will replace the six pole lights that illuminate its outdoor ice skating rink with fully shielded, 3000 K that comply with IDA and RASC standards.

The Stanley School, which provides education for grades K-8, is located on the crest of a hill with a panoramic view of the surrounding area. In 2015 it replaced the fixtures and lamps for all of its parking lot pole lights with shielded LED fixures. (see image). These three lights were a source of intrusive light pollution affecting most of the town due to the location of the school. At the same time, the school replaced all of its outdoor building lights with shielded light fixtures.

Stanley School Parking Lot Lights

The Mountain Village Resort is the largest employer within the City of Stanley. In 2015 it voluntarily replaced four unshielded globe-type parking lot

lights at its employee housing with four shielded LED lights. This retrofit greatly reduced light pollution and glare in the parking lot and into employee housing.

Mountain Village Employee Housing Parking Lot Lights, Stanley.

City of Sun Valley

In 2014, the City of Sun Valley replaced all existing metal halide wall pack lighting with Gardco Gullwing 107 LED fixtures.

Gardco Gullwing 107 Sconce

The retrofit wall packs were installed on the exterior of both the Sun Valley City Hall facility and the adjacent Street Department storage facility. The replacement LED fixtures were selected to minimize glare, light trespass, and ensure compliancy with the City's own dark sky ordinances. The building mounted lighting applications serve as a community demonstration on how to apply outdoor lighting that is compliant with dark sky principals including down casting and full shielding.

LED Shielded Light Fixture, Sun Valley

Ketchum

The City of Ketchum has demonstrated its commitment to dark sky lighting and light pollution reduction by undertaking a project to bring all of its right-of-way lights into compliance with the new full cut-off and 2,700 K standards established in its revised dark sky ordinance. Ketchum budgeted $100,000 in 2017 for this project, and has so far completed the retrofit of 14 street lights. The retrofit involves installing the Inovus Element Plus, solar powered, full-cut-off light, and the Design Series solar powered, full-cut-off light that has a NXT luminaire with color temperature of no more than 3000 Kelvins. Consistent with the standards of the International Dark Sky Association, the footcandles illuminating the sidewalk shall be an average of 0.2 fc and shall not exceed 5 fc. This demonstration project will continue in 2018.

Above and Below: Inovus Element Plus solar-powered shielded street light in public right of way, Ketchum.

Additional Information on the City of Ketchum's Dark Sky Ordinance and Dark Sky Community Efforts

The purpose Ketchum Dark Skies Ordinance is to protect and promote the public health, safety and welfare, the quality of life, and the ability to view the night sky by establishing regulations and a process of review for exterior lighting. The city of Ketchum passed one of the first dark skies ordinances within the state of Idaho, and was among the first to do so in the west. The benefits are readily experienced by residents and visitors alike within the city of Ketchum. The city of Ketchum has recently applied for a Dark Sky Community accreditation. The following are excerpts from that community application that show commitment to the Dark Sky Reserve.

The Ketchum Dark Skies Ordinance provides the framework for its portion of the CIDRS Lightscape Management Plan, and for achieving the outdoor lighting standards established by IDA and the Royal Astronomical Society of Canada.

IDA Standard: *All lighting fixtures over 500 lumens initial light output (or equivalent wattages) must be fully shielded or utilize full cutoff fixtures.*

Ketchum requires all exterior lighting to be full-cutoff and fully-shielded, regardless of lumens initial lamp output (reference City standard 17.132.030.H.1), with the following exemptions:

- Holiday Lighting
- Flagpole Lighting
- Floodlights
- Neon Lights
- Temporary Emergency Lighting
- Towers for Radio Communication/Navigation

Note: See definitions for detail on each item listed as exempt from the full cutoff fully shielded standard. Additionally, neon lights, floodlights, and towers for radio communication/navigation are not exempt from light trespass standards.

IDA Standard: All lighting fixtures must have a correlated color temperature of 3000 Kelvins or less.

Under the Ketchum Dark Skies Ordinance the established threshold for the allowable correlated color temperature of all lighting fixtures is 2700 Kelvin (reference City standard 17.132.030.A).

IDA Standard: The total amount of unshielded lighting must be restricted, such as a limit on lumens per acre or total site lumens in unshielded fixtures (or equivalent wattages).

This standard is addressed by the intersection of multiple sections of Ketchum's Dark Skies Ordinance, including the following:

17.132.030. H.1: All exterior lighting shall comply with the acceptable lighting fixtures located in Figure 2. All exterior lighting fixtures shall be full cutoff fixtures with the light source fully shielded, except as exempted in this chapter.

17.132.030. B: Light Trespass and Overlighting: All existing and/or new exterior lighting shall not cause light trespass and shall protect adjacent properties from glare and excessive lighting. All vehicle lighting originating from a commercial property shall be shielded from other adjacent properties. Incidental light trespass (lighting emanating from turning motor vehicles or motion sensor lighting) is permitted.

1. All lighting emitting from any zoning lot shall not cause the light level along any property line, as measured at a height of 60 inches above grade in a plane at any angle of inclination, to exceed the limitations listed in Figure 1: light trespass Matrix.

The restriction on total amount of unshielded lighting is addressed through the intersection of the requirement that all exterior lighting be full-cutoff and fully shielded, with the exceptions listed above, and the City's light trespass standards.

All lighting standards are enforced throughout the permitting process and through complaints from members of the public.

IDA Standard: There should be a policy to address over-lighting, such as energy density caps,lumens/acre caps or maximum illuminance specifications.

Under Ketchum's Municipal Code (17.132.030.C.) IESNA Guidelines: The Commission or Administrator may require that any new lighting or existing lighting that comes before them meet the standards for maximum Illuminance output as established by IESNA.

1) The city will commit to changing all lighting within the city rights of way and on city owned property to meet the requirements of this chapter when luminaires expire. (Reference City standard 17.132.060).

(2) Public Outdoor Lighting: Public outdoor lighting, including holiday lighting, shall be permitted to ensure the safety and enjoyment of the intended public use. All public lighting shall comply with the standards established herein and shall be turned off after hours of operation or when not in use. When practically possible, motion sensors may be used. Public Outdoor Lighting is exempt from lighting curfews and exempt from section 17.132.030B of this chapter. (Reference City standard 17.132.030.G).

IDA Standard: *There should be "A provision that clearly: (1) indicates where, when, and under what circumstances new public outdoor lighting (street lighting and lighting on other public property and rights-of-way) is warranted and will be permitted, and (2) requires that adaptive controls and curfews be employed in all future installations of public outdoor lighting."*

Ketchum will commit to changing all lighting within the city rights of way and on city owned property to meet the requirements of this chapter when luminaires expire. (Reference City standard 17.132.060).

Ketchum will permit public outdoor lighting, including holiday lighting, to ensure the safety and enjoyment of the intended public use. All public lighting shall comply with the dark skies ordinance standards and shall be turned off after hours of operation or when not in use. When practically possible, motion sensors may be used. Public outdoor lighting is exempt from lighting curfews and exempt from section 17.132.030B of the Ketchum City Code. (Reference City standard 17.132.030.G).

IDA Standard: Provide examples of a minimum of ten projects built under the lighting code, demonstrating effective application of the local lighting code.

Ketchum has a history of preserving the night sky that stretches back to 1999. The enforcement of the City's lighting ordinance is upheld via a combination of the permitting process on the front end and maintained via a complaint driven enforcement approach. This section contains a description of the enforcement process and local examples of projects that have been completed under the current ordinance. Reference Ketchum Application to IDA for designation as Dark Sky Community, August 2017.

Light Pollution Control Process

All new projects constructed within the City of Ketchum must have lighting that complies with the City's Dark Sky Ordinance. Per code Section 17.132.010.C.1 1.

All existing lighting located on a subject property that is part of an application for a city planning department design review, conditional use, subdivision permit, or building permit is required to be brought into conformance with this chapter.

Conformity shall occur prior to issuance of a certificate of occupancy, final inspection or final plat recordation, when applicable. For other permits, the applicant shall have a maximum of thirty (30) days from date of permit issuance to bring the lighting into conformance.

All exterior lighting is inspected by the Planning & Building staff, prior

to the issuance of a Certificate of Occupancy, to ensure that all exterior lighting is compliant with the Dark Skies Ordinance. The Building Permit application, located on the following page, contains information intended to both educate the members of the public and facilitate code compliance.

Additionally, Section 17.132.020.B details the process the city Planning and Building Department utilizes for all design review, conditional use, subdivision and/or building permits, detailed below:

17.132.020.B: Lighting Plans Required: All applications for design review, conditional use, subdivision and/or building permits shall include lighting plans showing location, type, height, color temperature, lumen output and amount of all proposed and existing fixtures. The applicant shall provide enough information to verify that lighting conforms to the provisions of this chapter. The administrator, commission and/or building official shall have the authority to
request additional information in order to achieve the purposes of this chapter.

For lighting that is not included as part of a permit with city Planning and Building Department, the following standards apply:

17.132.010C.2: All existing exterior commercial lighting that is not in conformance with this chapter shall be brought into conformance with this chapter by June 30, 2018.

17.132.010.C.3: All existing lighting that does not meet the requirement of section 17.124.060 of this title, which states that "any parking, yard or building illumination in (any) zoning (district) shall be so directed as to protect adjacent properties from glare and direct lighting", is required to be brought into conformance with section 17.132 of this title.

17.132.010. C.4: All existing exterior residential lighting, not affected by subsections C1 and C3 of this section, that does not comply with this chapter is required to be brought into conformance with this chapter by June 30, 2019.

Benchmarks for Lightscape Management Plan

Timeline
1-12 months following accreditation of the CIDSR
• Establish advisory group for CIDSR. This group will include a representative from each of the following: City of Ketchum, City of Sun Valley, City of Stanley, Blaine County Commission, Sawtooth NRA, Idaho Conservation League, the Sawtooth Society, and two citizen representatives: one from the Sawtooth Valley and one from the Ketchum/Sun Valley/Blaine County area. The advisory group will establish working groups for Educational Outreach, and Monitoring and Reporting. The Advisory Group will meet at least quarterly to ensure coordination among the CIDSR partners, and to provide feedback to the working groups.
• Launch a media and educational effort highlighting CIDSR
• Host at least 4 dark sky educational events in the surrounding communities
• Advisory group will begin to develop incentive programs for compliance. This will include continuing to work with the Salmon River Electric Cooperative (SREC) and Idaho Power to provide economic incentives for customers to convert to energy efficient, dark sky compliant lighting. SREC provides electricity to the entire Sawtooth Valley and offers customer rebates for energy efficient lights funded by the Bonneville Power Administration.
• Secure funding and erect signage along entrances to the Dark Sky Reserve
1-3 years after enactment of the CIDSR
• Advisory group will continue to work with Thompson Creek Mining Company to further reduce light output from mining operations based off of CIDSR compliance criteria.
• Stanley will adopt an outdoor lighting ordinance that will assure continuation of its program to maintain shielding of 100% of outdoor lights.
• Stanley will convert its current shielded street lights to 3000 K or less lamps.
• Advisory group will work with local communities to develop lighting showcase areas that can serve educational purposes

Annually

- Advisory group will coordinate with municipalities and partners to host at least four dark sky educational events in the surrounding communities
- SQM monitoring throughout reserve; compliance monitoring will occur in municipalities (see specifics outlined in monitoring and reporting plan section)
- Advisory group will oversee annual report preparation and submission to IDA.

Interpretation and Education

Because skies and celestial objects have engaged, intrigued and awed humanity since ancient times, they can serve as a useful bridge between those times and the present, as well as between science and imagination. Increasing awareness and knowledge in this arena is one key objective of CIDSR. There are currently a number of education programs underway which focus on astronomy and the dark skies of the region. Creation of CIDSR will enhance these programs as well as increase scientific research and astro-tourism.

Achievement of a dark sky status is also a way to bring back cultural storytelling, songs, and gatherings that have not been practiced for centuries. A Dark Sky designation could provide an opportunity to better connect and engage the public in these cultural opportunities.

A committee has been formed to carry out education and outreach efforts. It is currently made up of representatives from the Idaho Conservation League, local governments, educational non-profits, and interested volunteers from the Reserve area. The Education and Outreach Committee hopes to capture community excitement and channel it into effective action. In order to harness the early interest in CIDSR and create lasting, sustainable momentum, the committee will develop and implement a strategy that includes a variety of education and outreach events, publicizing these and other related activities, regularly reporting progress toward Dark Sky goals, and tapping into strong community institutions in order to make them vital stakeholders in lightscape management.

Current Education Programs and Promotions

A collaborative website has been developed for the CIDSR (www.idahodarksky.org). The goal of the website to is raise awareness about light pollution and night sky friendly lighting options, provide information about the CIDSR effort, and be an educational platform to connect individuals to action. This website will be managed by the CIDSR advisory group as means for promoting the reserve and associated events.

If the CIDSR is accredited, dark sky related programs would be developed through partnerships between the volunteer advisory committee, agencies, and interested organizations. These activities will range from regular amateur star viewing nights to potentially longer celestial events

that feature astronomy experts. A number of night sky programs were presented in 2017 by various organizations as shown in the table below.

As previously stated, Idaho has numerous astronomy clubs with active members across the state that can also serve as natural partners for boosting the profile of the Central Idaho Dark Sky Reserve and associated programs. The CIDSR area is also home to a number of interpretive and environmental organizations that will help to further educational goals.

Sawtooth Interpretive and Historical Association

The Sawtooth Interpretative and Historical Association (SIHA) serves as a cooperating organization with both the City of Stanley and the Forest Service. It operates the Stanley Museum and the Redfish Visitor Center at Redfish Lake. From these locations within the CIDSR, SIHA is well positioned to provide dark sky interpretation and education to support the goals of the lightscape management plan.

SIHA provides an array of night sky interpretive materials at the Museum and Visitor Center as well as at other outlets within the CIDSR area, including the Sawtooth NRA North Fork Visitor Center and Stanley Ranger Station, the Ketchum Ranger Station and several local businesses. Through its Forum and Lecture Series and scheduled interpretive programs at the visitor's center, SIHA will provide lectures each year by noted experts in astronomy, nocturnal ecosystems, outdoor lighting technology, light pollution and related subjects.

SIHA plans to purchase a telescope to promote appreciation of the quality of the dark night sky within the CIDSR. The telescope will further nighttime interpretive programs hosted by SIHA.

Outreach and Education Planning

If CIDSR is accredited the committee plans to work with a broad range of partners to increase awareness of the Reserve, encourage night sky friendly lighting, and inspire appreciation of the area's dark sky resource.

A wide range of educational efforts has been discussed throughout the planning process. The committee will determine the feasibility of the various proposals to be implemented within the first five years of achieving reserve status. Potential programs and actions include:

Outreach and Education

- Create relationships with routine outdoor users to implement a regular dark sky monitoring schedule (the Community School outdoor program, Hemingway STEAM School, Girl/Boy Scouts, 4H, Firstlite, etc)
- Create relationships with professional groups (architects, engineers, store owners) to develop displays and/or continuing education seminars for building professionals
- Create relationships with energy providers (Idaho Power, Salmon River Electric) and financial institutions on current and future financial incentives for upgrading light fixtures to be compliant
- Create relationships with scientists and astronomy/environmental professionals (ICL, ERC, CSI Planetarium), etc for information and advocacy on astronomy and the night sky
- Recruit and train volunteers to provide programs for interested

groups about dark sky benefits and responsibilities, to conduct light inventories, staff educational booths at local events, and support other efforts
- Establish a collection of educational and presentation materials that can be used for programs with schools, youth organizations (camps, scouts, 4H), and civic groups
- Develop a modular/traveling exhibit for use at local events and promotions to provide information about dark sky benefits and responsibilities, light pollution, and how to get involved
- Work with local visitor centers in the Stanley and Ketchum area to design and install permanent Dark Sky exhibits.
- Identify potential locations along state highways 75 and 21 where visitors can park to enjoy the night sky and install wayside interpretive signs to explain the role of the Reserve in preserving the dark sky resource.
- Work with the Idaho Transportation Department to explore the possibility of re-designating the Sawtooth Scenic Byway as the Sawtooth Dark Sky Scenic Byway
- Identify local and regional funding sources and potential grants to support educational outreach and other Dark Sky efforts and materials

Enforcement and Incentives
- Create a simplified protocol for reporting lighting that is out of compliance with city/county lighting ordinances, easily referring issues to appropriate departments, and then tracking future fixes
- Coordinate with all other municipal/county parties for common protocols and data collection to help with future progress reporting
- Create a standard dataset for tracking citywide/countywide compliance rate (for compliance reporting and also future grant writing purposes)
- Identify needs and write grants for capital needs to support the Dark Skies initiative (light monitors, certain numbers of replacement lightbulbs, etc)
- Create an action plan and schedule for systematic monitoring and review of data
- Work with local businesses to incorporate dark sky compliant lighting at their locations and offer special promotions of dark sky friendly products available for purchase.

Events and Tourism:
- Plan and host a Dark Sky celebratory/educational event for residents and visitors in the summer of 2018
- With support of outreach and education partnerships, identify potential community-focused events that could occur as early as Spring 2018
- In addition to community-focused events to build local pride and ownership, create relationships with local tourism groups (local Chambers of Commerce, Visit Sun Valley, local outfitters, lodging providers) to educate and excite them about the economic potential of Dark Skies tourism.

- Explore opportunities with Sun Valley Lodge, Galena Lodge, Smiley Creek Lodge, Idaho Rocky Mountain Ranch, Redfish Lake Lodge and others that could host events.
- Assist Sun Valley, Ketchum and Stanley with marketing about the area's Dark Sky Reserve status. This will entail creating star guides for local hotels, lodges and visitor centers to pass out, listing the benefits of retrofitting lights and reducing light pollution.
- In addition to the CIDSR website, city and partner websites will be used to advertise for events.
- Create fundraising strategy for a starter fund to support community Dark Skies initiatives and events

Staffing and Logistics:

Identify funding sources for staff to act as the primary coordinator for Dark Skies and the driving force for creating the on-going strategic plan and charter for the initiative.

2017 Dark Sky Related Interpretive Events in the CIDSR Area
Light Pollution: A Science Pub Discussion, Sawtooth Brewery, March 8: What is light pollution and why we should care, a presentation by the Idaho Conservation League
Eclipse by Day, Stars by Night, Idaho Conservation League, May 11: A presentation at ICL's annual conference hosted at Redfish Lake Lodge in the Sawtooth National Recreation Area featuring speaker Matt Benjamin
Night Watch Exhibit, Sun Valley Center for the Arts, June 30-August 26: This exhibition presents the work of contemporary artists who expose the many ways the night frames our lives and our dreams
Dark Sky Reserves, Sun Valley Center of the Arts, July 14: A nightscape gallery walk paired with a presentation on the proposed Central Idaho Dark Sky Reserve by the Idaho Conservation League.
Look Up to the Stars with Kevin Manning, Stanley Library, July 26: An educational and entertaining exploration of the universe, the stars and other celestial wonders to promote scientific literacy with Star Tour 2017.
Light Pollution and the Dark Sky Reserve, ICL Boise Office Porch Talk, August 4: An introduction of the proposed Central Idaho Dark Sky Reserve plus an overview of light pollution and why we should care, presented by the Idaho Conservation League
Small Potatoes: How we fit in the Cosmos, Sawtooth Interpretative and Historical Association, August 11: Forum and Lecture Series at the Stanley Museum with Dr. Steven Pauley.
The Great American Eclipse in Idaho, Idaho Conservation League, August 14: Eclipse 101 presentation including the history of eclipses and safety measures for observing the August 21 eclipse and information about the CIDSR efforts.
Starlight and Darkness, Sawtooth Interpretive and Historical Association, August 18: Forum and Lecture Series at the Stanley Museum with Paul Cox from Slooh Observatories.
Night Sky and Astronomy Lectures, Boise Astronomical Society, Stanley, August 19 & 20: This event was held in conjunction with the solar eclipse and included presentations, laser-guided night sky tours and several large telescopes available for public viewing.
Awesome Solar Eclipses, Stanley Community Building, August 20: History of eclipses and their importance in astronomy presented by Woody Sullivan, Professor of Astronomy at the University of Washington
Lighting Pollution: A Science Pub Discussion, Twin Falls, October 10: What is light pollution and why we should care, a presentation by the Idaho Conservation League
Lighting Ordinances and Becoming a Dark Sky Community, American Planning Association Conference, Oct 12: A presentation about light pollution management and dark sky preservation presented by the city of Ketchum and the Idaho Conservation League

Monitoring and Reporting Plan

Monitoring will be conducted by a working group appointed by the advisory group for the CIDSR and will include the collection of the following items on an annual basis:

- Reporting on all of the minimum guidelines listed above
- Information on sustained partnerships
- Outreach initiatives
- Demonstrated efforts towards 90 percent compliance with Lightscape Management Plan and justification for any lighting that is still non-compliant
- Date and descriptions of interpretative events
- Date and descriptions of lighting retrofit projects
- Date and descriptions of community outreach including new programming efforts with any relevant statistics
- Information on any potential or imminent sale of land that may impact Dark Sky Reserve status
- Samples of printed materials demonstrating events, outreach, etc
- Copies of any media or press coverage of the Reserve
- Updates to dark sky contact information
- Updated SQM-L readings at established monitoring sites at least quarterly and possibly readings at additional monitoring sites.

Summary of International Dark Sky Association Requirements

The core of the proposed DSR must be a public or a private land protected for scientific, natural, educational, cultural, heritage or other public enjoyment.
Both cores are contained within the Sawtooth National Recreation Area, an area administered by the U.S. Forest Service. The scientific, natural, educational, cultural and heritage and recreation resources are protected under the Sawtooth National Forest Plan. The Sawtooth NRA was created by Congress in 1972 specifically to preserve and protect "the natural, scenic, historic, pastoral, and fish and wildlife values and to provide for the enhancement of the recreation values associated therewith"[7] In addition, the cores encompass parts of two Congressionally designated Wilderness Areas. Wilderness mandates are discussed on page 5. For additional discussion, see pages 16 -18.

The core must provide sufficient area to meet the Dark Sky Places Program's outreach and public access requirements. If the core includes a publicly protected area, it should strive to fully encompass the boundaries of that area. If an irregular shape is chosen it must be explained in the text of application.
The dual cores encompass 140,000 acres, and are accessible year-round by Forest Service roads and trails, and in the winter by snowmachine. Forest Service regulations allow public entry on foot to all areas of the Sawtooth National Recreation Area, even those that are off-trail. The cores were selected because they are among the darkest areas within the Sawtooth NRA that are accessible year-round to large numbers of people. In addition to the three Forest Service roads that access the eastern core, several trails in the eastern core are open to bicycles motorcycles, and some motorized all-terrain vehicles and snowmobiles.

In the future, additional areas within the Sawtooth NRA may be evaluated for inclusion within the core. The evaluation will be based on further assessments of sky quality, accessibility, and reduction of light pollution from peripheral areas within the Reserve. See pages 28 and 29 for further explanation of the core boundaries.

The peripheral area should encompass a minimum of 173,000 acres around the core or an area sufficient to mitigate 80% of the current and expected future light pollution threats.
The peripherial area encompasses 766,000 acres around the core (see pages 28, 29-30). About 84% of the outdoor lighting fixtures in the area

[7] Public Law 92-400: Sawtooth National Recreation Area Act

are within the cities of Ketchum and Sun Valley (pages 36-41). These cities, with a combined population of 4,295, are located about 28 air miles from the core areas. Since most other areas near the cores are within the Sawtooth NRA and subject to minimal development, these two cities offer the most potential for growth and additional light pollution. Therefore at least 80% of the current and future light pollution threats are expected from the cities of Ketchum and Sun Valley, These cities are within the peripheral area and both have enacted dark sky ordinances.

The core must provide an opportunity for regular public nighttime access, with or without supervision.
The cores are accessed by roads and trails within the Sawtooth National Recreation Area, an area of public land managed by the U.S. Forest Service. Per U.S. Forest Service policy, these roads and trails provide all-night access to the public year-round. In addition, the public may access any part of the off-road and off-trail core areas by foot all night at any time of the year. See pages 28-29 for further discussion about access to the cores.

The core must provide an exceptional dark sky resource, relative to the communities and cities that surround it. Core night sky quality must fit in one of the three tier qualifications.
Sky Quality Meter (SQM-L) readings clearly indicate the exceptional quality of the night sky within the cores and peripheral areas within the Sawtooth NRA. Many of these readings are 21.75 or greater. The CIDSR Advisory Group believes that night sky quality, as evidenced by SQM-L readings from within and adjacent to the cores (highlighted in Appendix C), and by night sky photographs (pages 33-36), and by ALAN and New World Atlas satellite imagery (pages 29-30) qualifies the Reserve for Gold-tier status.

In contrast, SQM-L readings from within the cities of Ketchum and Sun Valley, which have outdoor lighting ordinances, are mostly within the 18.00-20.50 range. The large urban areas of Boise (pop. 223,000) and Twin Falls (pop. 48,000) lie 76 miles to the southwest and 102 miles to the south, respectively. Light pollution within and near these cities contrasts dramatically with the near-pristine conditions within the cores.

A quality comprehensive Lightscape Management Plan should be adopted by a sufficient number of communities within the entire DSR corresponding to at least 80% of population and 80% of designated areas of protection. The regulations contained in the LMP should address all private and public owners of communities within the area of protection.
The cities of Sun Valley and Ketchum, along with Blaine and Custer counties, have enacted dark sky ordinances. These ordinances form the basis for the CIDSR LMP. Although Elmore County does not have a dark sky ordinance, all of the lands in that county that are within

the Reserve are within designated Wilderness where outdoor lighting is prohibited by statue. Within the four counties that comprise the Central Idaho Dark Sky Reserve, 99% percent of the non-Wilderness land area and 99% percent of the incorporated city area is regulated by existing outdoor lighting ordinances. Approximately 98% of the total population of 4,733 within the Reserve live in areas regulated by dark sky ordinances.

New, current, and required retrofit lighting must meet all of the Reserve's LMP requirements.
The dark sky ordinances of the cities and counties involved in the Central Idaho Dark Sky Reserve all require outdoor lighting to meet the LMP requirements discussed on pages 42-44. The Sawtooth NRA has committed to bringing all of its outdoor luminaires into compliance, and to working with the cities and counties in the Reserve toward this goal (see page 45). CIDSR participants have agreed to achieve 90% compliance with the LMP standards within five years, and 100% compliance within 10 years.

LMP includes a policy for determining whether an area should or should not be lighted, at what times an area should or should not be lighted, and appropriate illumination levels.
The Central Idaho Dark Sky Reserve partners have agreed to evaluate how much outdoor lighting is needed and where it is needed during life cycle replacement and retrofit planning. See page 43-44 for the collective commitment statement, and page 48 for Ketchum ordinance requirements. Specific requirements for the appropriate amount and location of outdoor lighting are discussed in Ketchum's dark sky ordinance (page 101-106), and Sun Valley's dark sky ordinance (pages 90-100).

Any lighting fixtures above 500 lumens are required to use fully shielded fixtures emitting no light at or above the horizontal.
The dark sky ordinances for Ketchum (page 101-106), Sun Valley (page 90-100), Blaine County (page 84-87), and Custer County (page 88-89) require all lighting fixtures to be fully shielded, with exceptions, e.g. lighting of American Flag, some luminaires shielded under solid overhangs.

The correlated color temperature of lamps installed in the Reserve shall not exceed 3000 K.
The LMP for the Reserve requires a CCT of not more than 3000K (page 44). Ketchum's newly revised dark sky ordinance requires a maximum CCT of 2700 K (page 101-106). Stanley is retrofitting all of its previously dark sky compliant municipal lights to bring them into compliance with the new CCT standard of 3000K (page 46). Sun Valley is in the process of revising their dark sky ordinance to include a maximum CCT standard of 3000K.

The LMP should conform to or surpass applicable policy in the appropriate local jurisdiction concerning

lighting and dark sky protection as well as other applicable guidance and laws. The LMP recognizes and incorporates the dark sky ordinances and policies of the participating members of the Central Idaho Dark Sky Reserve. See pages 42-44 for further discussion of this policy.

Evidence of community commitment to dark skies and lightscape management, as shown by at least two-thirds of existing outdoor lighting fixtures within the core conforming to the LMP. The duel cores are comprised of public lands within the Sawtooth National Recreation Area managed by the U.S. Forest Service. These are wild lands, partially within designated Wilderness, and contain no outdoor lighting fixtures.

Lighting inventory and a plan to bring 90% of outdoor lighting into compliance with the Reserve's LMP within 5 years of receiving and IDA designation, as well as a written commitment to bring the Sanctuary into 100% compliance within 10 years of designation. A lighting inventory was completed for the entire 906,000 acre Reserve (pages 36-41). The municipalities and counties within the Reserve have committed themselves to achieving 90% compliance within 5 years and 100% compliance within 10 years (page 43-44). This will be accomplished by increased enforcement of dark sky ordinances along with increased educational and outreach efforts. The CIDRS partners also commit themselves to utilize and develop incentive programs to help achieve compliance while minimizing ordinance enforcement actions (see page 51 for further discussion).

A measurement program must be maintained either by the park, private landowner(s) or another public or private organization to follow the evolution of light pollution in the DSR core and assert that the night sky quality does not degrade. The CIDSR advisory Group will appoint a monitoring working group to report on an array of program elements, including the evolution of light pollution (see page 52). SQM-L readings be updated at established monitoring sites at least quarterly and readings also may expanded to additional monitoring sites. These data will be compiled into a written report each year in order to track changes in sky quality during each season. The results of this monitoring will be used to evaluate the effectiveness of efforts to achieve increased compliance with outdoor lighting requirements and the impact of external light pollution threats from nearby communities.

Each participating municipality should have completed at least one highly visible demonstration project with night sky friendly lighting consisting of at least 10 lighting fixtures for each 5000 residents and/or approximately 10% of fixtures within the Reserve (outside

the core) must be retrofitted or brought into compliance with the appropriate regulation or guideline. This percentage does not include fixtures that were compliant upon the initial lighting survey, but rather must show active motivation of the community to make changes through the form of retrofits and or appropriate physical changes to the current fixtures form.

The City of Stanley has converted all 13 of its street lights to full-cutoff LED luminaires, and is in the process of an additional conversion to install 3000 K lamps in these street lights. In addition, Stanley has converted the two area illumination lights on its maintenance buildings, and the two area illumination lights at the city parking lot to dark sky compliant luminaires (3000K). This demonstration project has dramatically reduced light pollution from the town, and has served as a catalyst for private businesses and the school district to adopt dark sky compliant lighting (see discussion on page 46).

The City of Ketchum (pop. 2,689) has demonstrated its commitment to dark sky lighting and light pollution reduction by undertaking a project to bring all of its right-of-way lights into compliance with the new full cut-off and 2,700 K standards established in its revised dark sky ordinance. Ketchum budgeted $100,000 in 2017 for this project, and has so far completed the retrofit of 14 street lights. The retrofit involves installing the Inovus Element Plus, solar powered, full-cut-off light, and the Design Series solar powered, full-cut-off light that has a NXT luminaire with color temperature of no more than 3000 Kelvins. Consistent with the standards of the International Dark Sky Association, the footcandles illuminating the sidewalk shall be an average of 0.2 fc and shall not exceed 5 fc. This demonstration project will continue in 2018 (see discussion on page 47).

The City of Sun Valley (pop.1609) converted exterior lighting fixtures at the City Hall and adjacent street department storage facility in 2014. The replacement LED fixtures were selected to minimize glare, light trespass, and ensure compliancy with the City's own dark sky ordinances. The building mounted lighting applications serve as a community demonstration on how to apply outdoor lighting that is compliant with dark sky principals including down casting and full shielding (see discussion on pg 47).

Participating communities must have a program, either through education, economic incentives, permitting or regulation, to encourage all new outdoor lighting fixtures to conform to the relevant regulation or guidelines for night sky friendly lighting. The Stanley City Council has conducted public meetings to publicize the environmental and economic benefits of dark sky compliant lighting. This education effort, along with its municipal lighting demonstration project, has

succeeded in encouraging businesses, private individuals, and the school district to adopt dark sky compliant lighting. Part of Stanley's educational effort involved publicizing the Salmon River Electric Cooperative's current economic incentive program for private and governmental entities to convert to dark sky compliant lighting. Substantial rebates are available for the installation of energy efficient dark-sky compliant lights through subsidies provided by the Bonneville Power Administration.

The cities of Ketchum and Sun Valley have existing dark sky ordinances, and educational efforts within the Design/Review and Building Permit processes to inform residents about the need for and benefits of dark sky compliant lighting. Ketchum is currently in the process of updating much of the educational flyers and publications that are released to the public to provide education on dark skies awareness. These explain to the public why the dark sky ordinance is needed, as well as steps that property owners can take to reduce the their light footprints.

The importance of dark skies/natural darkness and the benefits of good lighting should be part of Reserve interpretation/outreach programs. If the Reserve typically provides interpretive programs, then dark skies must be one of the central themes communicated through on-site interpretation. If interpretive programs are not typically offered, then publications, flyers, press releases, media, or other outreach are appropriate substitutes. Dedicated dark skies programming must occur at least four times per year; however more frequent events are preferable.

There were thirteen dark sky interpretive events in 2017, and more will be planned for 2018 in recognition of the interest generated in dark skies by the creation of a Dark Sky Reserve. These events will be sponsored by the Sawtooth National Forest, the Sawtooth Historical and Interpretive Association, the Idaho Conservation League, and various local astronomical societies. See pages 53-57 for further discussion.

Acknowledgement of the protected area by government or regulatory agencies situated higher than community level with the perspective that dark skies are an important scientific, natural, cultural, and/or scenic resource value as shown by the inclusion of appropriate language in official documents for long term-planning.

The Sawtooth National Forest has recognized the importance of preserving dark sky values by adopting the planning guidance incorporated within the collaborative Vision 20/20 process (see page 21-22) and by recognizing the value of dark sky lighting in its guidelines for private land ownership within the

Sawtooth NRA.[8] The Sawtooth Forest Supervisor has provided a written commitment to support the CIDSR (page 68). Blaine and Custer counties have dark sky ordinances (pages 73, 89) that provide recognition of dark sky values at the county level.

Documentation of sky quality, light pollution measures, satellite pictures, maps, photographs, or other evidence that demonstrates the noteworthiness of the resource.

Sky quality was recorded with a Unihedron SQM-L meter at various sites within the cores are peripheral areas of the Reserve (see page 32 and 111-116). In addition, dark sky imagery on pages 33-35 reveals the visual quality of the night sky from various points in the Reserve, as well as sky glow from distant cities.

The sources of light pollution in the DSR core must be estimated through calculations, maps, photographs or any other proper method and clearly identify actual and future threats to the sky quality. A plan must be devised to address these current and future threats.

The Artificial Light at Night imagery on pages 29-30 shows the primary sources of light pollution affecting the CIDSR. The 2016 New World Atlas of Artificial Night Sky Brightness imagery from 2015 (page 30) depicts the predicted sky brightness as viewed from the ground. The dark sky imagery on pages 33-35 show light domes visible near the horizon to the south and southwest. These images show that the main sources of light pollution threats are the cities of Ketchum, Sun Valley, Hailey, Boise, Twin Falls, and Mountain Home. These light pollution sources are expected to increase as the population of southern Idaho continues to increase in coming years. However, Ketchum and Sun Valley, which are the closest light pollution sources, are within the CIDSR and have outdoor lighting ordinances. Ketchum has recently revised its ordinance to provide strengthened protection. Their commitment to the CIDSR will help minimize the future light pollution threat. The city of Hailey, somewhat farther south of the Reserve, also has a dark sky ordinance.

Creation of the CIDSR will publicize the dark sky benefits of the Reserve enjoyed by and readily accessible to many people from the major population centers of Boise, Twin Falls, and Mountain Home. Educational and media outreach plans by the CIDSR advisory group will be designed to reach these populations and develop a constituency that will support efforts to reduce light pollution in those cities.

[8] What You Should Know About Private Land Ownership in the Sawtooth National Recreation Area; 2009

Nomination

Board of Directors
International Dark-Sky Association
3224 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation of Central Idaho Dark Sky Reserve

August 11, 2017

Dear IDA Board Members,

Our Utah chapter of the IDA is pleased to nominate our neighbor to the north, the Central Idaho Dark Sky Reserve, for accreditation under IDA guidelines.

This land is critically important in helping preserve the dark skies of the Intermountain West and to support the efforts now underway in Idaho, particularly those of Ketchum, Sun Valley, Stanley and Craters of the Moon National Monument.

Respectfully submitted,

Zach Thomas, President
Ogden Valley Starry Nights

Letters of Support

USDA United States Department of Agriculture | Forest Service | Sawtooth National Forest Supervisor's Office
2647 Kimberly Road East
Twin Falls, ID 83301
208-737-3200
Fax: 208-737-3236

File Code: 1300; 3170
Date: September 14, 2017

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

Dear Board of Directors,

The Sawtooth National Forest extends its support to the International Dark-Sky Association for the certification of the proposed Central Idaho Dark Sky Reserve. The proposed 906,000-acre reserve would primarily encompass public lands administered by the Sawtooth National Forest. The reserve would include the entire Sawtooth National Recreation Area (NRA) and a portion of the Ketchum Ranger District. The Forest has worked with the Idaho cities of Ketchum, Sun Valley and Stanley as well as Blaine County, the Idaho Conservation League, the Sawtooth Society and concerned citizens to help preserve the natural dark-sky experience for residents and visitors in central Idaho. The efforts by these partners to protect the quality of the night sky will also support the preservation and protection of the natural, fish, wildlife, scenic, historic, pastoral and recreational values for which the Sawtooth NRA was established.

The Sawtooth National Forest manages one of the few sizeable areas in the United States that retains exceptionally dark night skies, and is readily accessible for public enjoyment. It is of the utmost importance to protect this heritage as a part of the values recognized in the Sawtooth NRA enabling legislation, and to preserve the character of the associated Wilderness areas within the Sawtooth NRA. A paramount mission of the Forest Service is the responsibility to protect the natural conditions, primeval character and influence of designated wilderness. Preserving natural dark night skies is complementary to accomplishing that mandate.

The Forest is committed to working with cooperating groups and associations in support of the certification effort to accomplish the following:

- Support ongoing lighting inventory of the Dark Sky Reserve.
- Record sky quality meter readings to establish the quality of the dark night sky resource and changes throughout time.
- Offer public outreach, interpretation and educational programs explaining the purpose of the reserve and the value of the dark sky resource.
- Work with partner groups to acquire signage or other interpretive materials indicating dark sky reserve designation.
- Support efforts, where possible to bring outside lighting for Sawtooth National Forest facilities into compliance with IDA standards, subject to funding availability and normal maintenance procedures.

National Forest Service support of the Central Idaho Dark Sky Reserve will not infringe upon the Sawtooth National Forest Land and Resource Management Plan or the laws of the United States governing the management of the National Forest or the private lands therein. Our support of the Dark Sky Reserve will not require the Forest Service to obligate funds for any specific actions. Funding will remain subject to normal Forest Service procedures in regards to budgeting and other procedures.

Establishing the Central Idaho Dark Sky Reserve will strengthen our combined efforts to achieve our comprehensive land management goals for the Sawtooth National Forest. The Dark Sky Reserve will help to protect and preserve ecosystem integrity, and will enhance educational and interpretive opportunities and recreation as well as benefit local tourism economies.

We commend the International Dark-Sky Association for sponsoring this program, and look forward to joining our efforts to preserve the extraordinary dark sky resource in our area.

Sincerely,

KIT T. MULLEN
Forest Supervisor

APPROVED

CITY OF STANLEY

RESOLUTION #2017-4

A RESOLUTION OF THE CITY COUNCIL OF THE CITY OF STANLEY REGARDING PROPOSED INTERNATIONAL DARK SKY RESERVE DESIGNATION FOR THE SURROUNDING AREA, INCLUDING THE CITY OF STANLEY, THE SAWTOOTH NATIONAL RECREATION AREA, THE CITIES OF KETCHUM AND SUN VALLEY, AND PORTIONS OF BLAINE COUNTY

WHEREAS, The natural dark night sky is a vanishing resource throughout the United States due to increasing light pollution from cities and towns; and,

WHEREAS, The central Idaho region still retains some of the most pristine night sky conditions in the western United States; and,

WHEREAS, A goal of the City of Stanley Comprehensive Plan (2010) is to preserve and enhance the dark night sky; and,

WHEREAS, The policy of City of Stanley (Comprehensive Plan 2010) is to achieve dark night sky protection by shielding outdoor lighting; and,

WHEREAS, The City of Stanley believes that protecting the dark night sky will provide economic benefits by promoting astro-tourism and associated educational, scientific and recreational activities within Stanley and the proposed reserve; and,

WHEREAS, Protecting the night environment from light pollution preserves the quality of life for Stanley residents, and natural diurnal habitat requirements for flora and fauna in the surrounding Sawtooth National Recreation Area, White Clouds Wilderness, and Sawtooth Wilderness,

NOW THEREFORE, BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF STANLEY, THE MAYOR CONCURRING, THAT:

The City of Stanley supports the creation of the Central Idaho Dark Sky Reserve as depicted on the map included in the application to the International Dark Sky Association; and,

In addition, the City of Stanley agrees to serve on an advisory and oversight group that will coordinate actions among collaborative partners to implement the Reserve lightscape management plan.

Passed and approved by the City Council on the 10th day of August 2017.

Councilmember Steve Botti

THE MAYOR CONCURRING

The Honorable Mayor, Herb Mumford

ATTEST:

Cari Tassano, City Clerk

City of Stanley
P.O. Box 53 Stanley, ID 83278
Tel: 208.774.2286 / Fax: 208.774.2278
www.stanley.id.gov
cityclerk@stanley.id.gov

ORIGINAL IN RED

City of Ketchum

August 25, 2017

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

RE: IDSP Designation of the Central Idaho Dark Sky Reserve

To the IDA Board Members:

As Mayor of the city of Ketchum, I am pleased to support Central Idaho Dark Sky Reserve in its endeavor to become an accredited International Dark-Sky Reserve through the International Dark-Sky Association. The city of Ketchum falls within the southernmost border of the proposed Central Idaho Dark Sky Reserve boundaries. This honor will establish Ketchum and its surrounding areas as one of the best places in the country to observe and enjoy the stars or catch a comet streaking across the night sky.

Ketchum has worked in close concert with the cities of Stanley and Sun Valley, Blaine County, and the Idaho Conservation League in a joint effort to designate our collectively managed land area as an International Dark Sky Reserve. The Central Idaho Reserve will serve as an important local catalyst to protecting our region's exceptional night sky for years to come.

Our area is fortunate to have a clear window to the universe. On clear, cloudless nights, residents out walking their dog, or visitors strolling back to their hotel, can take advantage of our amazing window to the constellations, the planets and the Milky Way.

This legacy has led dark sky advocates, the city and its partners to work for several years to achieve the status of a Dark Sky Reserve. It's exciting to see the dark skies enthusiasm stretch beyond city limits.

Should you have any questions about our support for the Central Idaho Dark Sky Reserve application, please contact me at 208-726-7803. Thank you for your consideration!

Sincerely,

Nina Jonas
Mayor

480 East Ave. N. ★ P.O. Box 2315 ★ Ketchum, ID 83340 ★ main (208) 726-3841 ★ fax (208) 726-8234
facebook.com/CityofKetchum ★ twitter.com/Ketchum_Idaho ★ **www.ketchumidaho.org**

City of SUN VALLEY

September 19, 2017

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

RE: IDSP Designation of the Central Idaho Dark Sky Reserve

Dear IDA Board Members:

As Mayor of the City of Sun Valley, I am delighted to offer this letter of endorsement and recommendation for the creation of the Central Idaho Dark Sky Reserve. The City of Sun Valley falls within the southernmost border of the proposed Central Idaho Dark Sky Reserve boundaries. Since 2016, the City has worked with the cities of Ketchum and Stanley, and the Idaho Conservation League, in a joint effort to designate our collectively managed area as an International Dark Sky Reserve. Due to the dedicated efforts extended by local jurisdictions, dark sky advocates and the local community, the area has been committed to the preservation of the night sky.

The City of Sun Valley first established exterior lighting regulations in 2004 through Ordinance No. 351 in order to prevent light trespass, minimize the effects of direct glare and excessive lighting, and preserve the ability to view the night sky. The City of Sun Valley was the third city in Blaine County to adopt an exterior lighting ordinance. The regulations balance nighttime use and enjoyment of property while minimizing the degradation of the nighttime visual environment. The City of Sun Valley is currently pursuing an International Dark Sky Community designation from IDA.

The Central Idaho Reserve will serve as an important local catalyst to protecting our region's exceptional night sky for years to come. Protecting the dark sky preserves the unique character of Sun Valley and aligns with the goals in the City's 2015 Comprehensive Plan Update including preserving natural and scenic resources as well as protecting the vitality and cultural heritage of Sun Valley.

Please count on our City as one that is invested in the continued effort to preserve the night sky. We enthusiastically support the effort to become a part of the next Dark Sky Reserve. The community would be honored to join the Central Idaho Dark Sky Reserve, and looks forward to serving as a model to other communities striving to reclaim and preserve the dark skies.

Sincerely,

Peter M. Hendricks

Peter M. Hendricks, Mayor
City of Sun Valley

PMH/nf

P.O. Box 416 • SUN VALLEY, ID 83353 • 208-622-4438 • FAX 208-622-3401
www.sunvalley.govoffice.com

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

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

International Dark Sky Association (IDA) Board of Directors
3223 North First Avenue
Tucson, AZ 85179

September 20, 2017

RE: Central Idaho Dark Sky Reserve

Dear IDA Board of Directors,

On behalf of the Board of Blaine County Commissioners, I would like to express our full support for the Central Idaho Dark Sky Reserve. There are very few places left in the United States where one can look up at the night sky and still see the Milky Way. Across the world, this is becoming an increasingly rare and diminishing resource. Here, in Blaine County, we are fortunate to be one of the remaining places where the stars still shine brightly. Protecting this resource is not without effort. Blaine County has been a leader in Idaho in recognizing the importance of preserving and enhancing our night sky resources.

The Blaine 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. In May of 2010 the Board of County Commissioners acknowledged the value of our incredible dark night sky by voting unanimously to adopt countywide regulations designed to preserve this resource. Blaine County's ordinance was the first of it's kind in Idaho. It requires that all new outdoor lighting not shine directly in adjacent property or public right of ways. Our ordinance also requires all applications for zoning, subdivision and building permits to include lighting plans showing location, type and boundary of light.

Within Blaine County, the cities of Ketchum, Sun Valley and Hailey also have their own night-sky ordinances. Additionally, Custer County, adjacent to Blaine County, has a dark sky ordinance. Collectively, this effort shows true commitment on part of Blaine and Custer Counties, and our local communities to preserve the starry skies we treasure. Further, these ordinances form the basis of the Central Idaho Dark Sky Reserve.

Creating a Dark Sky Reserve is a natural next step for continuing to build awareness around night sky preservation and for bringing merited attention to this incredible resource. As a County, we pride ourselves in offering our residents and visitors the opportunity to experience nature along with an array of natural amenities and recreational pursuits. Our area remains one of the darkest places in the west, providing exceptional sky viewing opportunities year round. We aim to preserve this resource. In addition, the existing infrastructure within Blaine County has the capacity to support and educate visitors that may be drawn in from a Dark Sky Reserve. We are excited about the opportunity to further highlight our area by offering astronomy as yet another draw to Blaine County and the Central Idaho Dark Sky Reserve area.

We urge you to approve our application to establish the first Dark Sky Reserve in the United States. We thank you for your careful consideration of our area, and greatly appreciate your efforts to protect night sky across the world. If you would like any additional information from Blaine County, please do not hesitate to contact me at amccleary@co.blaine.id.us or 208-788-5500.

Sincerely,

Angenie McCleary

Angenie McCleary, Chairman

ENDORSEMENT OF DESIGNATION OF THE CENTRAL IDAHO DARK SKY RESERVE AS INTERNATIONAL DARK SKY RESERVE (IDA)

The Central Idaho Dark Sky Reserve 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 an IDA-accredited Central Idaho Dark Sky Reserve.

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 and Tourism

The Consortium for Dark Sky Studies
at the University of Utah

Board of Directors
International Dark-Sky Association
3224 North First Avenue
Tucson, AZ 85719

Re: IDSP Designation Central Idaho Dark Sky Reserve

August 10, 2017

To the IDA Board Members:

The Consortium for Dark Sky Studies (University of Utah), as determined by its Steering Group Members at today's quarterly meeting, sends this letter of support for the creation of the IDA-accredited Central Idaho Dark Sky Reserve and notes that this effort is, in many ways, groundbreaking through its particular intersections with the dark sky initiatives of not only the U. S. Forest Service but also Craters of the Moon National Monument and the Cities of Sun Valley, Stanley, and Ketchum.

The Intermountain West possesses a significant portion of the best remaining dark skies in America, and central Idaho is a place of particular beauty, with highly varied moonscape, valley and alpine areas, with, of course, exceptionally dark skies above.

Please note, the Consortium will also be submitting a Research Endorsement for the creation of this Dark Sky Reserve.

Sincerely,

Stephen Goldsmith
Co-Director

IDAHO CONSERVATION LEAGUE

208.726.7485 • PO Box 2671, Ketchum, ID 83340 • www.idahoconservation.org

Board of Directors
International Dark Sky Association (IDA)
3223 North First Avenue
Tucson, AZ 85179

September 21, 2017

Re: Central Idaho Dark Sky Reserve

Dear IDA Board of Directors

We enthusiastically offer our full support of the Central Idaho Dark Sky Reserve (CIDSR). Since 1973, the Idaho Conservation League ("ICL") has worked to protect Idaho's clean water, wilderness, and quality of life. We have a long history of involvement in natural resource protection and statewide energy issues. As Idaho's largest statewide conservation organization, we represent over 25,000 supporters.

This region in central Idaho processes some of the best remaining access to night sky in the United States. The area is sparsely developed and offers incredible access to public lands, wildlife, and nature. For more than two years, our organization has worked collaboratively with the counties and cities involved with the Dark Sky Reserve proposal. We are confident that IDA will not only find extraordinarily high quality night sky here but also a sincere commitment to preserve and enhance this resource over the long term.

We strongly encourage IDA's Board of Directors to approve the Central Idaho Dark Sky Reserve application. Please do not hesitate to contact me if you have any further questions.

Sincerely,

Dani Mazzotta
Central Idaho Director
Idaho Conservation League
(208) 726.7485
dmazzotta@idahoconservation.org

BOISE STATE UNIVERSITY
COLLEGE OF ARTS AND SCIENCES
Department of Physics

September 19, 2017

Board of Directors
International Dark Sky Association
3224 North First Avenue
Tucson, AZ 85719

Re: Designation of the Central Idaho Dark Sky Reserve

Dear IDA Board Members:

As Professor and Department Chair for the Boise State Physics Department, I extend my strong support for the creation of an IDA-accredited Dark Sky Reserve in Central Idaho.

While the quality of night viewing is rapidly diminishing across the United States, the Central region of our state continues to provide a night sky experience of the highest quality. Preserving this now and for generations to come is imperative for advancing scientific research related to the night sky, and for the enjoyment of the public. We in the Boise State Physics Department see many possible future opportunities for utilizing the Central Idaho Dark Sky Reserve as an outdoor laboratory for students and researchers.

We thank you for your consideration of the Central Idaho Dark Sky Reserve application and hope that it will soon become a reality.

Sincerely,

Charles Hanna, Ph.D.
Professor and Department Chair

1910 University Drive Boise, Idaho 83725-1570
Phone (208) 426-3775 Fax (208) 426-4330 physics@boisestate.edu physics.boisestate.edu

Kerrin McCall PO box 353 Ketchum ID 83340 208.726.5859

Board of Directors
International Dark Sky Association (IDA)
3223 North First Avenue
Tucson, AZ 85179

Date: August 7, 2017

Re: Support for Central Idaho Dark Sky Reserve Designation

Dear IDA Board Members,

As a 40- year resident of the Wood River Valley I have seen many changes. I remember looking south to Hailey from my home on a hillside in Indian Creek and seeing only 5 lights. I remember the stars at night and seeing the planets lined up from southeast to northwest. It was so remarkable to feel myself as a part of the universe, the wild cosmos and the infinity before me, all because the sky was dark, unintruded upon by artificial light pollution.

We have way more lights now in the valley but we also have Dark Sky Ordinances and now the possibility a Dark Sky Reserve extending north into the Sawtooth Valley and Stanley. I fully support this effort and look forward to the designation.

The beauty of dark skies, being able to see ourselves as part of the cosmos should be a gift we pass on to the many generations to come.

Sincerely,
Kerrin McCall

Board of Directors›
International Dark Sky Association (IDA)
3223 North First Avenue
Tucson, AZ 85179

July 31, 2017

Re: Support for Central Idaho Dark Sky Reserve Designation

Please accept this letter written in support of the Central Idaho Dark Sky Reserve. This Reserve, if approved, will guarantee a unique experience for thousands in the future while supporting the preservation of the natural habitat. Further protection of our rapidly diminishing night skies wherever possible is not only essential, it is our responsibility.

With its already protected land, large expanse of wilderness and unpolluted skies, Central Idaho is uniquely suited to be named as a Dark Sky Reserve. This area has seen decades of proven commitment to environmental protection by non-profits, the general population and local, state and federal government. especially qualified to receive your esteemed Dark Sky Reserve designation.

A Central Dark Sky Reserve would not only promote an awareness of Dark Sky Reserves around the world, it would inspire and incentivize the spawning of future Reserves.

Thank you for considering this highly prized designation for Central Idaho, an already cherished part of our planet. Future generations will be grateful for your vision and efforts to safeguard vanishing night skies.

Sincerely,

Barbi Reed

B. (Barbi) Anne Reed

barbi@annereedgallery.com

To Whom It May Concern,

I am in favor of creating a dark sky zone for the Sawtooth Valley in Central Idaho. Located amongst several mountain ranges, with one paved road running north to south through it, it would be a wonderful asset to the wilderness feel of the area.

Our natural world is getting impacted from many different angles, but to have an area that would be truly excellent for viewing the evening sky and allowing people to connect more with the natural world.

Please support this initiative.

Respectfully,

Bobby Noyes
109 Eagle Creek Rd
Ketchum, ID 83340
208-720-1257

Media

How Americans lost the stars and how we might be able to get them back

The Washington Post

October 13, 2017

https://www.washingtonpost.com/news/wonk/wp/2017/10/13/why-idaho-is-setting-up-a-giant-nature-preserve-in-the-sky/?utm_term=.a6dd05670944

Idaho May Soon Be Home to the First Dark Sky Reserve in the US

Conde Nast Traveler

September 21, 2017

https://www.cntraveler.com/story/idaho-may-soon-be-home-to-the-first-dark-sky-reserve-in-the-us

Idaho Officials Hope to Create First International Dark Sky Reserve in U.S.

Adventure Journal

September 20, 2017

https://www.adventure-journal.com/2017/09/idaho-officials-hope-create-first-international-dark-sky-reserve-u-s/

Idaho hopes to bring stargazers to first US dark sky reserve*

Washington Post

September 15, 2017

https://www.washingtonpost.com/national/energy-environment/stargazers-eye-the-nations-first-dark-sky-reserve-in-idaho/2017/09/15/b6fa75d0-99e9-11e7-af6a-6555caaeb8dc_story.html?utm_term=.e04584812b0e

* *This story was generated by AP and was run across numerous media outlets*

Idaho wants to create a 1,400-square-mile reserve for the stars

The Week

September 15, 2017

http://theweek.com/speedreads/725054/idaho-wants-create-1400squaremile-reserve-stars

A real star-spangled night! America set to get its first dark sky reserve in Idaho - with 80% of the rest of the country suffering from light pollution

Daily Mail UK

September 15, 2017

http://www.dailymail.co.uk/travel/travel_news/article-4887038/Stargazers-eye-nations-dark-sky-reserve-Idaho.html

Dark Sky Reserve application is on track: Designation for region would be a first in the United States

Idaho Mountain Express

August 30, 2017

http://www.mtexpress.com/news/blaine_county/dark-sky-reserve-application-is-on-track/article_bff9a798-8d08-11e7-b505-5b9a0f314087.html

As Stanley welcomes eclipse viewers, dark-sky backers shine a light on their cause

Idaho Statesman

August 19th 2017

http://www.idahostatesman.com/news/local/news-columns-blogs/letters-from-the-west/article168219632.html

Ketchum adopts amended dark skies ordinance

The Idaho Mountain Express

May 16, 2017

http://www.mtexpress.com/news/ketchum/ketchum-adopts-amended-dark-skies-ordinance/article_ed220df4-3a84-11e7-a511-2feba38058fc.html

Sawtooth 20/20 considers dark sky reserve: If established, reserve would be first of its kind in U.S

The Idaho Mountain Express

March 18, 2017

http://www.mtexpress.com/news/blaine_county/sawtooth-considers-dark-sky-reserve/article_d31eb362-ec7e-11e5-bc81-27739a727118.html

Ketchum hopes for darker skies with ordinance tweak: Idaho Conservation League advocates for dark sky reserve in Blaine County

The Idaho Mountain Express

March 15, 2017

http://www.mtexpress.com/news/ketchum/ketchum-hopes-for-darker-skies-with-ordinance-tweak/article_ad3b5496-0903-11e7-9f80-db3e30a1c6a3.html

Sun Valley-A Celestial Tourism Star?

Eye on Sun Valley

March 13, 2017

http://www.karenbossick.com/Story_Reader/3611/Sun-Valley-A-Celestial-Tourism-Star?/

What it takes to be a dark-sky reserve

Pique

November 24, 2016

https://www.piquenewsmagazine.com/whistler/what-it-takes-to-be-a-dark-sky-reserve/Content?oid=2856973

County considers plan for 'dark sky reserve' Stanley councilman wants to cooperate with commissioners

Idaho Mountain Express

Sept 28, 2016

http://www.mtexpress.com/news/state_regional/county-considers-plan-for-dark-sky-reserve/article_7c2dd86c-8508-11e6-8011-776078e713e3.html

APPENDIX A: Existing lighting ordinances in CIDSR

Blaine County

OUTDOOR LIGHTING
9-29A-1: PURPOSE:
9-29A-2: NEW LIGHTING:
9-29A-3: DEFINITIONS:
9-29A-4: OUTDOOR LIGHTING STANDARDS:
9-29A-5: PROCEDURE:
9-29A-6: EXEMPTIONS:9-29A-7: PENALTIES:

9-29A-1: PURPOSE:

The general purpose of an outdoor lighting ordinance is to protect and promote the public health, safety and welfare, while preserving and protecting the scenic and aesthetic values and natural resources of Blaine County by establishing regulations and a process for review of outdoor lighting. This chapter establishes minimum standards for regulating outdoor lighting. (Ord. 2010-06, 5-25-2010)

9-29A-2: NEW LIGHTING:

All outdoor lighting installed after the effective date of this chapter shall conform to the standards established by this chapter. (Ord. 2010-06, 5-25-2010)

9-29A-3: DEFINITIONS:

FLOODLIGHT: A lamp that is designed to flood a well defined area with light.

FULL CUTOFF LUMINAIRES: A luminaire designed and installed where no light is emitted at or above a horizontal plane running through the lowest point on the luminaire.

FULLY SHIELDED: The luminaire incorporates a solid barrier (the shield), which permits no light to escape through the barrier.

HOLIDAY LIGHTING: Strings of individual lamps, where the lamps are at least three inches (3") apart.

LAMP: The generic term for an artificial light source, to be distinguished from the whole assembly (see definition of Luminaire). Commonly referred to as "bulb".

LIGHTING: Any or all parts of a luminaire that function to produce light.

LUMINAIRE: A complete lighting unit, consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to the power. When used, includes ballasts and photocells. Commonly referred to as "fixture".

OUTDOOR LIGHTING: Temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outdoors. Luminaires that are indoors that are intended to light something outside are considered outdoor lighting for the purpose of this chapter.

PARTIALLY SHIELDED: A luminaire incorporating a semiopaque barrier or partial shield around the lamp that allows some light to pass through the barrier while concealing the lamp from the viewer.

SECURITY LIGHTING: Unshielded outdoor lighting for security purpose and not associated with an outdoor activity that requires illumination.

UPLIGHTING: Fully shielded lighting that is directed in such a manner as to shine light rays above the horizontal plane. (Ord. 2010-06, 5-25-2010)

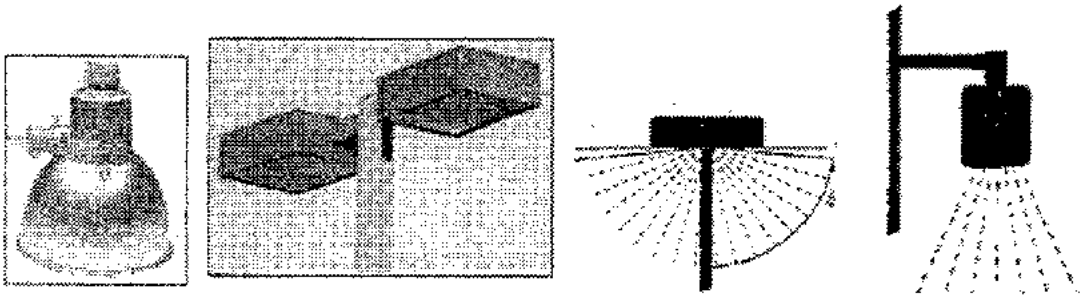
9-29A-4: OUTDOOR LIGHTING STANDARDS:

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.

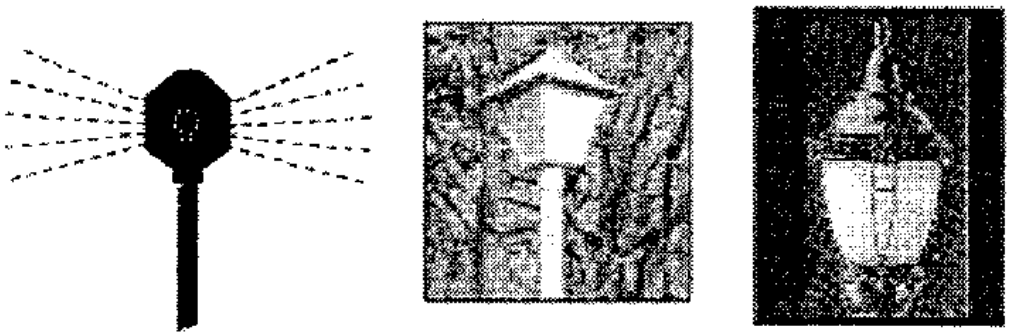
B. Height Of Luminaires:
   1. Parking area luminaires shall be no higher than seventeen feet (17') in height.
   2. Freestanding luminaires in residential zones shall be no higher than fifteen feet (15') in height.
   3. Streetlights used on arterial roadways shall be no higher than twenty feet (20') in height.
   4. The height of any light fixture or luminaire shall be no higher than thirty feet (30') in height.

C. Examples:

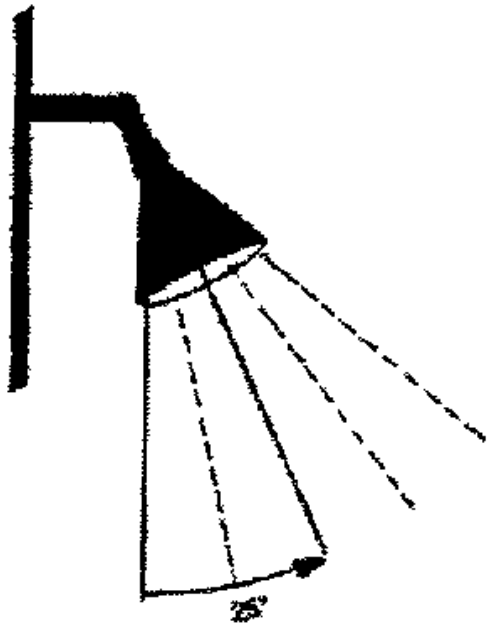
1. Full cutoff luminaires with the light source downcast and fully shielded.



2. Luminaires that are partially shielded with the lamp not visible and 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.



(Ord. 2010-06, 5-25-2010)

9-29A-5: PROCEDURE:

A. All applications for zoning, subdivision and building permits shall include lighting plans showing location, type and boundary of light.

B. The administrator shall review any new lighting on the subject property that is part of an application for zoning permit, subdivision or building permit, to determine whether the lighting complies with the standards of this chapter. The administrator shall convey in writing a recommendation whether the lighting complies with the standards of this chapter to the building official, the board of county commissioners, planning and zoning commission or hearing examiner before issuing approval of any zoning permit, subdivision application, or certificate of occupancy.

C. For all other lighting which must conform to the requirements of this chapter, the administrator shall issue a decision whether the lighting complies with the standards of this chapter. The administrator, prior to issuance of its decision, may request additional information from the applicant. (Ord. 2010-06, 5-25-2010)

9-29A-6: EXEMPTIONS:

The following forms of outdoor lighting are exempt from the provisions of this chapter and are not required to comply with its terms:

A. Agricultural lighting when used for agricultural purposes. Security lighting needs to comply.

B. Lighting required for safe nighttime operation in light industrial, heavy industrial, commercial, and agricultural zones. Security lighting needs to comply.

C. A single light for the sole purpose of up lighting of a flag.

D. Sports, recreation and entertainment lighting required for public events.

E. Lighting that is required to meet the federal aviation authority's compliance standards.

F. Traffic control, roadway, vehicular lights and all temporary emergency lighting.

G. Lighting activated by a motion sensor with a cutoff timer set for five (5) minutes or less. (Ord. 2010-06, 5-25-2010)

9-29A-7: PENALTIES:

A violation of this chapter shall be a misdemeanor, and subject to penalty as provided in section 1-4-1 of this code. Each day that such a violation continues shall constitute a separate criminal offense. The landowner, tenant, subdivider, builder, public official or any other person who commits, participates in, assists in or maintains such violation may be found guilty of such a violation. (Ord. 2010-06, 5-25-2010)

Custer County

ARTICLE XVIII LIGHTING

SECTION A: PURPOSE

The general purpose of this Chapter is to protect and promote the public health, safety and welfare, the quality of life, by establishing regulations and a process of review for exterior lighting. This Chapter establishes standards for exterior lighting in order to accomplish the following:

1. To protect against direct glare of excessive lighting;
2. To provide safe roadways for motorists, cyclists and pedestrians;
3. To prevent light trespass in all areas of the county;
4. To provide lighting guidelines;

SECTION B: SCOPE

All exterior lighting installed after the effective date of the ordinance in any and all zoning districts in the County shall be in conformance with the requirements established by this Title and any other applicable ordinances

SECTION C: DEFINITIONS

Unless specifically defined below, words or phrases used in this Chapter shall be interpreted so as to give them the meaning they have in common usage and to give this Section it's most reasonable application:

"Existing lighting" means any and all lighting installed prior to the effective date of the ordinance.

"Exterior lighting" means temporary or permanent lighting that is installed, located or used in such a manner to cause light rays to shine outside and includes all yard (100 HPS) and street (250 HPS) lamps. *Ordinance 2010-4*

"Light pollution" means any adverse effect of manmade light including, but no limited to, light trespass, up lighting, the uncomfortable distraction to the eye, or any manmade light that diminishes the ability to view the night sky; often used to denote urban sky glow.

SECTION C: CRITERIA

The Commission, the Building Official and/or the Planning and Zoning Administrator shall have the authority to require any new lighting to meet the recommendations and guidelines, in addition to the requirements of this Chapter.

Any new outdoor lighting installed or any existing lighting being replaced shall meet the requirements of the local electric company for be High Pressure Sodium lamps including a full cut-off shade. *Ordinance 2010-4*

SECTION D: VIOLATIONS AND LEGAL ACTIONS.

If after investigation, the Planning and Zoning Administrator finds that any provision of this Chapter is being violated, the Administrator shall given notice by hand delivery or by certified mail, return receipt requested, of such violation to the owner and/or to the occupant of such premises, demanding that the violation be abated within thirty (30) days of the date of mailing the notice. The Planning Department shall be available to assist in working with the violator to correct said violation. If the violation is not abated within the thirty (30) day period, the Administrator may institute actions and proceedings, either legal or equitable, to enjoin, restrain or abate any violations of this Chapter and to collect the penalties for such violations.

City of Sun Valley

ARTICLE B. EXTERIOR LIGHTING REGULATIONS

9-3B-1: PURPOSE:
9-3B-2: APPLICABILITY:
9-3B-3: GENERAL PROVISIONS:

9-3B-1: PURPOSE:

The purpose of these regulations is to protect and promote the public health, safety and welfare, the quality of life, and the ability to view the night sky, by establishing regulations and a process for review of exterior lighting. This article establishes standards for exterior lighting in order to accomplish the following:

A. To provide safe streets for motorists, cyclists, and pedestrians, and ensure that sufficient lighting can be provided where needed to promote safety and security;

B. To minimize the effects of direct glare and excessive lighting;

C. To balance the nighttime use and enjoyment of property while minimizing the degradation of the nighttime visual environment, and thereby help preserve the quality of life in the city;

D. To prevent light trespass in all areas of the city;

E. To promote energy efficient and cost effective lighting in all areas of the city;

F. To allow for flexibility in the style of lighting fixtures;

G. To define practical and effective measures by which the obtrusive aspects of outdoor light usage can be minimized, and provide lighting practices that direct the appropriate amount of light where and when it is needed;

H. To provide assistance to property owners and occupants in bringing nonconforming lighting into conformance with this article; and

I. To work with other jurisdictions within Blaine County to meet the purposes of this article. (Ord. 382, 10-25-2006)

9-3B-2: APPLICABILITY:

A. All existing exterior lighting installed after April 15, 2004, shall conform to the standards established by this article.

B. All existing exterior lighting installed before April 15, 2004, shall be brought into conformance with this article, except subsection 9-3B-3C of this article.

C. All existing exterior lighting located on a subject property that is part of an application for design review approval, a conditional use permit, subdivision approval, or a building permit is required to be brought into conformance with this article before issuance of a certificate of occupancy, final inspection or final plat recordation, when applicable. For other permits, the applicant shall have a maximum of thirty (30) days from date of permit issuance to bring the lighting into conformance. (Ord. 382, 10-25-2006)

9-3B-3: GENERAL PROVISIONS:

A. General Standards:

1. Exterior Lighting: All exterior lighting shall be designed, located, and lamped in order to prevent or minimize:
   a. Overlighting;
   b. Energy waste;
   c. Glare;
   d. Light trespass; and
   e. Skyglow.
2. Nonessential Lighting: All nonessential exterior commercial, recreational, and residential lighting shall be turned off after business hours and/or when not in use. Lights on a timer are encouraged. Sensor activated lights are encouraged to replace existing lighting that is desired for security purposes.
3. Canopy Lights: Canopy lights, such as service station lighting or covered entries, shall be fully recessed or fully shielded so as to ensure that no light source is visible from or causes glare on public rights of way or adjacent properties.
4. Area Lights: All area lights shall be a minimum eighty five degree (85°) full cutoff type luminaries.
5. Luminaries: Idaho Power shall not install any luminaries after the effective date hereof that light the public right of way without first receiving approval for any such application by the lighting administrator. (Ord. 382, 10-25-2006)

B. Use Of Luminaries: In no case shall unshielded or clear glass luminaries be allowed; all exterior lighting shall use full cutoff luminaries with the light source downcast and fully shielded, with the following exceptions:

1. Luminaries: Luminaries that have a maximum output of one thousand (1,000) lumens per fixture (equal to one 60-watt incandescent lamp) regardless of number of lamps, may be partially shielded provided the luminaries have an opaque top or is under a solid overhang[1]. In no case shall clear glass luminaries be allowed.
2. Floodlights: Floodlights with external shielding shall be angled so that no light is directed at more than a thirty degree (30°) angle beyond the vertical line from the center of the light extended to the ground, and only if the luminaries do not

cause glare or light to shine on adjacent property or public rights of way[2]. Residential floodlights shall be turned off by eleven o'clock (11:00) P.M. Photocells with timers that allow a floodlight to go on at dusk and off by eleven o'clock (11:00) P.M. are encouraged. In no case shall clear glass luminaries be allowed.

3. Residential Holiday Lighting: Residential holiday lighting is allowed from November 1 to March 15. The use of LED holiday lighting is strongly encouraged. Flashing holiday lights on residential properties are prohibited. Holiday lights may only be on between dusk and eleven o'clock (11:00) P.M.
4. Commercial Holiday Lighting: Commercial holiday lighting is allowed from November 1 to March 15. The use of LED holiday lighting is strongly encouraged. Flashing holiday lights are prohibited. (Ord. 414, 4-16-2009)
5. Sensor Activated Luminaries: Sensor activated luminaries, provided:

a. It is located in such a manner as to prevent glare and light trespass onto properties of others or into a public right of way;
b. The luminaries are set to only go on when activated and to go off within five (5) minutes after activation has ceased;
c. The luminaries shall not be triggered by activity off the subject property.

6. Emergency Lighting: All temporary emergency lighting needed by the fire and police departments or other emergency services.
7. Lighting For Flags: Lighting for flags provided the flag is a United States of America or state of Idaho official flag and the maximum lumen output is one thousand three hundred (1,300) lumens. The external beam shall minimize light trespass and/or glare.
8. Uplighting: Uplighting for landscaping and/or structures shall be reviewed on a case by case basis; it is strongly advised that all uplighting be fully captured. All uplighting shall be turned off by eleven o'clock (11:00) P.M.
9. Lighting Of Towers: Lighting of radio, communication and navigation towers; provided the owner or occupant demonstrates that the federal aviation administration (FAA) regulations can only be met through the use of lighting that does not comply with this article.
10. Neon Lights: Neon lights permitted pursuant to article F of this chapter.
11. Playing Field Luminaries: Luminaries used for playing fields and courts shall be exempt from the height restriction, provided all other provisions of this article are met and the light is used only while the field or court is in use.
12. Nonresidential Luminaries: Nonresidential luminaries may deviate from the requirements of these exterior lighting regulations only upon submitting for commission approval a design review application under article A of this chapter, detailing the specific reasons for the proposed deviation. The commission may approve, deny, or approve with conditions any such application submitted under this section.

C. Placement And Height Of Luminaries:

1. Parking area luminaries shall be no taller than seventeen feet (17') as measured from the ground to their tallest point. Parking area lights are encouraged to be greater in number, lower in height, and lower in lumens, as opposed to fewer in number, higher in height, and higher in lumens.

2. Freestanding luminaries on private property in residential zones shall be mounted at a height no greater than twelve feet (12') from ground level to the top of the luminaries.
3. Streetlights used on arterial streets may exceed twenty feet (20') in height, with the recommendation by the council, and only with a finding that exceeding twenty feet (20') is necessary to protect the safety of the residents of the city.
4. Luminaries used for playing fields shall be exempt from the height restriction, provided all other provisions of this article are met and the light is used only while the field is in use.

D. Illuminance And Type Of Lamp:

1. Illuminance levels for parking lots, sidewalks, and other walkways provided illuminance from side mounted building lights, and freestanding sidewalk lights (not streetlights) shall not exceed illuminance levels listed in the most current "IESNA Recommended Practices". The city recognizes that not every such area will require lighting.
2. Aboveground parking lot lighting shall not exceed an overall average illumination of 1.5 foot-candles. Interior parking structure lighting shall not exceed the minimum security illumination levels listed in the most current "IESNA Recommended Practices".
3. The use of lighting for exterior wall washing is limited for residences, condominiums, and apartments as listed in this subsection D3 of this section; the use of recessed eaves lighting to achieve wall washing is preferred, and wall washing should strive for uniform illumination distribution. The maximum average illumination limits for wall washing are:

a. Dark colored exterior surfaces: 1.0 foot-candle.
b. Light colored exterior surfaces: 0.5 foot-candle.
c. Illuminance measurements of indirect light creating wall wash shall be measured with an illuminance meter four feet (4') from ground level with the meter held horizontally and touching the wall surface.

4. Streetlights shall be high pressure sodium or metal halide, unless otherwise determined that another type is more efficient. Streetlights along residential streets shall be limited to a seventy (70) watt high pressure sodium (hps) light with a lumen output of six thousand four hundred (6,400). Streetlights along nonresidential streets or at intersections shall be limited to one hundred (100) watt hps, with a lumen output of nine thousand five hundred (9,500), except that lights at major intersections on state highways shall be limited to two hundred fifty (250) watt hps, with a lumen output of twenty eight thousand five hundred

(28,500). If a light type other than high pressure sodium or metal halide is permitted, then the equivalent output shall be the limit for the other light type[3].

E. Tables And Information Sheets: The following figures and information sheets shall be guidelines for the public and the city for use in enforcing this article. The city does not endorse or discriminate against any manufacturer or company that may be shown, portrayed or mentioned by the examples. Additional information is provided at the Sun Valley community development department.

TABLE 9-3B-1
INITIAL RATED LIGHT OUTPUT OF VARIOUS LAMPS

Lamp Type	Lamp Wattage	Initial Lumen Output
Incandescent lamp (frosted) (Sylvania)	25	235
Incandescent lamp (frosted) (Sylvania)	40	375
Incandescent lamp (frosted) (Sylvania)	60	890
Incandescent lamp (frosted) (Sylvania)	100	1,690
Incandescent lamp (frosted) (Sylvania)	150	2,850
Incandescent flood or spot (GE)	75	765
Incandescent flood or spot (GE)	120	1,500
Incandescent flood or spot (GE)	150	2,000
Quartz halogen lamp (frosted) (Sylvania)	42	665
Quartz halogen lamp (frosted) (Sylvania)	52	885
Quartz halogen lamp (frosted) (Sylvania)	72	1,300

Quartz halogen lamp (frosted) (Sylvania)	300	6,000
Quartz halogen lamp (frosted) (Sylvania)	500	10,500
Quartz halogen lamp (frosted) (Sylvania)	1,000	21,000
Quartz halogen flood or spot (GE)	20	260
Quartz halogen flood or spot (GE)	42	630
Quartz halogen flood or spot (GE)	50	895
Quartz halogen flood or spot (GE) (all 12 volt MR-16 type)	75	1,300
Fluorescent lamp (Phillips)	7	400
Fluorescent lamp (Phillips)	9	600
Fluorescent lamp (Phillips)	13	900
Fluorescent lamp (Phillips)	22	1,200
Fluorescent lamp (Phillips)	28	1,600
Fluorescent lamp (Phillips)	40	3,150
High pressure sodium lamp (diffuse) (GE)	35	2,250
High pressure sodium lamp (diffuse) (GE)	50	4,000
High pressure sodium lamp (diffuse) (GE)	70	6,400
High pressure sodium lamp (diffuse) (GE)	100	9,500
High pressure sodium lamp (diffuse) (GE)	150	16,000
High pressure sodium lamp (diffuse) (GE)	250	27,500
High pressure sodium lamp (diffuse) (GE)	400	50,000
Mercury vapor lamp (white deluxe) (Sylvania)	100	4,500
Mercury vapor lamp (white deluxe) (Sylvania)	175	8,500
Mercury vapor lamp (white deluxe) (Sylvania)	250	11,100
Mercury vapor lamp (white deluxe) (Sylvania)	400	20,100
Metal halide lamp (coated) (GE)	32	2,500
Metal halide lamp (coated) (Venture)	50	3,400
Metal halide lamp (coated) (GE)	100	9,000
Metal halide lamp (coated) (GE)	175	15,750
Metal halide lamp (coated) (GE)	250	20,500
Metal halide lamp (coated) (GE)	400	36,000

TABLE 9-3B-2
MOUNTING HEIGHT/LAMP OUTPUT RECOMMENDATIONS

Mounting Height (Feet)	Max Lumens
6	**1,000**
8	600 to 1,600
10	1,000 to 2,000

12	1,600 to 2,400
16	2,400 to 6,000
20	4,000 to 8,000
24	6,000 to 9,000
28	8,000 to 12,000
32	9,000 to 24,000
36	12,000 to 28,000
40	16,000 to 32,000

TABLE 9-3B-3
MOUNTING HEIGHT RECOMMENDATIONS PER LAMP TYPE

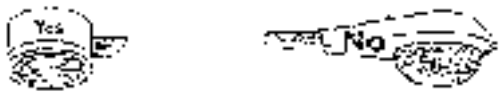
High Pressure Sodium								
Wattage	400 W	250 W	200 W	150 W	100 W	70 W	50 W	35 W
Mounting heights	>50'	32_36'	30'	28'	24'	20'	16'	12'
Initial lumens	50,000	28,500	22,000	16,000	9,500	6,300	4,000	2,250
Mean lumens	45,000	25,700	19,800	14,400	8,550	5,470	3,600	2,025
Lamp wattage	400	250	200	150	100	70	50	35
Circuit wattage	465	294	246	193	130	88	66	46
Initial lum/watt	108	97	89	83	73	72	61	49
Mean lum/watt	97	87	80	75	66	64	55	44
Annual kWh use	1,907	1,205	1,009	791	533	361	271	189

Metal Halide									
Wattage	1,000 W	400 W	250 W	175 W	150 W	100 W	70 W	52 W	32 W
Mounting heights	>60'	>36'	>30'	>28'	>24'	>20'	>16'	>12'	>10'
Initial lumens	110,000	36,000	20,500	16,600	13,000	9,000	5,500	3,500	2,500
Mean lumens	88,000	28,800	17,000	10,350	8,700	6,400	4,000	2,500	1,900
Lamp wattage	1,000	400	250	175	150	100	70	50	32
Circuit wattage	1,070	456	295	215	184	115	88	62	43
Initial lum/watt	103	79	69	77	71	78	63	56	58
Mean lum/watt	82	63	58	48	47	56	45	40	44
Annual kWh use	4,387	1,870	1,210	882	754	472	361	254	176

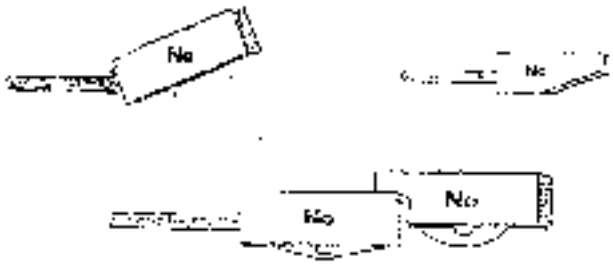
FIGURE I

What is a true cutoff outdoor lighting fixture?

Flat glass lens, eliminates or minimizes direct glare, no upward throw of light. The housing for these fixtures is available in many styles.



Same fixture as above mounted incorrectly - defeating the horizontal mounting design. The fixture now produces direct glare, and can also produce uplight at steeper mounting angles.



Known as just "cutoff" center "drop" or "sag" lens with or without exposed bulb, produces direct glare.

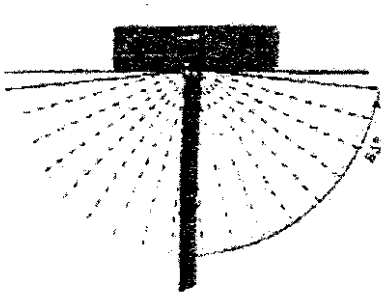


Figure 2
85° Full cutoff fixture

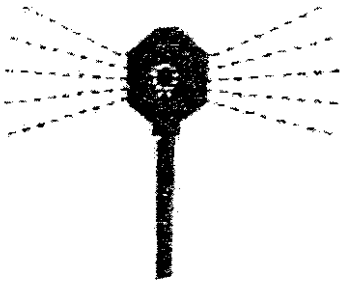


Figure 3
Partially shielded
(translucent siding - bulb not visible)

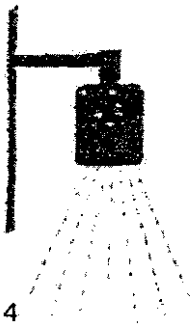


Figure 4
Shielded

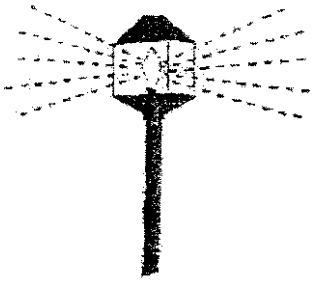


Figure 5
Unshielded - No

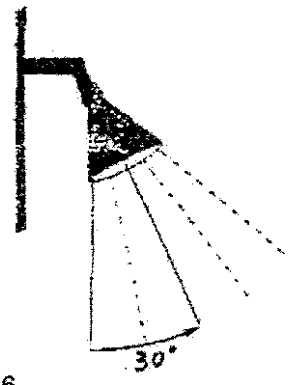


Figure 6
Angle of floodlight with
external shielding

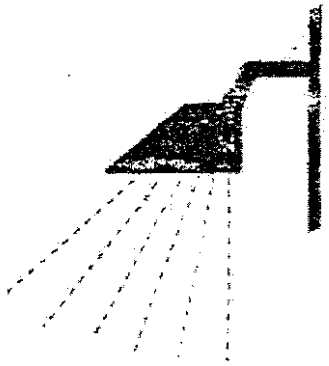


Figure 7
Directional floodlight

(Ord. 382, 10-25-2006)

F. Exemptions: The following are exempt from the provisions of this chapter:

1. Traffic control signals and devices.
2. Temporary emergency lighting (i.e., fire, police, repair workers).
3. Subject to community development department approval the following types of nonresidential lighting may be exempt:

a. Sports, recreation and entertainment lighting relevant to resort operations and public events.
b. In commercial districts, decorative lighting including, but not limited to, porte-cochere and chandelier lights. (Ord. 414, 4-16-2009)

Footnotes - Click any footnote link to go back to its reference.
Footnote 1: See figure 3, subsection E of this section.
Footnote 2: See figure 6, subsection E of this section.
Footnote 3: See table 9-3B-1, subsection E of this section.

City of Ketchum

Chapter 17.132
DARK SKIES

17.132.010: GENERAL PROVISIONS:

A. Title: This chapter, together with the amendments codified in this chapter, shall be known and may be cited as the KETCHUM DARK SKY ORDINANCE.

B. Purposes: The general purpose of this chapter is to protect and promote the public health, safety and welfare, the quality of life, and the ability to view the night sky by establishing regulations and a process of review for exterior lighting. This chapter establishes standards for exterior lighting in order to accomplish the following:
   1. To protect against direct glare and excessive lighting;
   2. To provide safe roadways for motorists, cyclists and pedestrians;
   3. To protect and reclaim the ability to view the night sky, and help preserve the quality of life and the tourist experience;
   4. To prevent light trespass in all areas of the city;
   5. To promote efficient and cost effective lighting;
   6. To ensure that sufficient lighting can be provided where needed to promote safety and security;
   7. To allow for flexibility in the style of lighting fixtures;
   8. To provide lighting guidelines;
   9. To provide assistance to property owners and occupants in bringing nonconforming lighting into conformance with this chapter; and
   10. To work with other jurisdictions within Blaine County to meet the purposes of this chapter.

C. Scope: All exterior lighting installed after the effective date hereof in any and all zoning districts in the city shall be in conformance with the requirements established by this chapter and any other applicable ordinances. All existing lighting installed prior to the effective date hereof in any and all zoning districts in the city shall be addressed as follows:
   1. All existing lighting located on a subject property that is part of an application for a city planning department design review, conditional use, subdivision permit, or building permit is required to be brought into conformance with this chapter. Conformity shall occur prior to issuance of a certificate of occupancy, final inspection or final plat recordation, when applicable. For other permits, the applicant shall have a maximum of thirty (30) days from date of permit issuance to bring the lighting into conformance.
   2. All existing exterior commercial lighting that is not in conformance with this chapter shall be brought into conformance with this chapter by June 30, 2018.
   3. All existing lighting that does not meet the requirement of section 17.124.060 of this title, which states that "any parking, yard or building illumination in (any) zoning (district) shall be so directed as to protect adjacent properties from glare and direct lighting", is required to be brought into conformance with section 17.132 of this title.
   4. All existing exterior residential lighting, not affected by subsections C1 and C3 of this section, that does not comply with this chapter is required to be brought into conformance with this chapter by June 30, 2019.
   5. In the event of a discrepancy in applicable ordinances, the most restrictive shall apply.

17.132.020: Applicability

A. The commission, the building official and/or the administrator shall have the authority to require

new lighting and existing lighting pursuant to subsection 17.132.010.C.1 of this chapter to meet the requirements of this chapter.

B. Lighting Plans Required: All applications for design review, conditional use, subdivision and/or building permits shall include lighting plans showing location, type, height, color temperature, lumen output and amount of all proposed and existing fixtures. The applicant shall provide enough information to verify that lighting conforms to the provisions of this chapter. The administrator, commission and/or building official shall have the authority to request additional information in order to achieve the purposes of this chapter.

17.132.030: Lighting Standards

A. Color Temperature: All exterior lighting shall utilize light sources not to exceed 2700 kelvin.

B. Light Trespass and Overlighting: All existing and/or new exterior lighting shall not cause light trespass and shall protect adjacent properties from glare and excessive lighting. All vehicle lighting originating from a commercial property shall be shielded from other adjacent properties. Incidental light trespass (lighting emanating from turning motor vehicles or motion sensor lighting) is permitted.

1. All lighting emitting from any zoning lot shall not cause the light level along any property line, as measured at a height of 60 inches above grade in a plane at any angle of inclination, to exceed the limitations listed in Figure 1: Light Trespass Matrix.

Figure 1: Light Trespass and Overlighting Matrix

Zone of Light Source	Impacted Zone	Maximum Foot-Candle Limits
Non-commercial (LR, LR-1, LR-2,GR-L,GR-H,STO-.4, STO-1,STO-H,RU,AF)	**Non-commercial (LR, LR-1, LR-2,GR-L,GR-H,STO-.4, STO-1,STO-H,RU,AF)**	0.1 foot-candles
Non-commercial (LR, LR-1, LR-2,GR-L,GR-H,STO-.4, STO-1,STO-H,RU,AF)	**Commercial Zones** (CC, T,T-3000, T-4000, LI-1,LI-2,LI-3)	0.5 foot-candles
Commercial Zones (CC, T,T-3000, T-4000, LI-1,LI-2,LI-3)	**Non-commercial (LR, LR-1, LR-2,GR-L,GR-H,STO-.4, STO-1,STO-H,RU,AF)**	0.1 foot-candles
Commercial Zones (CC, T,T-3000, T-4000, LI-1,LI-2,LI-3)	**Commercial Zones** (T,T-3000, T-4000, LI-1,LI-2,LI-3)	0.5 foot-candles
Community Core (CC)	**Community Core (CC)**	No limit

C. IESNA Guidelines: The commission or Administrator may require that any new lighting or existing lighting that comes before them meet the standards for maximum Illuminance output as established by IESNA.

D. Nonessential Exterior Commercial and Residential Lighting: All nonessential exterior commercial and residential lighting shall be turned off after business hours and/or when not in use. Lights on a timer shall be used. Sensor activated lights shall be used to replace existing lighting that is desired for security purposes.

E. Area Lights:

1. All area lights, including streetlights and parking area lighting, shall be level mounted and

eighty-five degrees (85°) full cutoff type fixtures.

2. Residential Streetlights shall be limited to one-thousand two hundred (1125) lumens, unless otherwise recommended by the Public Works Department.
3. Nonresidential Streetlights shall be limited to one-thousand five hundred (1500) lumens, unless otherwise recommended by the Public Works Department.
4. Lights on major intersections on state highways shall be limited to three-thousand (3000) lumens, unless otherwise recommended by the Public Works Department.
5. Parking area lights are encouraged to be greater in number, lower in height and lower in light level, as opposed to fewer in number, higher in height and higher in light level. Parking lot lighting shall not exceed IESNA recommended illuminance (foot-candle) level and are encouraged to utilize the lowest range available.
6. All freestanding area lights within a residential zone, except streetlights, shall be mounted at a height equal to or less than the value 3 + (D/3), where D is the distance in feet to the nearest property boundary.
7. Luminaire Mounting Height: Freestanding luminaires shall be no higher than twenty-five feet (25') above the stand/pole base; except, that luminaires used for playing fields shall be exempt from the height restriction, provided all other provisions of this chapter are met and the light is used only while the field is in use; and except, that streetlights used on major roads may exceed this standard if necessary as determined by the city council, as advised by a lighting engineer. Building mounted luminaires shall be attached only to walls, and the top of the fixture shall not exceed the height of the parapet or roof, whichever is greater.
8. Area lights on a timer, sensor activated, or turned off at 10:30 pm are exempt from section 17.132.030B of this chapter, provided all other standards of this section are met.

F. Uplighting: Uplighting is prohibited in all zoning districts, except as where permitted in this chapter.

G. Public Outdoor Lighting: Public outdoor lighting, including holiday lighting, shall be permitted to ensure the safety and enjoyment of the intended public use. All public lighting shall comply with the standards established herein and shall be turned off after hours of operation or when not in use. When practically possible, motion sensors may be used. Public Outdoor Lighting is exempt from lighting curfews and exempt from section 17.132.030B of this chapter.

H. Lighting Fixtures:
   1. All exterior lighting shall comply with the acceptable lighting fixtures located in Figure 2. All exterior lighting fixtures shall be full cutoff fixtures with the light source fully shielded, except as exempted in this chapter.
   2. The following figures and information sheets shall be incorporated into this chapter as guidelines for the public and the city for use in meeting the intent of this chapter. The figures and information sheets only serve as examples. The city does not endorse or discriminate against any manufacturer or company that may be shown, portrayed or mentioned by the examples. Additional information is provided at the Ketchum planning department.

Figure 2: Lighting Fixture Guidelines

I. Lighting Fixture Exceptions and Additional Requirements

Type of Lighting	Full Cutoff Light Fixture	Light Trespass Standards	Additional Requirements
Canopy Lighting	Required	Not exempt	- All canopy lighting shall be recessed sufficiently so as to ensure that no light source is visible from or causes glare on public rights of way or adjacent property.
Holiday Lights	Not Required	Exempt	- Shall only be displayed from November 20th to March 20th. - Exempt from color temperature requirements set forth in this chapter. - All new holiday lighting shall be LED lighting, or bulb that has been demonstrated to be the most energy efficient technology available. - Flashing holiday lighting is permitted. - All private holiday lighting shall be turned off at the close of business hours in the Community Core zoning district, and after 10:30PM in all other zoning districts. Outdoor Public lighting shall not be subject to holiday lighting curfew.
Flagpole Lighting	Not Required	Exempt	- Upward flagpole lighting is permitted for governmental flags only. - The maximum lumen output shall be one thousand three hundred (1,300) lumens. - Flags are encouraged to be taken down at sunset to avoid the need for lighting.
Floodlights	Not Required	Not Exempt	- Floodlights with external shielding shall be angled provided that no light escapes above a 25-degree angle measured from the vertical line from the center of the light extended to the ground. - Floodlights shall not cause glare or light to shine directly on adjacent property or public rights of way. - Shall be encouraged to be motion sensor activated.
Neon Lights	Not Required	Not Exempt	- Neon Lights: Neon lights are only permitted pursuant to the sign ordinance, chapter 17.127 of this title.
Sensor Activated Lighting	Required	Exempt	- Shall be located so as to prevent lighting into adjacent properties or into a public right of way.

			- Lighting shall activate only when motion on the property is detected and shall deactivate within no more than five (5) minutes. - Lighting shall not be triggered by any activity off the property or in the public right of way. - The maximum lumen output shall be 600 lumens.
Temporary Lighting	Required	Exempt	- Lumens output shall be approved by the Administrator.
Temporary emergency lighting	Not Required	Exempt	- Utilized by public safety services. Exempt from provisions of this chapter.
Highway 75 lighting	Required	Exempt	- Correlated Color temperature 2700 kelvin.

J. Additional Development Restrictions

Development	Full Cutoff Light Fixture	Light Trespass Standards	Additional Requirements
Motor Vehicle Fueling Stations and Motor Vehicle Service Stations	Required	Not Exempt	- The average foot-candle lighting level at the pump for new and existing service stations is required to be no greater than thirty (30) foot- candle average, as set by the IESNA for urban service stations.
Towers for Radio Communication and Navigation	Not Required	Not Exempt	- All radio, communication and navigation towers that require lights shall have dual lighting capabilities. - For daytime, the white strobe light may be used, and for nighttime, only red lights shall be used. - Lighting that is required by legal jurisdictions are exempt from this provision.

17.132.040: PROHIBITED LIGHTING

A. Any light source that does not meet the requirements of this chapter.
B. Searchlights, beacons, laser source, and other high-intensity light fixtures.
C. Except as otherwise allowed by this title, any lighting that is flashing, blinking, rotating, chasing, or rapidly changing in color or intensity is prohibited.

17.132.050: NOTIFICATION:

A. The city building and planning department permits shall include a statement asking whether the subject property of the proposed work includes any exterior lighting.

17.132.060: THE CITY'S ROLE:

A. The city will commit to changing all lighting within the city rights of way and on city owned property to meet the requirements of this chapter when luminaires expire.

APPENDIX B: Outdoor Lighting Inventory Process and Forms

Central Idaho Dark Sky Lighting Inventory

Thank you for your help completing this lighting inventory!

Inventory Zone:
(please write a short description of the area you covered, if relevant please include streets/blocks covered or landmarks.):

Date and times that inventory was completed:
(if you conducted the inventory on multiple days, please note this)

Your name and contact information:
(in case we have questions or need clarification on something)

Instructions:

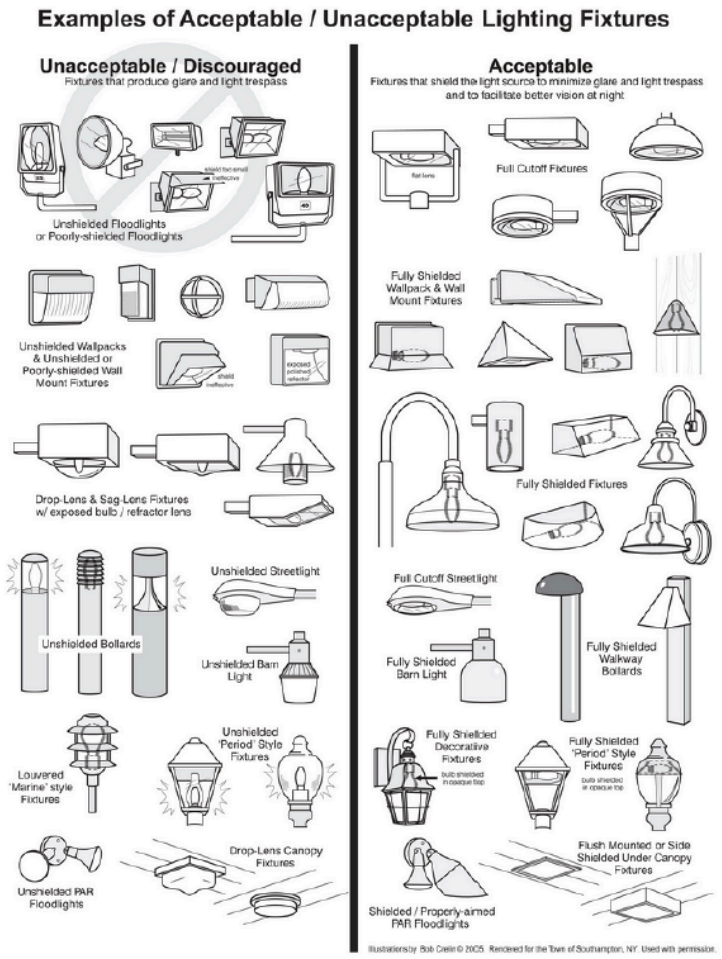
You will be collecting lighting information relative to the zone you are inventorying. There is no need to collect specific information on where lights within your zone exist (meaning you do not need to call out specific properties), rather you are collecting a snapshot of the baseline lighting situation in each zone. You will specifically be inventorying the number of acceptable and unacceptable lighting fixtures and light emission type for each zone.

Below is reference information that you will need to assess light fixtures and light output. If you have any questions or need clarification, please contact Dani Mazzotta or Betsy Mizell at 208.726.7485 or by email dmazzotta@idahoconservation.org and bmizell@idahoconservation.org. Feel free to snap some pictures while you are doing your inventory. We would love to have some of these! If you would like a color copy of the inventory and reference form, please stop by the ICL office and we would be happy to provide you with one.

We are hoping to have this inventory completed no later than April 24th, 2017. If you need more time to conduct the inventory, please let us know.

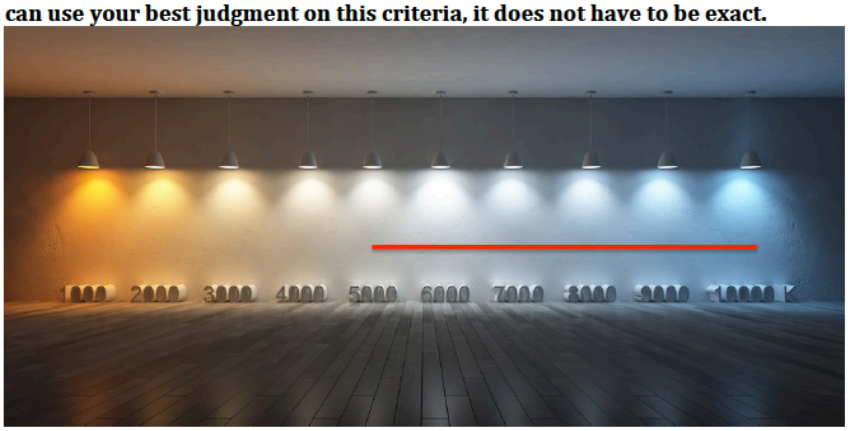
Reference Information:

This chart demonstrates they types of lighting fixtures you would be marking down as unacceptable in your zone. The key to finding "unacceptable" lighting is looking for lights that are unshielded or produce an excess amount of light trespass (meaning are shining into or past an intended area)

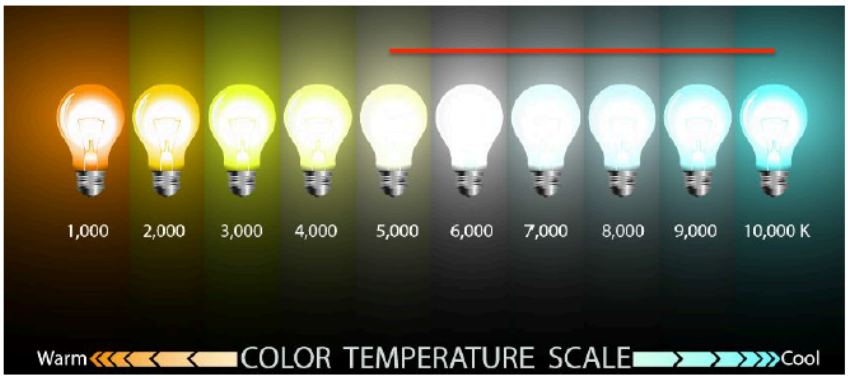


Reference: Color Temperature

This chart demonstrates the colors of light you may see at night during your inventory. Please mark down any overly white or blue light that you see. You can use your best judgment on this criteria, it does not have to be exact.



Record when you see a light that looks like once of these



APPENDIX C: SQM-L Meter Readings

Date	Meter Reading (mag/square arc)	GPS Coord.	Location	Time	Sky Notes	Meter
21-Oct-16	20.98	43.676748, -114.307945	Keystone Rd, Elkhorn	22:00	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.54	43.692515, -114.346039	Sun Valley City Hall	22:05	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.73	43.690596, -114.345739	Dollar Mtn Parking Lot	22:03	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.69	43.694034, -114.353104	Sun Valley Pavilion	22:06	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.54	43.695400, -114.354358	Sun Valley Lodge at Pond	22:10	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	18.75	43.681966, -114.363407	Ketchum Town Square	22:15	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	12.1	43.680901, -114.364462	Outside Pioneer Rest.	22:18	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.53	43.679506, -114.367474	Ketchum Post Office	22:20	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	20.83	43.676108, -114.370137	Rember St. & Byrd	22:05	Moon at 65% last quarter, not visible at time of readings	SQM
21-Oct-16	16.23	43.681948, -114.362212	The Elephants Perch	22:30	Moon at 65% last quarter, not visible at time of readings	SQM
11-Nov-16	18.79	43.794681, -114.421628	SNRA Waste Station	20:17	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-16	17.42	43.871993, -114.655563	Galena Lodge Parking Lot	20:43	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-16	19.22	43.870031, -114.712451	Top of Galena Summit Pullout	20:57	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-	19.29	43.872848, -	Salmon	21:03	Moon at 91.3% Waxing	SQM

16		114.729684	River Overlook Pullout		Gibbous, Very Bright	
11-Nov-16	19.11	43.906944, -114.794946	Smiley Creek Airport Parking Lot	21:13	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-16	19.12	44.028633, -114.833234	Junction 4th of July Rd, Hwy 75	21:28	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-16	19.03	44.151965, -114.881006	Fish Hatchery	21:41	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
11-Nov-16	18.93	44.055391, -114.789461	Fish Creek Road, Past USFS boundary	22:03	Moon at 91.3% Waxing Gibbous, Very Bright	SQM
17-Nov-16	21.58	44.161983, -115.005403	Dry Creek	19:35	Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.62	44.161983, -115.005403	Dry Creek		Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.35	44.316551, -115.088630	Trap Creek	19:46	Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.45	44.250329, -115.055223	Stanley Lake	20:06	Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.52	44.250329, -115.055223	Stanley Lake		Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.36	44.151965, -114.881006	Fish Hatchery	20:30	Moon at 88% Waning Gibbous, not visible at time of readings	SQM
17-Nov-16	21.27	44.028633, -114.833234	Junction 4th of July Rd, Hwy 75	20:42	Moon at 88% Waning Gibbous, not visible at time of readings	SQM
21-Nov-16	21.63	44.211545, -114.939187	Stanley	20:25	Moon Waning Gibbous, not visible	SQM
21-Nov-16	21.71	44.161983, -115.005403	Dry Creek	20:40	Moon Waning Gibbous, not visible	SQM
21-Nov-16	21.64	44.316551, -115.088630	Trap Creek	20:52	Moon Waning Gibbous, not visible	SQM
21-Nov-16	21.69	44.256138, -114.855272	Casino Creek	21:16	Moon Waning Gibbous, not visible	SQM

22-Nov-16	21.34	44.256138, -114.855272	Casino Creek	5:02	Moon Waning Gibbous, not visible	SQM
5-Dec-16	21.33	44.211545, -114.939187	Stanley	2:13	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
5-Dec-16	21.74	44.161983, -115.005403	Dry Creek	2:21	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
5-Dec-16	21.69	44.161983, -115.005403	Dry Creek	2:23	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
5-Dec-16	21.59	44.151965, -114.881006	Fish Hatchery	3:02	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
5-Dec-16	21.33	44.151965, -114.881006	Fish Hatchery	3:04	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
5-Dec-16	21.54	44.211545, -114.939187	Stanley	3:35	Moon Waxing Crescent 32%, not visible, ground snow covered, -5 degrees	SQM
6-Dec-16	21.95	44.161983, -115.005403	Dry Creek	3:45	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -15 degrees	SQM
6-Dec-16	22.19	44.161983, -115.005403	Dry Creek	3:47	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -15 degrees	SQM
6-Dec-16	22.15	44.161983, -115.005403	Dry Creek	3:49	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -15 degrees	SQM
6-Dec-16	21.95	44.316551, -115.088630	Trap Creek	4:01	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -12 degrees	SQM
6-Dec-16	21.73	44.316551, -115.088630	Trap Creek	4:04	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -12 degrees	SQM

6-Dec-16	22.05	44.316551, -115.088630	Trap Creek	4:07	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -12 degrees	SQM
6-Dec-16	21.75	44.211545, -114.939187	Stanley	4:16	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -11 degrees	SQM
6-Dec-16	21.56	44.211545, -114.939187	Stanley	4:18	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -11 degrees	SQM
6-Dec-16	21.62	44.211545, -114.939187	Stanley	4.2	Moon Waxing Crescent 43.8%, not visible, ground snow covered, -11 degrees	SQM
8-Dec-16	21.56	44.211545, -114.939187	Stanley	17.4	Moon Waxing Gibbous, not visible, ground snow covered, -24 degrees	SQM
8-Dec-16	21.86	44.211545, -114.939187	Stanley	17.4	Moon Waxing Gibbous, not visible, ground snow covered, -24 degrees	SQM
8-Dec-16	21.93	44.211545, -114.939187	Stanley	17.41	Moon Waxing Gibbous, not visible, ground snow covered, -24 degrees	SQM
8-Dec-16	21.56	44.161983, -115.005403	Dry Creek	17.55	Moon Waxing Gibbous, not visible, ground snow covered, -18 degrees	SQM
8-Dec-16	21.64	44.161983, -115.005403	Dry Creek	17.55	Moon Waxing Gibbous, not visible, ground snow covered, -18 degrees	SQM
8-Dec-16	21.62	44.161983, -115.005403	Dry Creek	17.56	Moon Waxing Gibbous, not visible, ground snow covered, -18 degrees	SQM
2-Jan-17	21.61	44.211545, -114.939187	Stanley	22.45	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.25	44.211545, -114.939187	Stanley	22.46	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.19	44.211545, -114.939187	Stanley	22.46	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.36	44.161983, -115.005403	Dry Creek	23.02	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.46	44.161983, -	Dry Creek	23.03	Moon Waxing Crescent,	SQM

		115.005403			not visible, ground snow covered, -6 degrees	
2-Jan-17	21.63	44.161983, -115.005403	Dry Creek	23.03	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.39	44.316551, -115.088630	Trap Creek	23.17	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.41	44.316551, -115.088630	Trap Creek	23.17	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
2-Jan-17	21.38	44.316551, -115.088630	Trap Creek	23.18	Moon Waxing Crescent, not visible, ground snow covered, -6 degrees	SQM
18-Jul-17	21.72	44.211545, -114.939187	Stanley	2.35	Moon Waning Crescent, not visible, clear, 54 degrees	SQM
18-Jul-17	21.72	44.211545, -114.939187	Stanley	2.38	Moon Waning Crescent, not visible, clear, 54 degrees	SQM
18-Jul-17	21.78	44.211545, -114.939187	Stanley	2.41	Moon Waning Crescent, not visible, clear, 54 degrees	SQM
19-Jul-17	21.52	44.082947, -114.333883	Railroad Ridge	3.2	Moon Waning Crescent, not visible, clear, light smoke visible in evening	SQM
19-Jul-17	21.68	44.082947, -114.333883	Railroad Ridge	3.26	Moon Waning Crescent, not visible, clear, light smoke visible in evening	SQM
19-Jul-17	21.61	44.082947, -114.333883	Railroad Ridge	3.33	Moon Waning Crescent, not visible, clear, light smoke visible in evening	SQM
28-Jul-17	21.76	44.151965, -114.881006	Fish Hatchery	12.46	Moon Waxing Crescent, not visible, clear, dissipating thunderstorms	SQM
28-Jul-17	21.8	44.151965, -114.881006	Fish Hatchery	12.52	Moon Waxing Crescent, not visible, clear, dissipating thunderstorms	SQM
28-Jul-17	21.81	44.151965, -114.881006	Fish Hatchery	1.06	Moon Waxing Crescent, not visible, clear, dissipating thunderstorms	SQM-L
14-Oct-17	21.64	44.083497, 114.550233	Redfish Lake	20.30	Moon Waning Crescent, not visible, sky clear	SQM-L

14-Oct-17	21.65	44.083497, 114.550233	Redfish Lake	20.35	Moon Waning Crescent, not visible, sky clear	SQM-L
14-Oct-17	21.76	44.083497, 114.550233	Redfish Lake	20.37	Moon Waning Crescent, not visible, sky clear	SQM-L
14-Oct-17	21.77	44.085273, 114.575220	Western Core, Fishhook Moraine	21.46	Moon Waning Crescent, not visible, sky clear	SQM-L
14-Oct-17	21.84	44.085273, 114.575220	Western Core, Fishhook Moraine	21.53	Moon Waning Crescent, not visible, sky clear	SQM-L
14-Oct-17	21.82	44.085273, 114.575220	Western Core, Fishhook Moraine	21.57	Moon Waning Crescent, not visible, sky clear	SQM-L
15-Oct-17	21.81	44.024937	Eastern Core, 4th of July Trailhead	22.45	Moon Waning Crescent, not visible, sky clear	SQM-L
15-Oct-17	21.88	44.024937	Eastern Core, 4th of July Trailhead	22.47	Moon Waning Crescent, not visible, sky clear	SQM-L
15-Oct-17	21.91	44.024937	Eastern Core, 4th of July Trailhead	22.53	Moon Waning Crescent, not visible, sky clear	SQM-L

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