



FOSTERING THE DARK SKIES IN THE KEWEENAW
[LIGHT POLLUTION, LIGHT MANAGEMENT, & DARK SKY PARK DESIGNATION]

PRESENTER

JOHN MUELLER

JULY 29, 2024

CENTER FOR SCIENCE AND ENVIRONMENTAL OUTREACH









Sustainable Tourism



...still being defined within Visit Keweenaw's activities,

...however, we know that it incorporates not only the visitor's economy, but also the entertainment and hospitality industries / economies.

...The Keweenaw Mountain Lodge sits in all 3 of these areas

...at the Keweenaw Mountain Lodge, sustainable tourism initiatives are supported by our customers, along with Visit Keweenaw, WUPPDR, EGLE, MEDC (Office of Future Mobility and Electrification), Next Energy, and more.

Established in 1934



THIS PROPERTY
HAS BEEN PLACED ON THE
NATIONAL REGISTER
OF HISTORIC PLACES
BY THE UNITED STATES
DEPARTMENT OF THE INTERIOR



A four-season historic wilderness resort at the top of the Keweenaw, focused on outdoor activities, rustic worldly food, and education

Marrying history with the future to get to a vibrant and progressive present

Established in 1934



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FOR IMMEDIATE RELEASE, A JOINT PRESS RELEASE
June 21, 2022



Keweenaw Dark Sky Park Designated as an International Dark Sky Park

As the headquarters for the Keweenaw Dark Sky Park, the Keweenaw Mountain Lodge leads the effort in the region to foster the dark skies.

Copper Harbor, Michigan

The International Dark-Sky Association (IDA) has named Keweenaw Dark Sky Park (KDSP) the newest addition to the International Dark Sky Places (IDSP) Program. The headquarters for the dark sky park will be at the Keweenaw Mountain Lodge (KML), where visitors and supportive community members can meet, learn, and look U.P. to the stars for inspiration and to get closer to nature, while traveling around the top of the Keweenaw peninsula. The park becomes the 3rd IDA-certified Dark Sky Park in the State of Michigan, joining the Headlands International Dark Sky Park and the Dr. T.K. Lawless International Dark Sky Park; and is the first International Dark Sky Park in the Upper Peninsula of Michigan.

“Keweenaw Dark Sky Park offers a unique experience to stargazing in the Midwestern United States,” stated Ashley Wilson, IDA’s Director of Conservation. “The historic wilderness lodge allows visitors to view the magnificence of the night sky in a window of the pristine boreal landscape while also having the opportunity to further engage with the nocturnal environment with astrophotography and lighting management workshops.”



4 International Dark Sky Parks & Sanctuary in Michigan

- Beaver Island Dark Sky Sanctuary
- Headlands Dark Sky Park
- Keweenaw Dark Sky Park
- Dr. T.K. Lawless Dark Sky Park

[Just over 200 parks worldwide currently, 2+ in Michigan applying]

6 Dark Sky Preserves in Michigan (DNR)

- [Lake Hudson Recreation Area \(Lenawee County\)](#)
- [Nagawgon State Park \(Alcona County\)](#) - No winter plowing.
- [Port Crescent State Park \(Huron County\)](#) - No winter plowing, visitors can hike from the parking lot to the preserve.
- [Rockport Recreation Area \(Presque Isle County\)](#) - Plowed in the winter.
- [Thompson's Harbor State Park \(Presque Isle County\)](#) - Plowed in the winter.
- [Wilderness State Park \(Emmet County\)](#) - No winter plowing; however, area near park headquarters is plowed.



DarkSky
INTERNATIONAL





KEWEENAW DARK SKY PARK

[Home](#)

[Stargazing](#) ▾

[Astrophotography](#)

[Maps](#)

[Events](#)

[About](#) ▾

[Contact](#) ▾



[nurturing and fostering the dark skies]

keweenawdarksky.com



KEWEENAW MOUNTAIN LODGE

A four-season historic wilderness resort at the top of the Keweenaw, est. in 1934

How can we help you?



The Headquarters of the Keweenaw Dark Sky Park
[nurturing and fostering the dark skies]

MOON PHASES AND LUNAR CALENDAR JUNE 2024

SUN	MON	TUE	WED	THU	FRI	SAT
						1 Waning crescent 28.4% 28 days
2 Waning crescent 18.5% 26 days	3 Waning crescent 20.4% 27 days	4 Waning crescent 24.9% 28 days	5 Waning crescent 30.9% 29 days	6 New Moon 8:55 A.M. 0 days	7 Waning crescent 7.6% 1 day	8 Waning crescent 4.4% 2 days
9 Waning crescent 11.1% 3 days	10 Waning crescent 18.2% 4 days	11 Waning crescent 26.9% 5 days	12 Waning crescent 35.4% 6 days	13 Waning crescent 44.7% 7 days	14 First Quarter 1:19 A.M. 8 days	15 Waning gibbous 63.5% 9 days
16 Waning gibbous 72.4% 10 days	17 Waning gibbous 80.7% 11 days	18 Waning gibbous 87.9% 12 days	19 Waning gibbous 93.7% 13 days	20 Waning gibbous 97.9% 14 days	21 Full Strawberry Moon 8:10 P.M. 15 days	22 Waning gibbous 96.5% 16 days
23 Waning gibbous 92.8% 17 days	24 Waning gibbous 87.1% 18 days	25 Waning gibbous 78.1% 19 days	26 Waning gibbous 66.2% 20 days	27 Waning gibbous 51.7% 21 days	28 Last Quarter 1:53 P.M. 22 days	29 Waning crescent 41.9% 23 days
30 Waning crescent 30.5% 24 days						



To learn more about stargazing at the Lodge: keweenawmountainlodge.com

NEW & FULL MOONS OF 2024



at the Keweenaw Mountain Lodge



JANUARY



WOLF
25th

JULY



BUCK
21st

FEBRUARY



SNOW
24th

AUGUST



STURGEON
19th

MARCH



WORM
23rd

SEPTEMBER



HARVEST
17th

APRIL



PINK
25th

OCTOBER



HUNTERS
17th

MAY



FLOWER
23rd

NOVEMBER



BEAVER
15th

JUNE



STRAWBERRY
21st

DECEMBER



COLD
15th

To see more about stargazing at the Lodge: keweenawmountainlodge.com



Keweenaw Dark Sky Park Night Sky Viewing Area



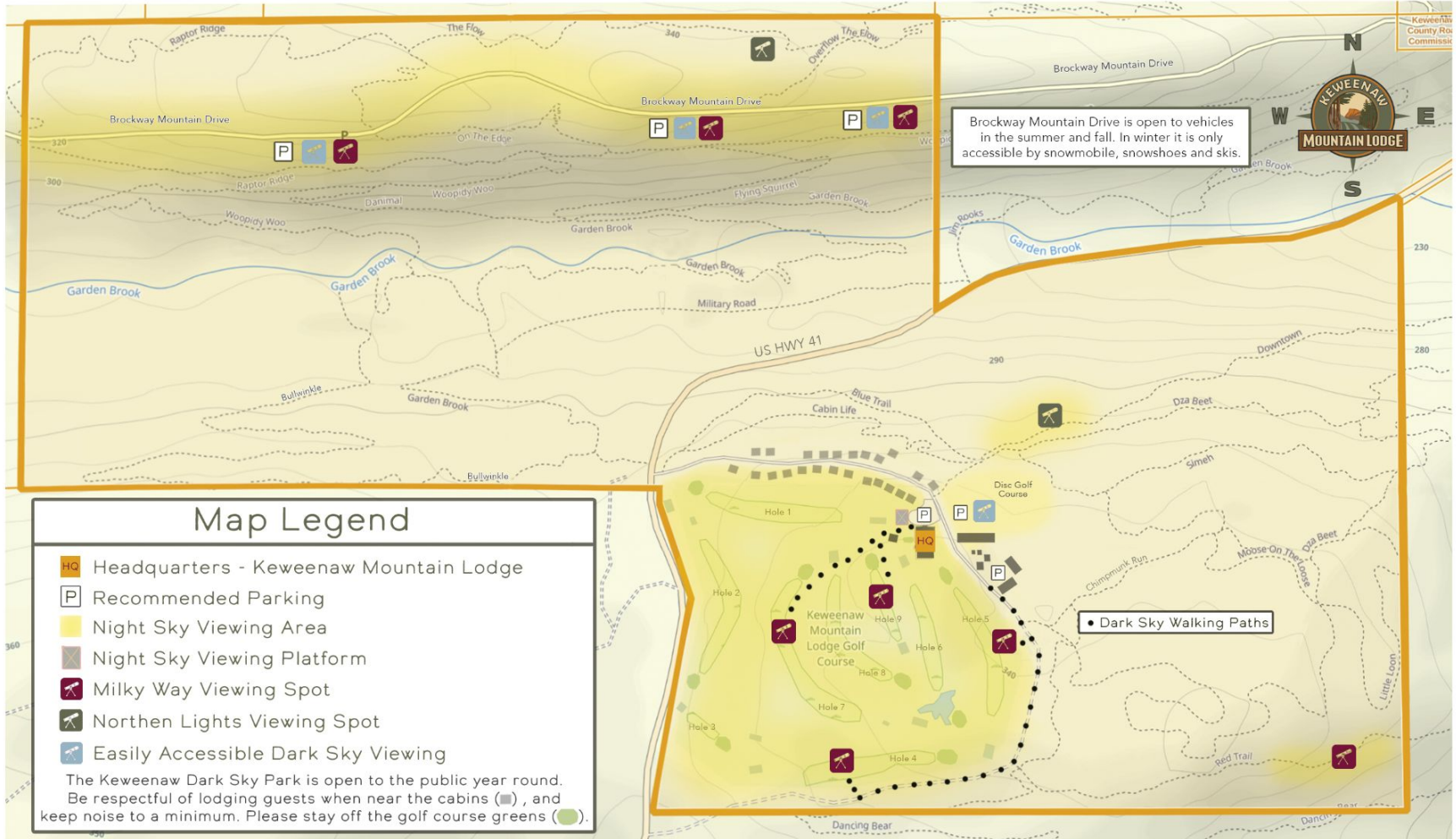
DarkSky



Map Key		
Holes On the Golf Course	Outdoor Activity Center Information - Open 9am - 5pm	Paved Roads
Greens and Tee Boxes - Please Stay Off	Keweenaw Mountain Lodge Headquarters of the Keweenaw Dark Sky Park	Dirt Roads
Fairways and Open Areas - Open For Stargazing		Dark Sky Walking Paths
Parking for Stargazing		Recommended Night Sky Viewing Areas

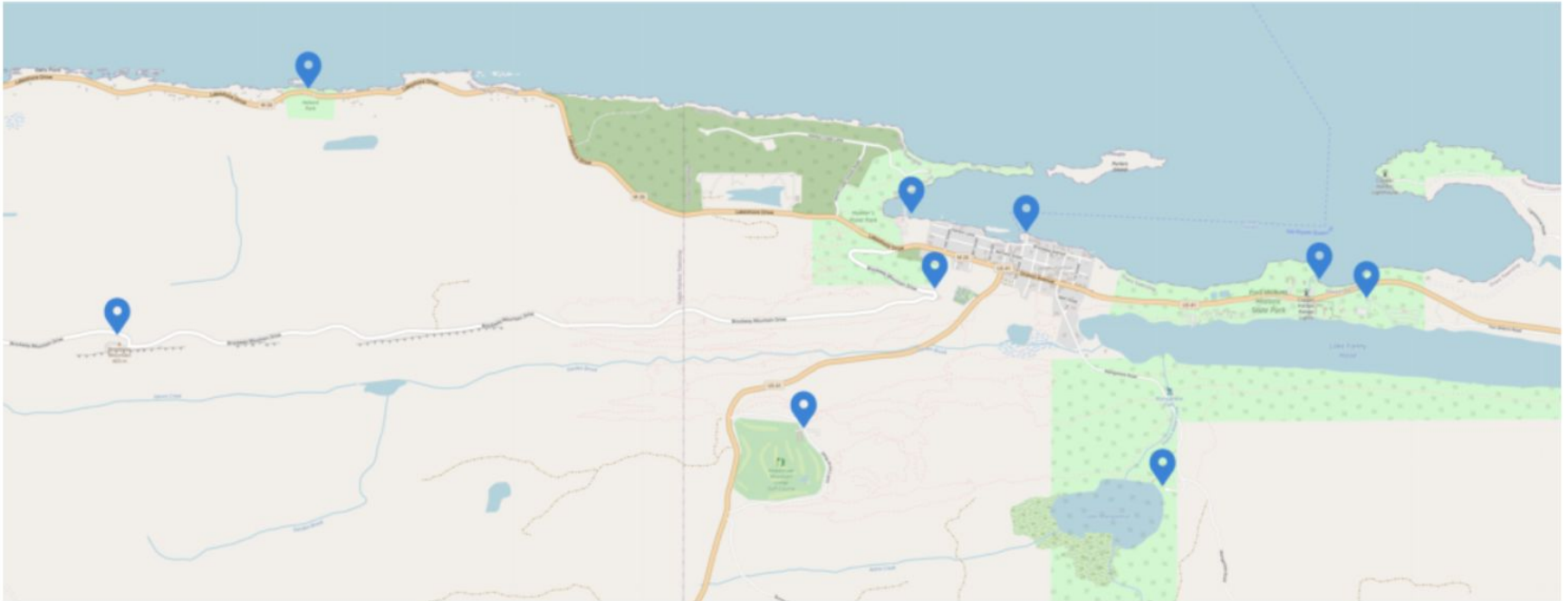


KEWEENAW DARK SKY PARK NIGHT SKY VIEWING AREAS



Surrounding Areas

At the top of the Keweenaw, there are not very many areas that are developed. This offers stargazers multiple locations to look up and see the stars. This includes places along the Lake Superior lake front (on M-26 and US Hwy 41), in multiple county and state parks, and up Brockway Mountain; all of which are just a short jaunt away from the Lodge. Below is a map of several vantage points in surrounding areas.



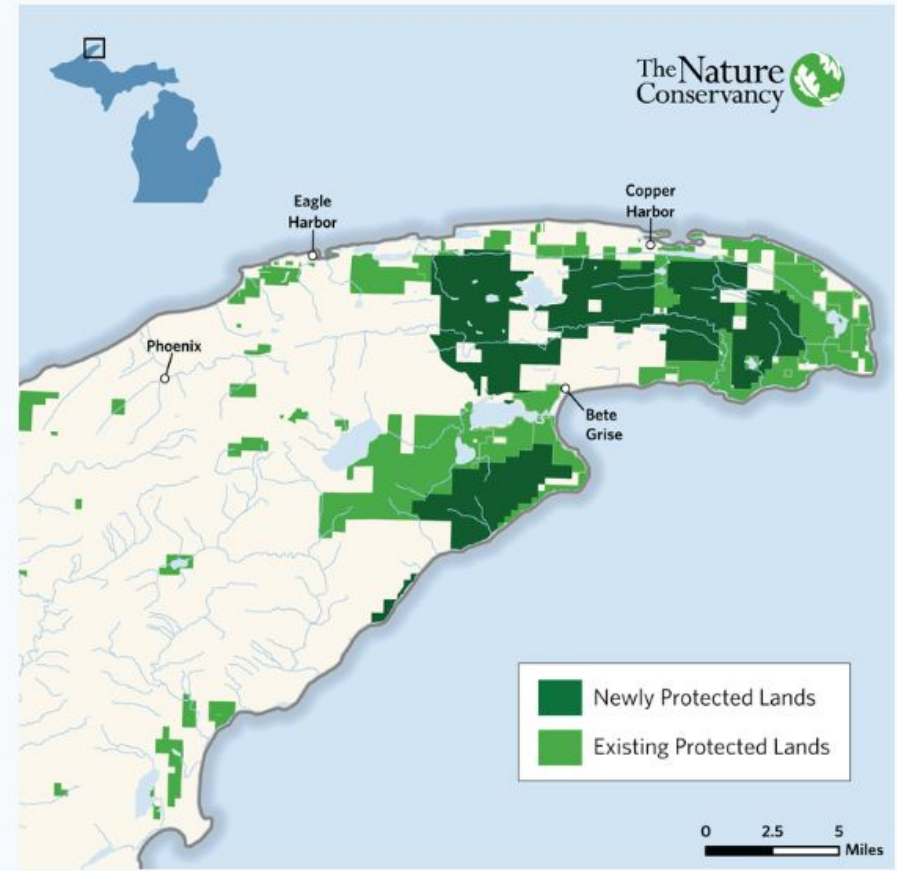
WHAT IS THE KEWEENAW HEARTLANDS PROJECT?

In late 2022, [The Nature Conservancy in Michigan \(TNC\)](#) announced the purchase of approximately 32,600 acres of working forestland near the tip of the Keweenaw Peninsula in Keweenaw County, known as the Keweenaw Heartlands. This purchase from The Rohatyn Group was completed with the support and input of community leaders, the Michigan Department of Natural Resources (DNR) and many people who love the Keweenaw.

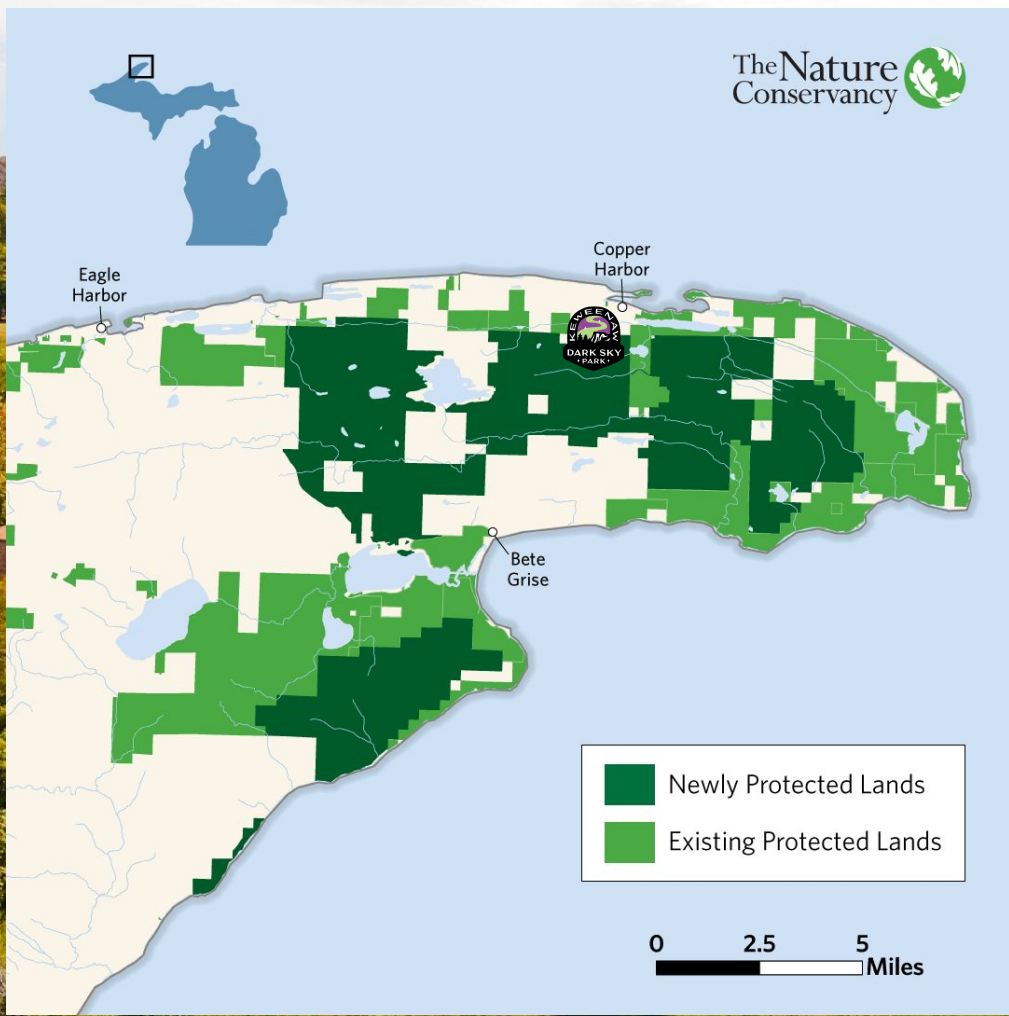
TNC and DNR have convened a planning committee to develop a long-term governance and management plan for the Keweenaw Heartlands. As the interim owners while these plans for the property are developed, TNC will steward the property and lay the foundation for its continued conservation and sustainable use as part of a resilient Keweenaw community.

These lands help define the identity of Keweenaw County and its residents. They contain many sites of [unique ecological, historic, cultural and scenic beauty](#) that help make the peninsula so beloved by the thousands who live and visit here.

Through this project, the Keweenaw Heartlands will be sustainably managed and kept available for the public to access and enjoy for generations to come.



PROJECT MAP This map outlines the existing protected lands and the newly protected lands in the Keweenaw Peninsula as of autumn 2022.




MICHIGAN'S NORTHERNMOST GOLF COURSE. AND DARK SKY PARK.

The Golf Course at the Keweenaw Mountain Lodge is a wilderness-focused 9-hole golf course designed during the great depression using the Keweenaw terrain, with spectacular views of Brockway Mountain. Being that the course is in the wilderness, individuals can enjoy the natural environment and the wildlife during the day time while playing traditional and fling golf, or just going for a nature hike. And during the night time, individuals can walk the golf course and designated night-time trails to enjoy the stars and possibly the northern lights. These day-and-night efforts marry history with the future to provide a vibrant and progressive wilderness golf course for you to enjoy.

Get closer to nature.



 (906) 289-4403

 info@keweenawresort.com

 keweenawmountainlodge.com

 14252 US Hwy 41
Copper Harbor, Michigan 49918



FUN. JOYOUS. ADVENTURESOME.

[get closer to nature]



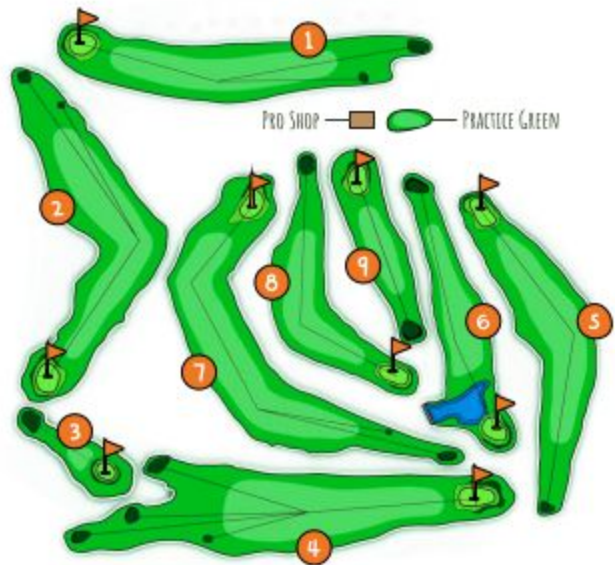
USGA rules shall govern all play except where modified by the local rules (see website)

Date:

Hole	1	2	3	4	5	6	7	8	9	Out
Black	390	394	121	460	392	330	510	336	187	3,120
Copper	339	384	116	398	378	321	495	331	182	2,944
Par	4	4	3	4	4	4	5	4	3	35
Handicap	9	1	17	3	5	11	7	13	15	

Scorer:

Attester:



For more details on each hole, scan the QR code.

[get closer to nature]

AUDUBON INTERNATIONAL COOPERATIVE SANCTUARY GOLF COURSE CERTIFICATION

Edit

The Keweenaw Mountain Lodge is working toward becoming an Audubon International Cooperative Sanctuary Golf Course. We are currently in the early stages of this process.



Member #: 15001

The Audubon Cooperative Sanctuary Program for Golf is an education and certification program that will help us maintain our golf course to protect our environment and preserve the natural heritage of the game of golf. The program will assist us “to take stock of its environmental resources and any potential liabilities, and then develop a plan that fits its unique setting, goals, staff, budget, and time.” — Audubon International

The elements of the program include:

- Environmental Planning
- Wildlife and Habitat Management
- Chemical Use Reduction and Safety
- Water Conservation
- Water Quality Management
- Outreach and Education

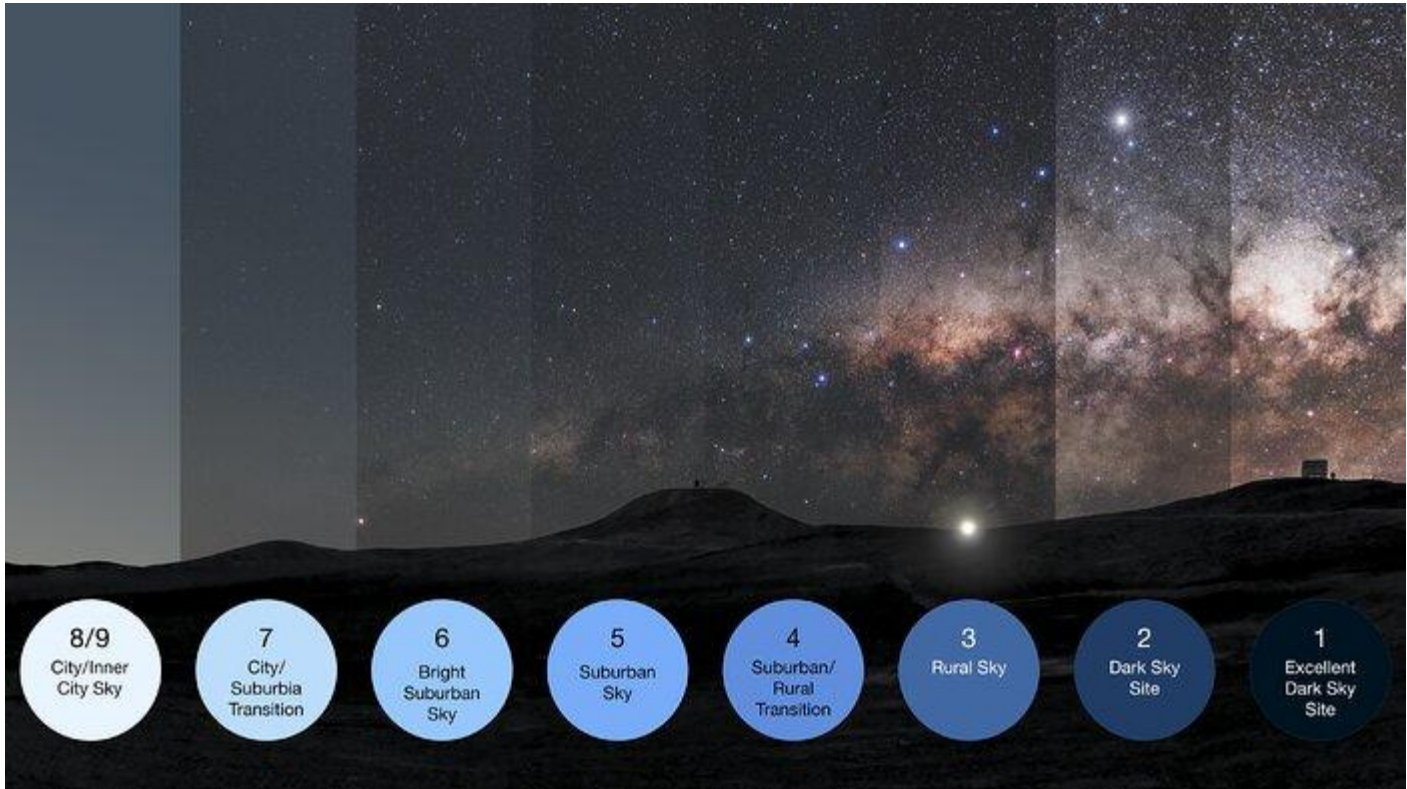






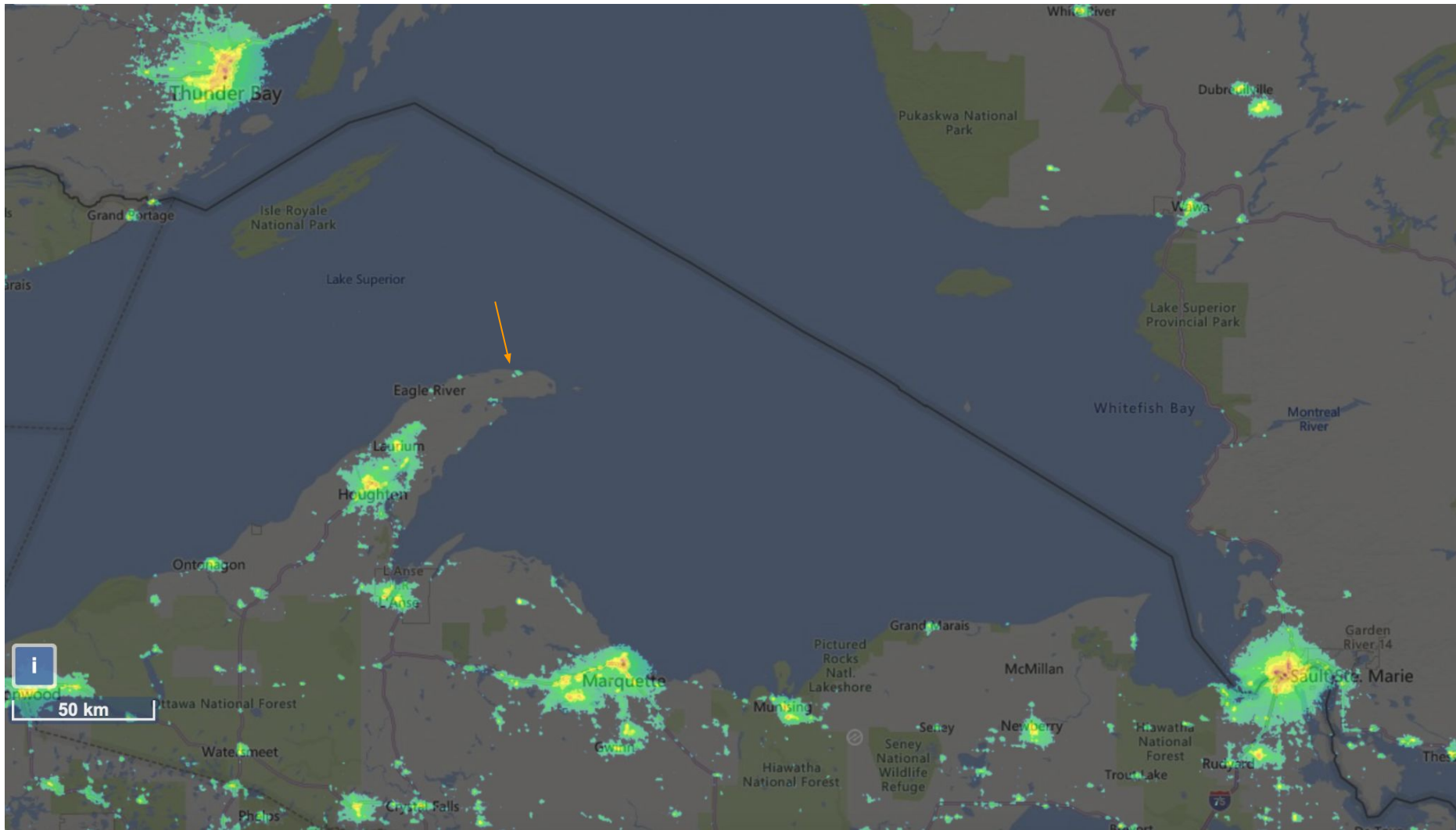


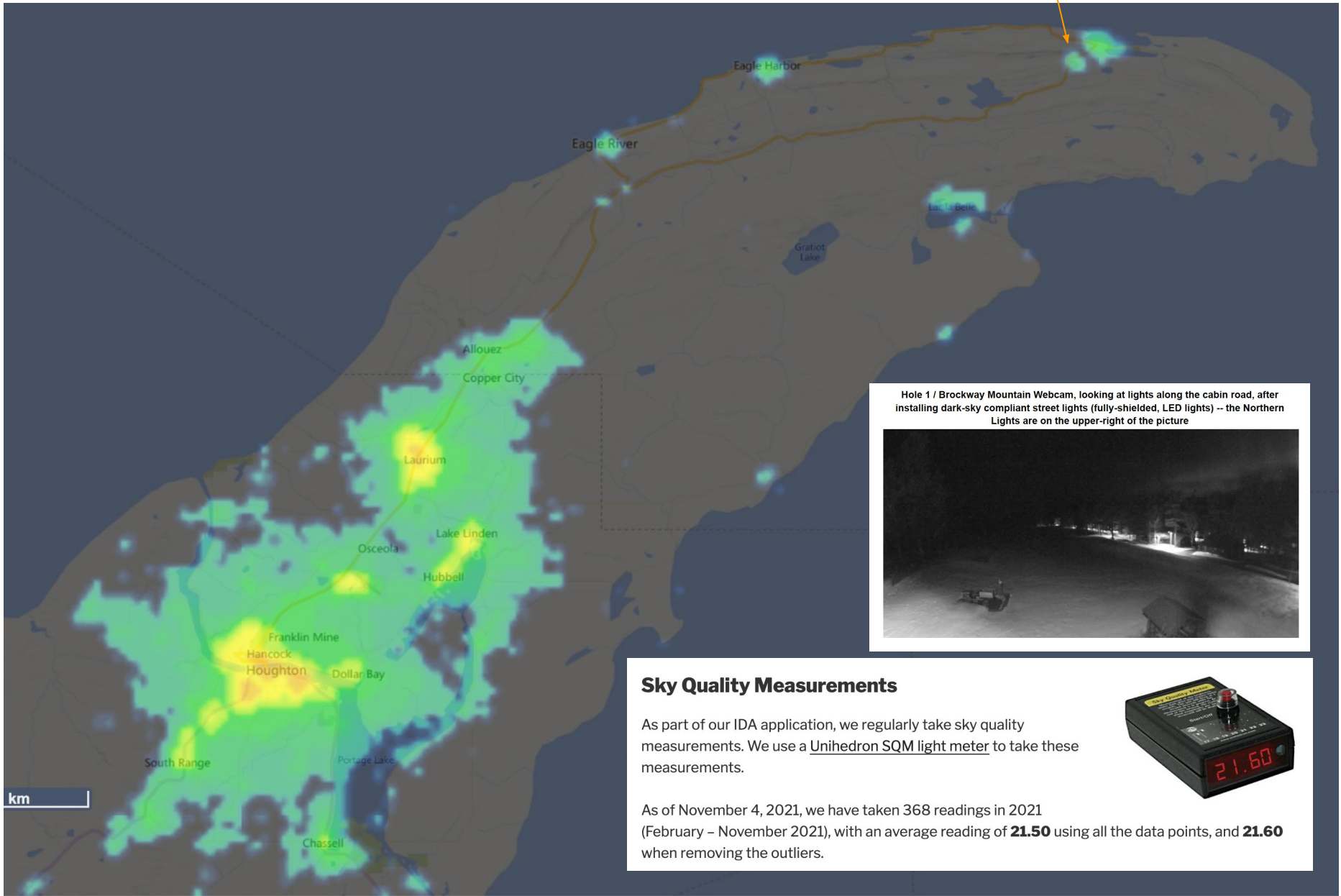




Source: IDA







Hole 1 / Brockway Mountain Webcam, looking at lights along the cabin road, after installing dark-sky compliant street lights (fully-shielded, LED lights) -- the Northern Lights are on the upper-right of the picture



Sky Quality Measurements

As part of our IDA application, we regularly take sky quality measurements. We use a Unihedron SQM light meter to take these measurements.



As of November 4, 2021, we have taken 368 readings in 2021 (February - November 2021), with an average reading of **21.50** using all the data points, and **21.60** when removing the outliers.

km

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Below is a link to the spreadsheet where we store the data for our sky quality measurements (*updated as new readings are taken, containing more than 500 readings*).

- [KML – Sky Quality Measurements Spreadsheet](#)

Magnitudes per Square Arc Second. Magnitudes are a measurement of an object's brightness. Measuring sky brightness.

Another measurement Bortle Scale – estimate sky brightness and interpret how light pollution is affecting your view of night sky phenomenon. The lower the number is, the better sky quality. We are a 1 or 2 at the dark sky park.

Part of determining the sky quality is to understand if there are any light dome effects in the vicinity. This requires taking horizon photos. Below is a horizon image which was taken from hole 4 on the property on December 12, 2021 between 2:25am and 4:05am ET (taken by KML team member, Tom Oliver). This image is a spherical panorama merge of 24 photos.



Click on the image to view and download a [high quality version of this image](#) (~86mb).

On the night these photos were taken the temperature was 28°F, with a relative humidity of 81%. Winds were SSW 15 knots, gusting to 30 knots. Moonset was at 01:40 EST moonrise was 14:09 EST. Astronomical twilight began at 6:38 and ended at 18:52. The camera used to take the images was a Canon 7D Mark II, with Canon EFS 17-55mm lens [@17mm (w/ sensor 1.6x crop factor = 27.2mm). The camera details and settings are as follows:

The street lights being replaced January / February 2021, showing the older lights



Hole 1 / Brockway Webcam, with the old street lights in place. Hole 1 street light pole is where the cameras are installed



Hole 1 / Brockway Webcam, with the Hole 1 street light and cabin road street lights replaced with Dark-Sky Compliant light fixture (note: even with more street lights working on the cabin road, there is less light pollution on the golf course)



Hole 1 / Brockway Mountain Webcam, looking at lights along the cabin road, after installing dark-sky compliant street lights (fully-shielded, LED lights) -- the Northern Lights are on the upper-right of the picture



The make/model of the new street lights that were installed, in January / February 2021



RWL2-S-30-30-D-7P7-3-G- ALUM ARM
When ordered in 3K this is dark sky rated



RWL™ G2

Cobrahead

DESCRIPTION

The RWL™ G2 fixture from TGS represents a new performance-based, forward-thinking design for roadway lighting for residential/commercial streets, intersections, and high-speed roadways. Designed for both retrofit and new construction, RWL™ G2 provides multiple lumen packages with field adjustability and distribution options. A Comfort view optic lens is applied to minimize glare and backlight while maximizing luminaire efficacy. RWL™ G2 has tool-less entry providing quick access for installation and maintenance. A variety of control options are available for future upgrades.

APPLICATION

Roadway, Parking Lots, Walkways and General Outdoor Spaces



3:15:27 AM

Hole 1 / Brockway Mountain Webcam, April 19, 2023

[illustrating the darkness with Lights Out!]



Nest

3:15:09 AM

Lodge Webcam, April 19, 2023

[illustrating the darkness with Lights Out!]



Nest



Northern Lights over the 1930s Toro tractor, with a crescent moon, March 23, 2023
[illustrating the connection with the golf course and the cabins]



Flashlights: It is useful to take a flashlight with you when you are walking around the property so you watch where you are stepping. To be considerate of others, a red flashlight is preferred. If you do not have one, inquire at the OAC about borrowing one. If using a flashlight that uses standard colored bulb, be respectful of others while viewing the night sky by making sure to shine it downwards and turn it off when not needed.



EXPLORE THE NIGHT WITH A RED LIGHT



The use of a red flashlight can help preserve night vision for you and others.

"The big player in human night vision is the chemical rhodopsin, and that takes from 20 to 40 minutes for humans to start benefiting from it. The body does not produce this chemical in daytime. It takes a very low light level sensed by the eyes to produce rhodopsin. When the light is detected at a low level for 20 minutes or so, the body starts producing rhodopsin and night vision starts setting in.

A key trait of this feature is that rhodopsin is photoreactive. It only takes a few seconds of bright light to cause the rhodopsin to decay into two parts with a photosensitive reaction, and the rods in your eyes stop working. Then the cycle starts again.

It is an interesting trait that deep red lights do not trigger the neutralization of the rhodopsin, so astronomers and safety officials use red lights for night lighting to allow night vision to continue."

- Jim O'Connor of the Tucson Amateur Astronomy Association

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NIGHT SKY BLOTTED OUT
BY LIGHT POLLUTION

VISIBLE NIGHT SKY



VERY BAD

BAD

BETTER

BEST

Bad, better, best

Use outdoor lighting responsibly by only using it where it's needed, when it's needed, and in the amount required. Use the lowest light level required, limit blue-violet light, utilize timers or motion sensors, and use shielding.

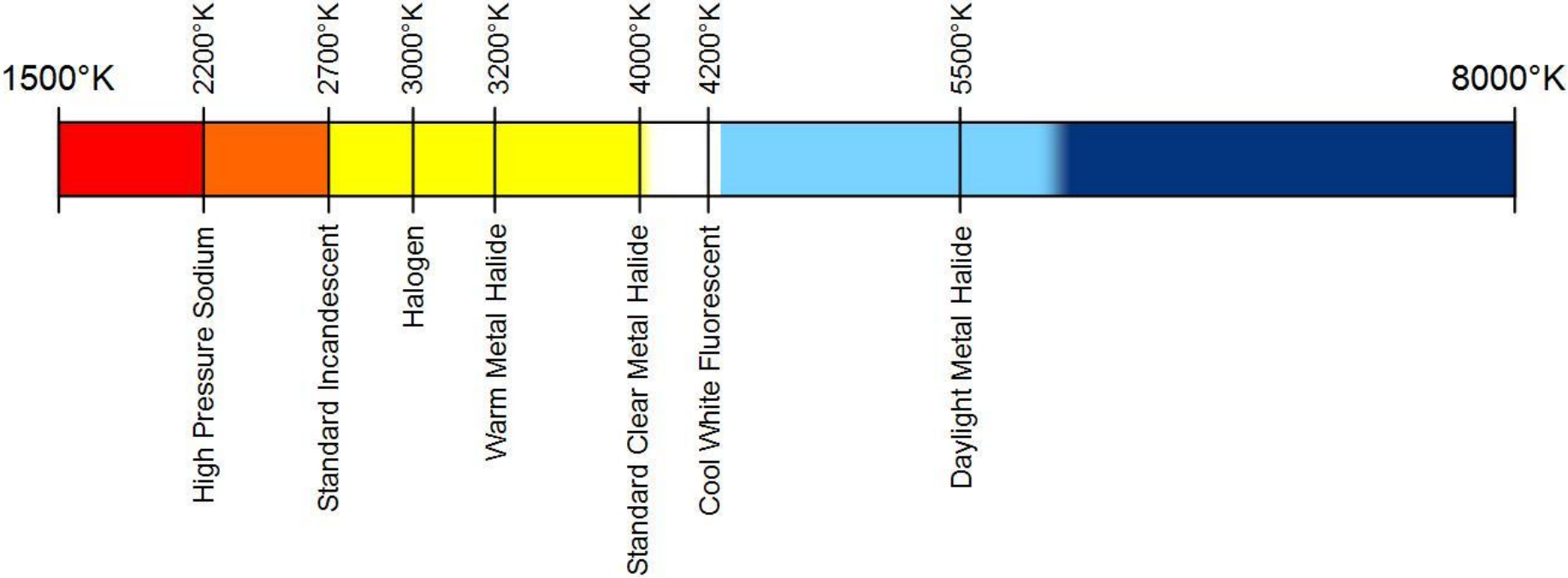


DARK SKY-FRIENDLY LIGHTING

Light can be used without polluting our natural night skies.

[LEARN MORE](#)

Kelvin Temperature Chart



Lighting Guidelines

The International Dark-Sky Association has specific guidelines for lighting in order to foster dark skies. We follow those guidelines at the Lodge and as part of our goal of establishing the Keweenaw Dark Sky Park as an International Dark Sky Park.

- Lighting Management Plan

Lighting Management Plan

Date last updated: December 14, 2021
Author(s): Mike Miller, John Mueller



We take lighting seriously.

For our lighting requirements we follow the International Dark-Sky Association's guidelines, and are in line with fostering the dark skies and being designated as an International Dark Sky Park.

We have the following overarching guidelines when evaluating new lighting on Lodge property:

- Outside lighting must be dark-sky compliant: fully shielded, 3000K color temperature or less. Where it is an option, use timers and motion sensors -- with them staying on less than 5 minutes.
- Reduction of energy consumption using energy saving light fixtures, minimizing the time lights are on, and the removal of unnecessary lighting.
- Provide a safe observing area for dark sky viewing where the public can enjoy the beauty of the stars.
- As part of our education and outreach initiatives, we will work with individuals and organizations in the area to educate them about what we have learned regarding artificial lighting as it relates to dark skies.

Visitor Lighting

The use of auxiliary lighting at night can detract from a guest's experience. When walking around the property at night, guests are advised to use red light, and to shine the light towards the ground in order to not hinder the stargazing experience of others. For example, below is the text we have on our Stargazing page of our website regarding using flashlights on property.

Through our education and messaging currently, and going forward, we provide guests with opportunities to understand the impacts of outdoor lighting on outdoor activities. The goal is to provide for the enjoyment of stargazing and other nighttime activities, while still providing supplemental lighting for safety and navigation.

Temporary Lighting

Any temporary installation of outside lighting will adhere to the dark-sky compliant guidelines to the greatest possible extent, and whose duration will be limited to the shortest possible time.

Light Pollution Affects Us All!



Wildlife



Health



Energy



Heritage



Safety

The benefits of dark skies are:

- Improve one's circadian clock (or rhythm) — sleep patterns, hormone release, eating habits and digestion, and body temperature; for good health, we need sunshine as well as darkness
 - [i.e. better circadian clock means a better sleep, which contributes to better overall health]
- Improving ecological integrity — many plants, wildlife, and insects rely on darkness to forage, breed and navigate, thus dark skies help them survive.
 - [e.g. many birds migrate at night, and the top of the Keweenaw is one of their byways]
- Ensuring the full enjoyment of a wilderness experience

Keweenaw Mountain Lodge

Copper Harbor, MI



Application for Dark Sky Park Designation

Keweenaw Dark Sky Park

V4.1

Designated June 21, 2022

- Our goal was to improve on the dark sky environment and experience, not to get the certification. The designation provided us a guiding light.
- Part of the bigger Keweenaw, not just the Keweenaw Mountain Lodge
- Application took around 1.5 years. 1 year from first version submitted.
- First version submitted on April 22, 2021, fourth (last) version submitted on April 22, 2022 (Earth Day).
- Revise and resubmit process, similar to academic journals / scholarly research.
- Projects page – showing the process
- Worked with 3 program managers, and now Amber has taken the lead – our point person at IDA.
- Annual reports, SQM readings, regular improvements

Keweenaw Mountain Lodge

Copper Harbor, MI



Application for Dark Sky Park Designation

Keweenaw Dark Sky Park

Application progress / schedule:

- **June 6, 2022:** Application accepted. Full Endorsement of Keweenaw Dark Sky Park Certification by the IDA.
- **May 20, 2022:** Submitted version 4.1 of application to our IDA program manager Ashley Wilson, with "ver 4.1 change log"
- **May 19, 2022:** Received response from Ashley Wilson regarding version 4.0 application
- **April 22, 2022:** Submitted version 4.0 of application to our IDA program manager Ashley Wilson, with "ver 4.0 change log"
- **March 23, 2022:** Meeting with Ashley Wilson and Amber Harrison to discuss the ownership structure, and discuss the Lodge deed restriction that pertains to the guidelines set by the Michigan State Historical Preservation Office (SHPO) because the Lodge is on the National Register of Historic Places. A clear direction to address the committee's concerns was established for the required updates to the application
- **March 22, 2022:** Received response from Ashley Wilson regarding the ownership structure
- **February 15, 2022:** Received feedback from Ashley Wilson with initial responses from the Dark Sky Places Committee's review of our application. There is one item that Ashley Wilson is still working to get clarity on before we start to work on the updates to the application (*guidelines for a for-profit company to manage a dark sky park*)
- **January 20, 2022:** The Dark Sky Places Committee reviewed our application, and Ashley Wilson is formulating their response
- **December 25, 2021:** Received confirmation that our application is complete and will be reviewed by the Dark Sky Places Committee at their January 20, 2022 meeting
- **December 15, 2021:** Submitted version 3.0 of application to our IDA program manager Ashley Wilson, with "ver 3.0 change log"
- **December 14, 2021:** Online Meeting with IDA program manager, Ashley Wilson, to review the latest draft of version 3.0 and answer additional questions about the updates.
- **November 29, 2021:** Online Meeting with IDA program manager, Ashley Wilson, to go through her review and discuss updates for version 3.0.
- **November 8, 2021:** Received feedback on version 2.1 of our application from our IDA program manager, Ashley Wilson
- **October 9, 2021:** Submitted version 2.1 of application to our IDA program manager Ashley Wilson, with "ver 2.1 change log"
- **October 1, 2021:** Submitted version 2.0 of application to our IDA program manager Ashley Wilson
(our program manager changed, as John Barentine has left the IDA as of August)
- **May 29, 2021:** Received feedback on version 1.0 of our application from our IDA program manager, John Barentine
- **April 22, 2021:** Submitted version 1.0 of application on Earth Day to our IDA program manager, John Barentine

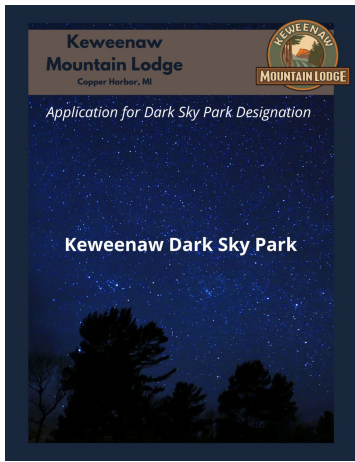


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[a robust application]

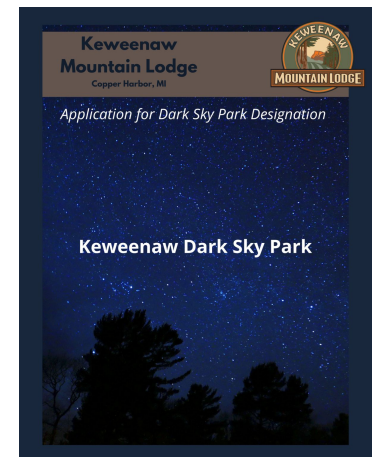
Letters of Support

The following organizations and individuals have shown their support for our Dark Sky Park application. We appreciate their support during the application process, and we look forward to fostering the appreciation of seeing the stars in the wilderness going forward together. [Listed in the order by date]

- [Keweenaw Convention & Visitors Bureau](#), Brad Barnett [[ltr](#)]
- [Keweenaw Economic Development Alliance](#), Jeff Ratcliffe [[ltr](#)]
- [Keweenaw Adventure Company](#), Sam Raymond [[ltr](#)]
- [Copper Harbor Trails Club](#), Nathan Miller [[ltr](#)]
- [Mariner North](#), Don and Peg Kauppi [[ltr](#)]
- [Fort Wilkins State Park](#), Bob Wild [[ltr](#)]
- [Grant Township](#), Scott Wendt [[ltr](#)]
- [Michigan Nature Association](#), Julie Stoneman [[ltr](#)]
- [Keweenaw Community Forest Company \(dba, KORC\)](#), Gina Nicholas [[ltr](#)]
- [Keweenaw Traveler](#), Charles Eshbach [[ltr](#)]
- [Keweenaw County](#), Don Piche [[ltr](#)]
- [Kall Morris Inc](#), Troy Morris [[ltr](#)]
- [Pure Michigan](#), Dave Lorenz [[ltr](#)]
- [Mt. Bohemia](#), Lonie Glieberman [[ltr](#)]
- [Eagle Harbor Township](#), Rich Probst [[ltr](#)]
- [Roger B. Chaffee Planetarium](#), David L. DeBruyn [[ltr](#)]

16 letters of support. Local, regional, and state support.

Private, non-profit, and government.



Keweenaw Mountain Lodge

Copper Harbor, MI



Application for Dark Sky Park Designation

Keweenaw Dark Sky Park

Corporate Resolution

We have drafted a corporate resolution supporting the Dark Sky Park. This has further solidified the dark sky initiatives that the Keweenaw Mountain Lodge's dark sky initiatives and intent for fostering stargazing activities at the top of the Keweenaw. The resolution is officially recorded with the company's official documents, being a signed corporate resolution by its sole member — approved and adopted on December 6th, 2021.

- [KML – Resolution No 2021-001 – Dark Sky Park 20211206](#)



RESOLUTION No. 2021-001

A RESOLUTION SUPPORTING THE FOSTERING OF THE DARK SKY ACTIVITIES IN THE KEWEENAW

WHEREAS, the Keweenaw Resort, LLC company, the owner of the Keweenaw Mountain Lodge, supports efforts to foster Dark Sky initiatives at the Keweenaw Mountain Lodge and in Keweenaw county; and

WHEREAS, the Keweenaw Mountain Lodge represents an outstanding opportunity to view the dark sky under a pristine and undiluted viewing environment; and

WHEREAS, the natural starry night as found at the Keweenaw Mountain Lodge represents an important and valuable asset to the County of Keweenaw that contributes to the quality of life for its residents, visitors, and wildlife in and around the resort; and

WHEREAS, the Keweenaw Mountain Lodge recognizes the pristine quality of dark skies at the top of the Keweenaw as an important natural, cultural, and environmental resource of significant value and believe it should be fostered; and

WHEREAS, the Keweenaw Mountain Lodge seeks to preserve the Dark Sky at the Keweenaw Mountain Lodge through responsible lighting; and

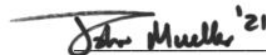
WHEREAS, the Keweenaw Mountain Lodge supports sponsored events that help educate the public on the sensible outdoor lighting practices that help preserve the Dark Sky asset in and around Keweenaw County; and

WHEREAS, the Keweenaw Mountain Lodge believes its Lighting Management Plan approved by top management at the Keweenaw Mountain Lodge in 2021 is more stringent than the current Keweenaw County Zoning Ordinance, and the Keweenaw Mountain Lodge supports it as a means to protect the pristine Dark Sky asset at the top of the Keweenaw; and

THEREFORE, BE IT RESOLVED, that the owner of the Keweenaw Mountain Lodge, the Keweenaw Resort, LLC company, pledge its support in the creation of a Dark Sky Park at the Keweenaw Mountain Lodge within Keweenaw County, Michigan.

APPROVED AND ADOPTED THIS 6th day of December, 2021.

Attest:



John Mueller, Member
Keweenaw Resort, LLC

[first privately owned and operated international dark sky park]

Keweenaw Mountain Lodge

Copper Harbor, MI



Application for Dark Sky Park Designation

Keweenaw Dark Sky Park

Lighting Management Plan

Date last updated: December 14, 2021
Author(s): Mike Miller, John Mueller



We take lighting seriously.

For our lighting requirements we follow the International Dark-Sky Association's guidelines, and are inline with fostering the dark skies and being designated as an International Dark Sky Park.

We have the following overarching guidelines when evaluating new lighting on Lodge property:

- Outside lighting must be dark-sky compliant: fully shielded, 3000K color temperature or less. Where it is an option, use timers and motion sensors -- with them staying on less than 5 minutes.
- Reduction of energy consumption using energy saving light fixtures, minimizing the time lights are on, and the removal of unnecessary lighting.
- Provide a safe observing area for dark sky viewing where the public can enjoy the beauty of the stars.
- As part of our education and outreach initiatives, we will work with individuals and organizations in the area to educate them about what we have learned regarding artificial lighting as it relates to dark skies.

Visitor Lighting

The use of auxiliary lighting at night can detract from a guest's experience. When walking around the property at night, guests are advised to use red light, and to shine the light towards the ground in order to not hinder the stargazing experience of others. For example, below is the text we have on our Stargazing page of our website regarding using flashlights on property.

Through our education and messaging currently, and going forward, we provide guests with opportunities to understand the impacts of outdoor lighting on outdoor activities. The goal is to provide for the enjoyment of stargazing and other nighttime activities, while still providing supplemental lighting for safety and navigation.

Temporary Lighting

Any temporary installation of outside lighting will adhere to the dark-sky compliant guidelines to the greatest possible extent, and whose duration will be limited to the shortest possible time.

Keweenaw Mountain Lodge

Copper Harbor, MI



Application for Dark Sky Park Designation

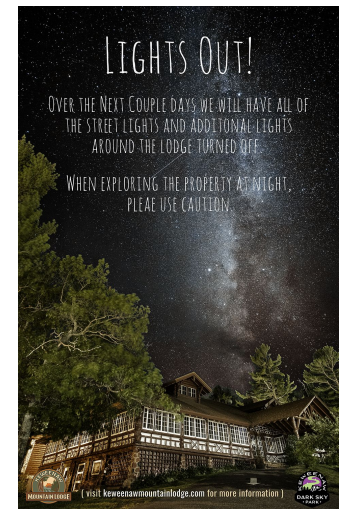
Keweenaw Dark Sky Park



ADVENTURE NORTH
KEWEENAW
MICHIGAN, USA

Name of the park:

- Wanted the dark sky initiative to encompass the region, not just the KML.



Started in 2003, Jennifer Barlow (high school student)

Discover the Night

Astronomy Clubs

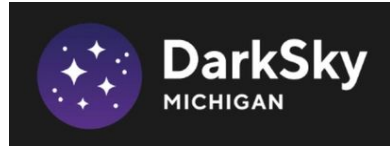
<https://idsw.darksky.org/>



DarkSky

Dark Sky Intl (fka, IDA)
Tucson, Arizona
<https://www.darksky.org/>

Michigan Dark Skies (UofMichigan)
Sally Oey
<https://sites.lsa.umich.edu/darkskies/>



Dark Sky Michigan Chapter
Robyn Porteen (Sam Tidwell)
<https://darkskymichigan.org/>



Starry Skies North IDA Chapter, Todd Burlet, <https://darkskymichigan.org/>

2023 UPPER PENINSULA DARK SKY FESTIVAL



Next Up: Stargazing Activity @ 8:45pm

KEWEENAW MOUNTAIN LODGE

FRIDAY - APRIL 21, 2023

ALL TIMES ARE EASTERN STANDARD TIME

- 5:00 PM - SOCIAL HOUR - MEET AND GREET IN THE HISTORIC LODGE
- 6:00 PM - EVOLUTION OF THE KEWEENAW DARK SKY PARK BY JOHN MUELLER
- 8:45PM - STARGAZING ON SNOWSHOES BY THE OAC TEAM

SATURDAY - APRIL 22, 2023

- 12:30 PM - RUSTIC - WORLDLY LUNCH
- 2:00 PM - CHASING THE NORTHERN LIGHTS IN MICHIGAN BY MELISSA KAELIN
- 3:30 PM - THE STORY BEHIND THE IMAGES BY MARY BETH KICZENSKI
- 8:00 PM - NORTHERN LIGHTS PHOTOGRAPHY WORKSHOP BY NATE BETT

For more information visit: keweenawdarksky.com

Offered in partnership with Visit Keweenaw



LIGHTS OUT!

DURING THE NEW MOON AND SPECIAL OCCASIONS,
WE TURN OFF ALL THE STREET LIGHTS AND
ADDITIONAL LIGHTS AROUND THE LODGE.



(visit keweenawmountainlodge.com for more information)



LIGHTS OUT!

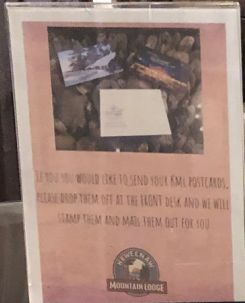
OVER THE NEXT COUPLE DAYS WE WILL HAVE ALL OF
THE STREET LIGHTS AND ADDITIONAL LIGHTS
AROUND THE LODGE TURNED OFF.

WHEN EXPLORING THE PROPERTY AT NIGHT,
PLEASE USE CAUTION



(visit keweenawmountainlodge.com for more information)





IF YOU WOULD LIKE TO SEND YOUR KML POSTCARDS, PLEASE DROP THEM OFF AT THE BACKY BELK AND WE WILL STAMP THEM AND MAIL THEM OUT FOR YOU!

Keweenaw Mountain Lodge

LIGHTS OUT!

OVER THE NEXT COUPLE DAYS WE WILL HAVE ALL OF THE STREET LIGHTS AND ADDITIONAL LIGHTS AROUND THE LODGE TURNED OFF.

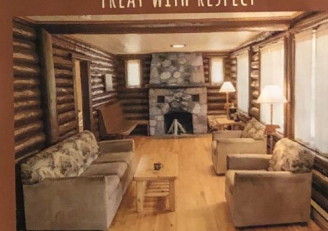
WHEN EXPLORING THE PROPERTY AT NIGHT, PLEASE USE CAUTION.



Keweenaw Mountain Lodge
(visit keweenawmountainlodge.com for more information)

RUSTIC AND HISTORIC CABINS

TREAT WITH RESPECT



The Cabins at the Keweenaw Mountain Lodge are listed on the National Register of Historic Places. The Cottages, as they were originally called, were built between 1936 and 1940 as part of a federally funded Works Progress Administration (WPA) Project.

Staying in a cabin is a special and unique experience. We expect you to be respectful of these rustic structures.

Each cabin has its own unique quirks. Embracing these characteristics will enhance your stay.

THE MOUNTAIN LODGE IS ON THE NATIONAL REGISTER OF HISTORIC PLACES

Keweenaw Mountain Lodge **MARRYING HISTORY WITH THE FUTURE**

The street lights being replaced January / February 2021, showing the older lights



Hole 1 / Brockway Webcam, with the old street lights in place. Hole 1 street light pole is where the cameras are installed



Hole 1 / Brockway Webcam, with the Hole 1 street light and cabin road street lights replaced with Dark-Sky Compliant light fixture (note: even with more street lights working on the cabin road, there is less light pollution on the golf course)



Hole 1 / Brockway Mountain Webcam, looking at lights along the cabin road, after installing dark-sky compliant street lights (fully-shielded, LED lights) -- the Northern Lights are on the upper-right of the picture



The make/model of the new street lights that were installed, in January / February 2021



RWL2-S-30-30-D-7P7-3-G- ALUM ARM
When ordered in 3K this is dark sky rated



RWL™ G2

Cobrahead

DESCRIPTION

The RWL™ G2 fixture from TGS represents a new performance-based, forward-thinking design for roadway lighting for residential/commercial streets, intersections, and high-speed roadways. Designed for both retrofit and new construction, RWL™ G2 provides multiple lumen packages with field adjustability and distribution options. A Comfort view optic lens is applied to minimize glare and backlight while maximizing luminaire efficacy. RWL™ G2 has tool-less entry providing quick access for installation and maintenance. A variety of control options are available for future upgrades.

APPLICATION

Roadway, Parking Lots, Walkways and General Outdoor Spaces



LIGHTS OUT!

OVER THE NEXT COUPLE DAYS WE WILL HAVE ALL OF THE STREET LIGHTS AND ADDITIONAL LIGHTS AROUND THE LODGE TURNED OFF.

WHEN EXPLORING THE PROPERTY AT NIGHT, PLEASE USE CAUTION.



(visit keweenawmountainlodge.com for more information)



2024 UPPER PENINSULA DARK SKY FESTIVAL



KEWEEENAW MOUNTAIN LODGE

THURSDAY - APRIL 11, 2024

8:00PM - OPENING GREETINGS

8:30 PM - STARGAZING IN THE KEWEEENAW
BY JEREMY ROWE AND CHRIS GILBERT

9:30 PM - STARGAZING

FRIDAY - APRIL 12, 2024

1:00 PM - THE SKY IS THE LIMIT
BY JAIME WESTFALL

3:30 PM - POSTCARDS FROM THE UNIVERSE
BY DR. ROBERT NEMIROFF

8:00 PM - NIGHT SKY PHOTOGRAPHY WORKSHOP
BY NATE BETT

9:30 PM - STARGAZING ADVENTURE WITH
ANDREW JOHNSON & THE DAC TEAM

SATURDAY - APRIL 13, 2024

1:00 PM - EMBRACE THE DARKNESS
BY MELISSA KAELIN

3:30 PM - SOLAR SECRETS
BY MARYBETH KICZENSKI

8:00 PM - THE EFFECTS OF LIGHT POLLUTION ON
OUR WORLD BY DAVID FALKNER

9:30 PM - STARGAZING

For more information visit: keweenawdarksky.com

Offered in Partnership with Visit Keweenaw



STATE OF MICHIGAN



CERTIFICATE OF PROCLAMATION

ON BEHALF OF THE PEOPLE OF MICHIGAN,
I, Gretchen Whitmer, governor of Michigan, do hereby proclaim

APRIL 2-8, 2024

as
DARK SKY WEEK

WHEREAS, empirical evidence shows the negative effects light pollution has on both the human population and environmental health; and,

WHEREAS, using inefficient outdoor lighting causes light pollution and obstructs the full view of the amazing Michigan sky and its surrounding environment; and,

WHEREAS, we can take steps to minimize the issues associated with light pollution, and preserve the beauty of our environment and night sky; and,

WHEREAS, there are nine dedicated land areas in Michigan, three of which are internationally designated dark sky parks and six of which are designated dark sky preserves in Michigan state parks; and,

WHEREAS, because Michigan is dedicated to the preservation of dark skies, dark sky preserves have been dedicated at: Lake Hudson Recreation Area, Lenawee County; Negwegon State Park, Alcona County; Port Crescent State Park, Huron County; Rockport Recreation Area, Presque Isle County; Thompson's Harbor State Park, Presque Isle County; and Wilderness State Park, Emmet County; and,

WHEREAS, our state is known for three internationally designated dark sky parks, Headlands International Sky Park in Mackinaw City, Dr. T.K Lawless Park in Vandalia, and Keweenaw Dark Sky Park in Copper Harbor; and,

WHEREAS, Beaver Island is seeking to become the first officially recognized international dark sky sanctuary in Michigan for its near absence of all light pollution which provides an extraordinary experience for stargazers; and,

WHEREAS, these parks are designated areas that allow for thousands of Michiganders and tourists to experience the true beauty of the Michigan night sky and observe the wonder of meteorological events such as the Northern Lights; and,

NOW, THEREFORE, I, Gretchen Whitmer, governor of Michigan, do hereby proclaim April 2-8, 2024, as Dark Sky Week in Michigan.



Gretchen Whitmer

Gretchen Whitmer
Governor





Wi-fi Module for Street Lights – Installed October/November 2023



Golf Course-side Cabin Road

Control • 6 Devices • Dimmer - 5%



Lodge Parking Lot

Control • 6 Devices • Dimmer - 5%

OFF ON 5%

Sensors



Sensor One - 15acc0

MAC: 15ACC0

Status: No Light, sensor last updated 11 minutes ago

Lights



Lodge Parking Lot - Light 1 - 15acc0

MAC: 15ACC0

5%

BLINK



Lodge Parking Lot - Light 2 - 15acc4

MAC: 15ACC4

5%

BLINK



Lodge Parking Lot - Light 3 - 15acbc

MAC: 15ACBC

5%

BLINK



Lodge Parking Lot - Light 4 - 15babb

MAC: 15BABB

5%

BLINK



Golf Course-side Cabin Road

Control • 6 Devices • Dimmer - 5%

OFF ON 5%

Lights



Cabin 1 - Light 15ac9f

MAC: 15AC9F

5%

BLINK



Cabin 11 - Light 15af9d

MAC: 15AF9D

5%

BLINK



Cabin 12 - Light 15b480

MAC: 15B480

5%

BLINK



Cabin 5 - Light 15b715

MAC: 15B715

5%

BLINK



Cabin 6 - Light 15b111

MAC: 15B111

5%

BLINK

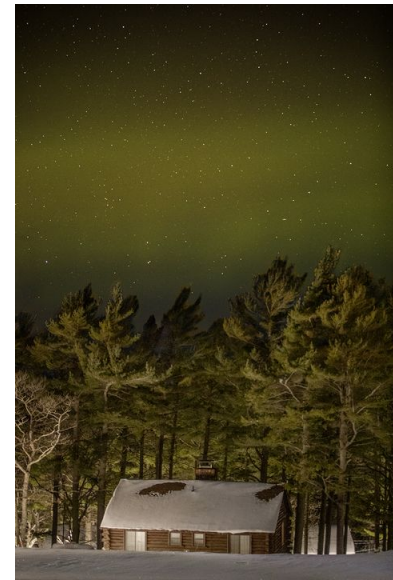


Cabin 9 - Light 15b688

MAC: 15B688

5%

BLINK



Northern Lights, The Lodge and Cabins Sunday, February 26, 2023

Photos by: Chris Guibert

[illustrating high quality photography]

NORTHERN LIGHTS PHOTO WORKSHOP

JOIN PHOTOGRAPHER NATE BETT FOR A DARK SKY PHOTO WORKSHOP
IN THE KEWEENAW DARK SKY PARK



KEWEENAW MOUNTAIN LODGE

NOVEMBER 11, 2023 - 7:00 PM

LODGING GUESTS FREE • \$75 PUBLIC • LIMITED AVAILABILITY

KEWEENAWMOUNTAINLODGE.COM FOR DETAILS



NIGHT SKY PHOTO WORKSHOP

JOIN PHOTOGRAPHER TOM OLIVER FOR A DARK SKY PHOTO WORKSHOP
IN THE KEWEENAW DARK SKY PARK



KEWEENAW MOUNTAIN LODGE

AUGUST 18, 2023 - 8:30 PM

LODGING GUESTS FREE • \$75 PUBLIC • LIMITED AVAILABILITY

KEWEENAWMOUNTAINLODGE.COM FOR DETAILS



NORTHERN LIGHTS PHOTO WORKSHOP

JOIN PHOTOGRAPHER NATE BETT FOR A DARK SKY PHOTO WORKSHOP
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KEWEENAW MOUNTAIN LODGE

AUGUST 18, 2023 - 8:30 PM

LODGING GUESTS FREE • \$75 PUBLIC • LIMITED AVAILABILITY

KEWEENAWMOUNTAINLODGE.COM FOR DETAILS



MOONLIT SNOWSHOE HIKES



JOIN THE KML OUTDOOR ACTIVITY STAFF
FOR AN INTERPRETIVE NIGHT TIME SNOWSHOE HIKE


 KEWEENAW MOUNTAIN LODGE
 

JANUARY 7 • FEBRUARY 4 • MARCH 4 • APRIL 8

FREE ACTIVITY - RESERVATIONS REQUIRED - SNOWSHOE RENTALS AVAILABLE
KEWEENAWMOUNTAINLODGE.COM FOR DETAILS



All-Sky Camera, along with our Webcams

[Working on a Northern Lights Camera]



[Learn more about the All-Sky and Northern Light Web Cameras that we are building.](#)

Location: 14252 US Hwy 41, Copper Harbor, Michigan, USA

Latitude: 47.458N

Longitude: -87.913W

Camera: ZWO ASI 178MC

Lens: Arecont Vision MPL 1.55 CS-mount 1.55mm Fixed Fisheye Lens

Computer: Raspberry Pi 4 4GB Model B with 1.5GHz 64-bit quad-core CPU (4GB RAM)

Owner: Keweenaw Mountain Lodge



Green Lodging



Good for the Environment, Good for Business

[get closer to nature]

RUSTIC AND HISTORIC CABINS
TREAT WITH RESPECT

The Cabins at the Keweenaw Mountain Lodge are listed on the National Register of Historic Places. The Cottages, as they were originally called, were built between 1936 and 1940 as part of a federally funded Works Progress Administration (WPA) Project.

Staying in a cabin is a special and unique experience. We expect you to be respectful of these rustic structures.

Each cabin has it's own unique quirks. Embracing these characteristics will enhance your stay.

THIS PROPERTY HAS BEEN PLACED ON THE NATIONAL REGISTER OF HISTORIC PLACES BY THE UNITED STATES DEPARTMENT OF THE INTERIOR

Keweenaw MOUNTAIN LODGE MARRYING HISTORY WITH THE FUTURE



LEAVE NO TRACE

Proud Partner



ADVENTURE NORTH

KEWEENAW

MICHIGAN, USA

Sustainable Tourism

[get closer to nature]



The Leave No Trace Seven Principles



PLAN AHEAD AND PREPARE

- Know the regulations and special concerns for the area you'll visit.
- Prepare for extreme weather, hazards, and emergencies.
- Schedule your trip to avoid times of high use.
- Visit in small groups when possible. Consider splitting larger groups into smaller groups.
- Repackage food to minimize waste.
- Use a map and compass to eliminate the use of marking paint, rock cairns or flagging.



TRAVEL AND CAMP ON DURABLE SURFACES

- Durable surfaces include established trails and campsites, rock, gravel, dry grasses or snow.
- Protect riparian areas by camping at least 200 feet from lakes and streams.
- Good campsites are found, not made. Altering a site is not necessary.
- In popular areas:
 - Concentrate use on existing trails and campsites.
 - Walk single file in the middle of the trail, even when wet or muddy.
 - Keep campsites small. Focus activity in areas where vegetation is absent.
- In pristine areas:
 - Disperse use to prevent the creation of campsites and trails.
 - Avoid places where impacts are just beginning.



DISPOSE OF WASTE PROPERLY

- Pack it in, pack it out. Inspect your campsite and rest areas for trash or spilled foods. Pack out all trash, leftover food and litter.
- Deposit solid human waste in catholes dug 6 to 8 inches deep, at least 200 feet from water, camp and trails. Cover and disguise the cathole when finished.
- Pack out toilet paper and hygiene products.
- To wash yourself or your dishes, carry water 200 feet away from streams or lakes and use small amounts of biodegradable soap. Scatter strained dishwater.



LEAVE WHAT YOU FIND

- Preserve the past: examine, but do not touch cultural or historic structures and artifacts.
- Leave rocks, plants and other natural objects as you find them.
- Avoid introducing or transporting non-native species.
- Do not build structures, furniture, or dig trenches.



MINIMIZE CAMPFIRE IMPACTS

- Campfires can cause lasting impacts to the environment. Use a lightweight stove for cooking and enjoy a candle lantern for light.
- Where fires are permitted, use established fire rings, fire pans, or mound fires.
- Keep fires small. Only use sticks from the ground that can be broken by hand.
- Burn all wood and coals to ash, put out campfires completely, then scatter cool ashes.



RESPECT WILDLIFE

- Observe wildlife from a distance. Do not follow or approach them.
- Never feed animals. Feeding wildlife damages their health, alters natural behaviors, and exposes them to predators and other dangers.
- Protect wildlife and your food by storing rations and trash securely.
- Control pets at all times, or leave them at home.
- Avoid wildlife during sensitive times: mating, nesting, raising young, or winter.



BE CONSIDERATE OF OTHER VISITORS

- Respect other visitors and protect the quality of their experience.
- Be courteous. Yield to other users on the trail.
- Step to the downhill side of the trail when encountering pack stock.
- Take breaks and camp away from trails and other visitors.
- Let nature's sounds prevail. Avoid loud voices and noises.

Nurturing and Fostering Quiet

One of the best compliments we get when people stay at the lodge is how quiet and peaceful it is, and that they were able to get the best night of sleep in a long time.

To help quantify and formalize the quietness at the resort, we are talking with Quiet Parks International about becoming a Quiet Parks Quiet Stay resort. Quiet Parks International is an organization that works to foster quiet areas around the world. This is important to us as our guests come from urban areas and want a getaway that is calm and quiet in the wilderness. This gives them the ability to restore their balance in silence and nature.

We are in communication with Vikram Chauhan at Quiet Parks International, and working on an application to be certified as a quiet park. This will give us the ability to host quiet experiences (quiet stays, quiet retreats) and provide education about the benefits of quiet [Initial communication with Vikram Chauhan, February 2022]



#SAVEQUIET

Everybody needs quiet right now

April 22, 2023

ON EARTH DAY I...

EARTH DAY

[it is when we submitted our initial version, and our last version (4.1)



business as a force for good.

Keweenaw Resort, LLC (dba, Keweenaw Mountain Lodge)



LAST VERIFIED SCORE

80.3

CERTIFICATION DATE

March 14, 2024



Governance

QUESTIONS ANSWERED

25/25

OVERALL SCORE

8.2



Workers

QUESTIONS ANSWERED

44/44

OVERALL SCORE

33.1



Community

QUESTIONS ANSWERED

43/43

OVERALL SCORE

33.2



Environment

QUESTIONS ANSWERED

35/35

OVERALL SCORE

12.6



Customers

QUESTIONS ANSWERED

5/5

OVERALL SCORE

3.6





© Photo by Chris Guibert

TEAM VALUES



SECONDARY VALUES

1. Adapt accordingly to the situation in a positive manner
2. Look conflict in the eye, and gracefully wipe it out
3. Be fearless and persistent in learning on a daily basis
4. Respect others
5. Check egos at the door
6. Appreciate life
7. Be welcoming

TABLE STAKES VALUES

(These are assumed since we are running a hospitality business in the wilderness)

- Value our team members
- Value our customers and guests
- Value our community
- Value our environment

KEWEENAW SUSTAINABLE TOURISM SERIES [November 10, 2023]

Conserving the Wilderness of the Night Sky

Understanding And Solving The Problem Of Light Pollution

John Barentine, Ph.D.

Dark Sky Consulting, LLC

Keweenaw Sustainable Tourism Series
10 November 2023

Neal Grosskopf



KEWEENAW

ADVENTURE NORTH



THE PODCAST FOR PEOPLE WHO LOVE LAKE SUPERIOR

Explore the fascinating people, places, wildlife, and culture of Lake Superior—and its five National Parks—with hosts Walt Lindala and Frida Waara.

Each season we release a new episode every two weeks. We encourage you to subscribe on Apple Podcasts, leave us a five-star review, and spread the word to others who care about our big lake!

Interested in becoming a podcast sponsor? Contact us at info@nplsf.org.



Lake Superior Podcast

S4 E7: JOHN MUELLER, OWNER OF THE KEWEENAW MOUNTAIN LODGE





Calumet: Where Collaborative Economic Development Drives Michigan Prosperity

Garrett Anderson

Monday, November 6, 2023

Nestled in the Keweenaw Peninsula – the northernmost area of Michigan’s Upper Peninsula (U.P.) – Calumet is central to the state’s efforts to drive prosperity for all Michiganders. With locally driven initiatives and statewide support, the people of Calumet are demonstrating what it means to have an impact through economic development.



Extra Slides

Hole 1 / Brockway Webcam, with the old street lights in place. Hole 1 street light pole is where the cameras are installed



Hole 1 / Brockway Webcam, with the Hole 1 street light replaced with Dark-Sky Compliant light fixtures, but the cabin road street lights not yet changed out



Hole 1 / Brockway Webcam, with the Hole 1 street light and cabin road street lights replaced with Dark-Sky Compliant light fixture (note: even with more street lights working on the cabin road, there is less light pollution on the golf course)



Hole 1 / Brockway Mountain Webcam, looking at lights along the cabin road, after installing dark-sky compliant street lights (fully-shielded, LED lights) -- the Northern Lights are on the upper-right of the picture





