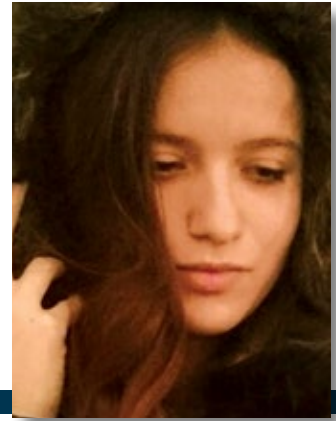


Finding Wilderness in the Stars

By Esther Bogorov, AWA Conservation Specialist



You pack up your hiking boots, water bottles, and After-Bite and head out to Jasper National Park, hoping to spot some wildlife you haven't yet had the luck to see. When the sun sets and takes the warmth with it, you curl up in your sleeping bag deep inside your tent to get ready for the next day. Perhaps, this summer, you'll try something different: pack your sleep mask, pitch your tent in the late morning, sleep through the day, and then wake up with the sunset. When darkness sets in, you'll look up and see the stars revealed in our northern sky. Through the night, the sky will change as we on Earth make half of a rotation on our axis, one tiny fraction of our orbit around the sun, and a much tinier fraction of our flight around the centre of our Milky Way galaxy. That nighttime darkness you'll witness is a part of true wilderness.

Dark Sky Preserves

Jasper National Park is the second largest dark sky preserve in the world, second only to Wood Buffalo National Park. A dark sky preserve is a place where the nighttime sky is pristine. On clear nights it's awash with starlight, thanks to preventing any necessary artificial light sources from spilling up into the sky. Alan Dyer, astronomy author and photographer based in southern Alberta, has been travelling the world chasing solar eclipses and watching stars for decades. Dyer reflects on the value of these preserves, saying: "As our cities become more brightly lit, the sky itself becomes an endangered species. Yet today, interest in the night sky is higher than ever

before." This means the chance to see the stars is attracting more visitors to these preserves, drawing people to wild spaces they might otherwise never experience. Dyer goes on to say, "in the last decade, park officials have worked with astronomers to create the system of dark sky preserves. Having this designation is now sought after by parks as it helps attract a new class of visitor: the astronomy tourist."

Alberta has great night sky viewing opportunities and there are some big events you can attend to experience them in good company. Jasper hosts an annual festival in October. The Rothney Astrophysical Observatory in Calgary hosts special open houses for the general public. But if you want to just get out there and get into it, enthusiasts and scientists gather at the many star parties that happen all around the province.

These events offer great ways to meet space experts and use their tools to see details and features the naked eye cannot detect. Field telescopes and massive digital observatories show details of the night sky that you literally have to see to believe.

If you plan on being out this June or July but don't have a telescope, there are a few special celestial objects much closer to Earth that you can see with the naked eye. Jupiter, Mars, and Saturn all should be visible on clear, light pollution-free nights. A particularly good time to see them in Edmonton will be at the beginning of July during the new moon. Jupiter is the first to rise – most of its journey across the skies will be during daylight hours. But, you should be able to see it before it sets at 12:30 a.m. Mars will be in the sky until just after 2:00 a.m. and Saturn will be vis-



Orion, one of the easiest constellations to spot in the winter, hovering over the Hoodoos near Drumheller, Alberta. PHOTO: © ALAN DYER /amazingssky.com



As Earth rotates through the evening, the stars appear to spin over our heads. The North Star is unique in that, as shown in the photo taken on the solstice at Dinosaur Provincial Park, it appears to remain stuck in place at all times. PHOTO: © Alan Dyer /amazingsky.com

ible until 3:30 a.m. Look for them above at altitudes of roughly 15 degrees above the horizon in the southeastern to southwestern parts of the sky. Towards dawn, you might catch a glimpse of Mercury. Venus, often the easiest to spot, will only become visible again in August. This kind of information, and much more about the planets, stars and constellations, is readily available through endless online resources. Just a quick search for “night sky map” can provide the link between knowledge and magical experience. Vito Technology’s mobile app called Star Walk lets you take a map of the sky with you into the field. Another good place to start is at www.timeanddate.com/astronomy. Type in a mid-size or larger city for your reference point and you’ll get a plethora of astronomical information. Ironically, perhaps, Vulcan Alberta isn’t included...

Dark sky preserves aren’t the only way to promote star visibility: having a strong community working to keep their part of the sky dark helps. North of Edmonton, Bon Accord is the first town in Canada to be recognized internationally as a dark sky

community for their efforts. According to the International Dark-Sky Association, the town, municipality, or city vying for recognition must use proper outdoor lighting, offer dark sky education programs, and most importantly, have citizen participation. A few years ago, the town committed to building an observatory park and encouraging businesses to operate under a culturally and environmentally-conscious ethic. They thus succeeded in making Bon Accord another Alberta destination for astronomy tourism. It is set to open to the public in the summer of 2017. Dark sky stewardship is an effort to not only promote responsible living locally, but to set an example for other communities.

Light Pollution

Light pollution, of course, does not only get in the way of our view. In addition to the aesthetic and recreational value of dark skies, they deliver significant health benefits for humans. Artificial light at night has led to disturbances in our natural, daily clock and has been blamed for increased insomnia in the developed world. More broadly, leaking,

bleeding light hurts nature; it disturbs the wildlife that depends on darkness. Not only does light at night increase stress for birds, bats, amphibians, insects, and many more creatures, but it can alter their behaviour, orientation, and mating habits. This will inevitably affect the entire ecosystem and its valuable biodiversity.

A case study published this year in *Biological Conservation* looked at how terrestrial vertebrates’ behaviour changed with different light intensity during the nighttime. The researchers treated passage structures such as vegetated over- and underpasses with different light intensity over the course of several weeks. They concluded that lit areas served as deterrents for some of the animals they tracked, including mule deer and deer mice. The passages are designed to increase wildlife connectivity, but the lit areas were habitat disturbances that decreased animal use of these structures. For light-averse species light pollution means the populations will suffer from the decreased connectivity and may contribute to increased disease susceptibility and reduced genetic diversity.

These types of studies are presented annually at the Artificial Light at Night (ALAN) conference. People gather here to discuss all aspects of the problematic effects of artificial light, from technology and mapping to the social, economic, and environmental implications of light and darkness. By developing informed and strong regulations, cities, towns, and wild lands can all contribute to a healthier ecosystem. The public has the opportunity to help planners and politicians make ecologically informed, economically wise, and socially acceptable decisions across urban and rural human-dominated landscapes. By starting on our streets, something as simple as re-designed light fixtures can help nocturnal creatures survive while improving human quality of life.

Learning from Star Gazing

The effects of light on wildlife in particular inform how the Royal Astronomical Society determines what a truly dark sky should look like. By learning just how

dark it needs to be for animals to thrive, we have protected lands that are also great locations for building important tools for astronomy. Telescopes first proved the heliocentric model of our universe, which explains that the sun is the centre of our solar system. This explained why it seemed that some of the bright dots in the sky, now called planets, did not act like the rest of them. Modern, digitized telescopes are now showing us the age and the size of our expanding universe. We learn that, by looking at the stars, we are looking into the past.

The brightest star in the northern hemisphere is Sirius, found in the dog constellation, busy chasing Orion the hunter across the sky. It gives off light that reaches our naked eye from about nine light years away. That means that the starlight, traveling at the speed of light, left the surface of the star nine years ago and just some of it is finally reaching us here. The countless other stars, some even closer than Sirius, do not appear to shine as brightly as this

one from our vantage point on Earth.

While the speed of light alone is enough to blow our minds, not every mission to dig deep into space and into the past has been in the best interest of people. In April 2015, the Canadian government committed millions of dollars to invest in the Thirty Metre Telescope (TMT). The TMT was planned to be built on Mauna Kea, a mountain in Hawaii. The mountain already hosts a few smaller telescopes because of the darkness and absence of cloud cover. This time, however, protests erupted. The mountain is sacred, and the proposal to further colonize the land of the Ancient Hawaiians ultimately resulted in land claims disputes. Later last spring, the courts of Hawaii ruled against the project. The researchers and developers are now looking for an uncontested site, eyeing a town in India.

The grassroots protests in Mauna Kea left the peak of the mountain free for star-gazers to view the sky the way humans have for thousands of years. While sometimes it



The Andromeda galaxy, 2.5 million light years away from Earth. PHOTO: © ALAN DYER /amazingsky.com

is valuable to look at the sky through massive machines to witness the past up close, it is also important to have the freedom to lay down, look up, and hope for an asteroid to fly into our atmosphere, leaving behind a trail that looks like a shooting star. (If you look to the northeast sky, you will see the Perseid meteor shower peaking this year on August 12 and 13. The challenge will be seeing it through the light of the waxing gibbous Moon.)

The sky taught us that our sun is a star, that there 100 billion stars in our galaxy, and that there are 100 billion galaxies in our universe. Our telescopes and careful calculations taught us that Earth is one of eight planets in our system, along with another five dwarf planets, including Pluto.

And as we continue to learn, we've discovered that many of those countless stars are suns themselves, surrounded by evermore countless planets.

Yet the deeper into space we look, the more we realize how unique planet Earth really is: we have not found life anywhere else but right here around us. Protecting the dark skies that have inspired us since ancient times also protects our home planet and the life that defines it. Our work as wilderness defenders is not only to make sure that our land stays wild and our skies stay dark, but to give our descendants the same chance to look up in wonder. As astronomer Dyer says: "It is so important to have parks and wild areas where not only the earthly environment is preserved, but also the celestial.

The night sky is as much a part of nature as are the flora and fauna." It is a noble duty to make sure we can tell the story of how, over the course of billions of years, stars grew and died and sent enough stardust across the universe to collect in rock, plant, and animal here on Earth, including you. 🌌

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