Sunriver Nature Center & Observatory and the Oregon Chapter of the International Dark Sky Association announced the designation of Sunriver, Oregon as a IDA International Dark Sky Places Program as a Dark Sky Friendly Development of Distinction. Sunriver is the first International Dark Sky Places recognized in Oregon.

The Sunriver development was launched in the late 1960's with a vision to build a community integrated with nature, a vision which has been achieved and is continued and valued by Sunriver residents.

"We are honored that IDA has elected to welcome Sunriver into the IDA Dark Sky Places Program", said Keith Mobley, President of the Sunriver Owners Association Board of Directors. "And we are pleased that our ongoing efforts of the past 60 years to be one with nature are recognized now for our protection of pristine skies from light pollution."

- **Who is the International Dark-Sky Association?**

  - The International Dark-Sky Association (IDA) was founded in 1988 and is dedicated to protecting the night sky for all viewers to enjoy. The IDA's main goals are public education about night sky conservation and protecting the environment from light pollution. Light pollution is artificial outdoor lighting that infringes upon views of the night sky and is the reason millions of kids will never see the Milky Way where they live.

  - The IDA works through a network of grassroots advocates from across the world. The network leads efforts of public education to show how we can all do our part to limit light pollution.

- Through the organization, the International Dark-Sky Places conservation program recognizes areas that protect the night sky. The program designates International Dark Sky Communities, Parks, Reserves, Sanctuaries, and Urban Night Sky Places. Dark Sky Places go through a rigorous process to be designated. There are currently over 180 officially designated International Darky Sky Places.

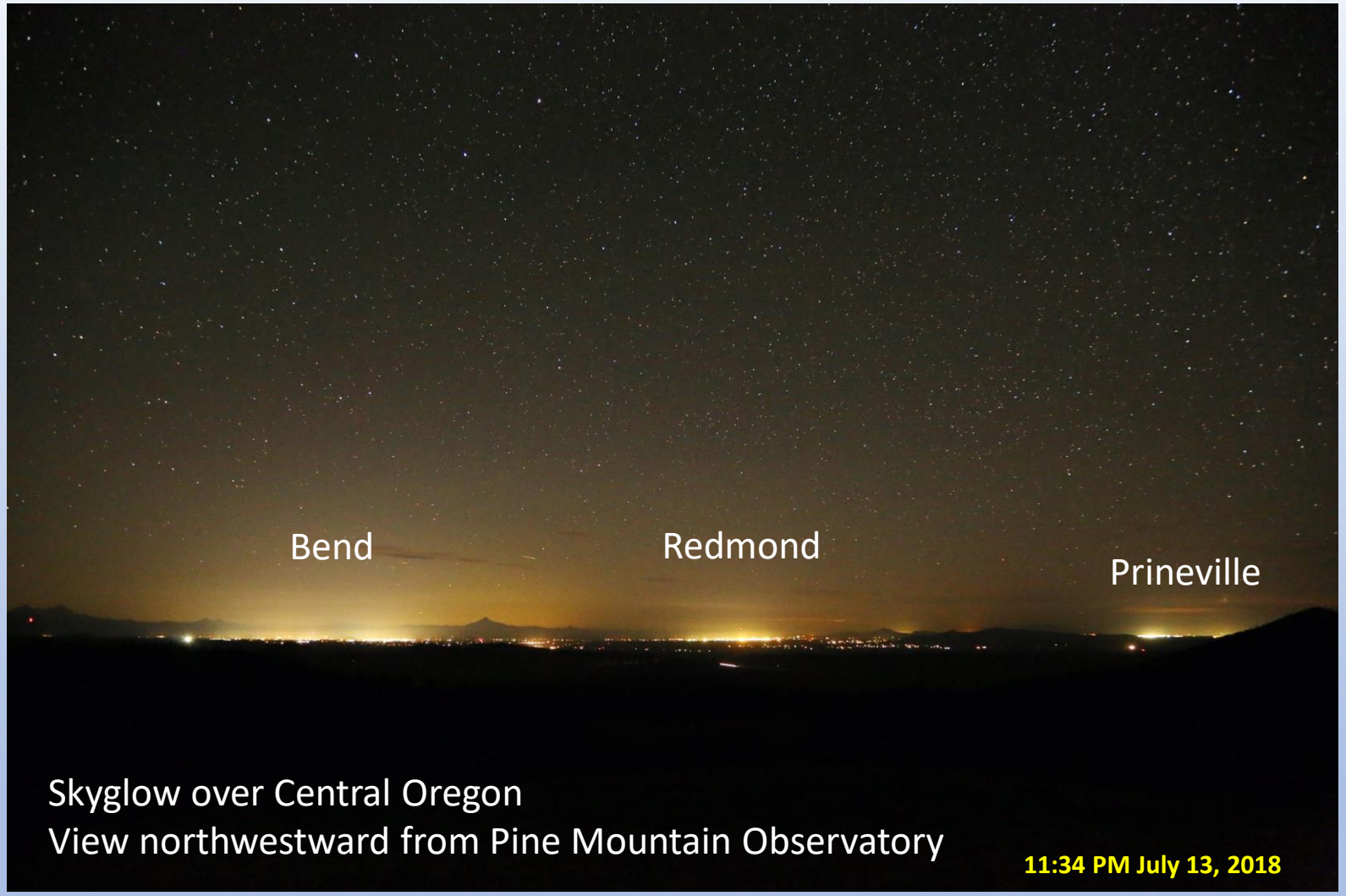
- **Why is Dark Sky so important?**

  - The IDA's efforts to preserve our night sky are important due to the many negative effects of light pollution. Light pollution is characterized by excessive use of artificial light and results in brightening the night sky. This causes unnecessary energy consumption, negatively harms the environment, disrupts wildlife, affects safety, and even harms human health.

-

- Outdoor lighting costs millions of dollars a year, and most of it is ineffective in its job to increase safety. Outdoor lighting can sometimes have the reverse effect, lighting up property can increase crime such as theft and vandalism. Additionally, bright lights cause our pupils to shrink which makes it harder for our eyes to adjust to low light, leading to avoidable accidents.
- Artificial light can also affect the natural rhythm of most plants and animals. This can disrupt entire ecosystems of nocturnal animals such as birds that migrate or hunt during the night and rely on seasonal light patterns.
- Humans have also evolved to rely on light patterns and our natural sleep cycles are disrupted by artificial light. Blue light, which is common on screens, is especially harmful to our sleep cycles and is another reason to use a warmer color for outdoor lighting.
-

Skyglow over Central Oregon



Notes: Light escaping upward from Bend, Redmond and Prineville is scattered by the atmosphere, causing a glowing sky – "skyglow." When I took this picture, I thought that all of the uplight in Deschutes County was coming from Bend and Redmond. Night time satellite images, however, show that in 2020, unincorporated Deschutes County was responsible for 26% of the uplight. See later.

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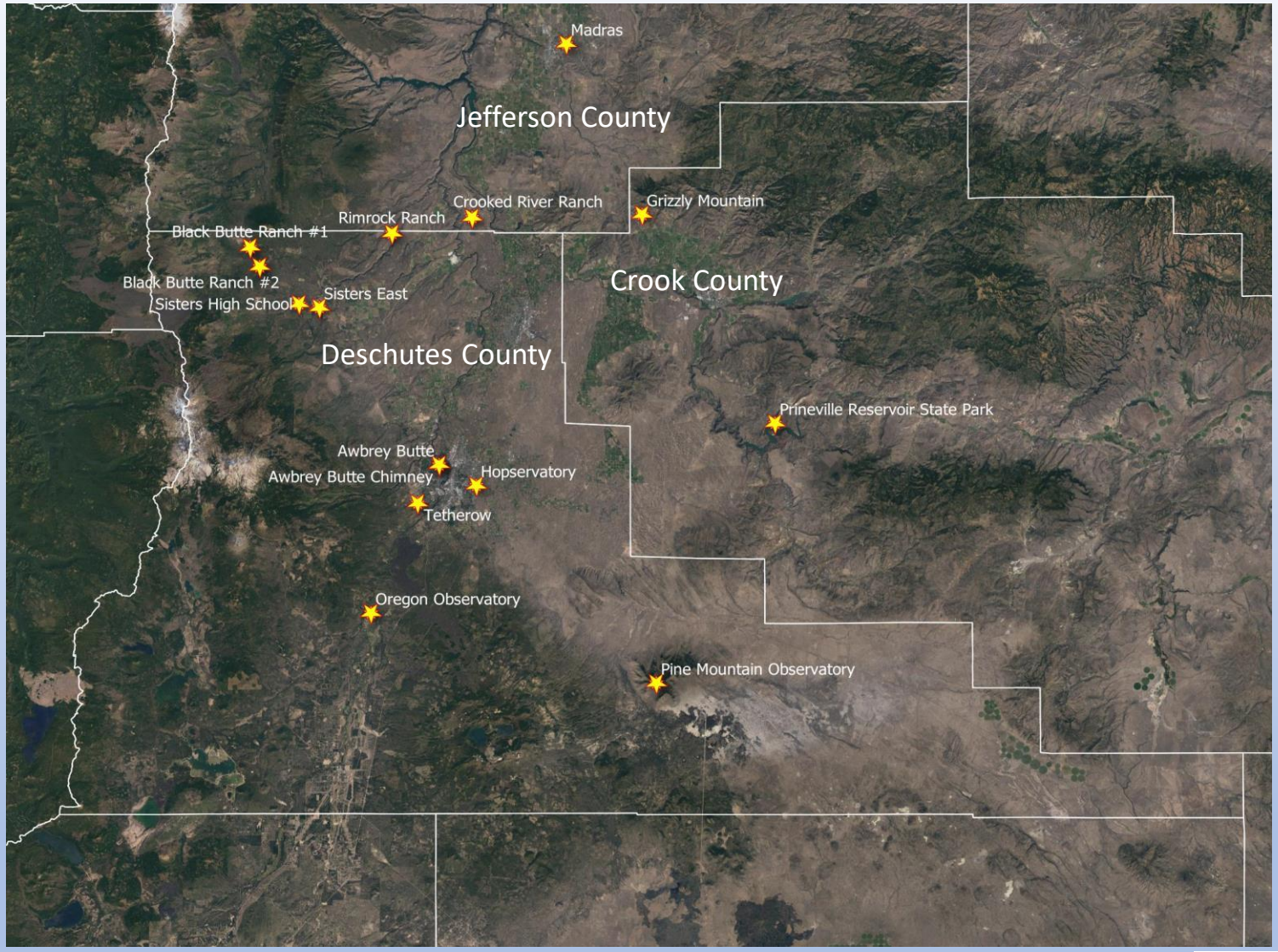
Locations of Light Pollution Meters in Central Oregon



Notes: IDA Oregon and volunteers have been measuring light pollution across Oregon for the past three years. Currently we have 35 instruments recording continuously, 11 of them in Deschutes County – at the stars on the map. The data are used to document the state of light pollution and also as input to certification of Dark Sky Places, as achieved so far at Sunriver (Oregon Observatory) and Prineville Reservoir State Park. Black Butte Ranch is currently working toward certification as a Dark Sky Community.

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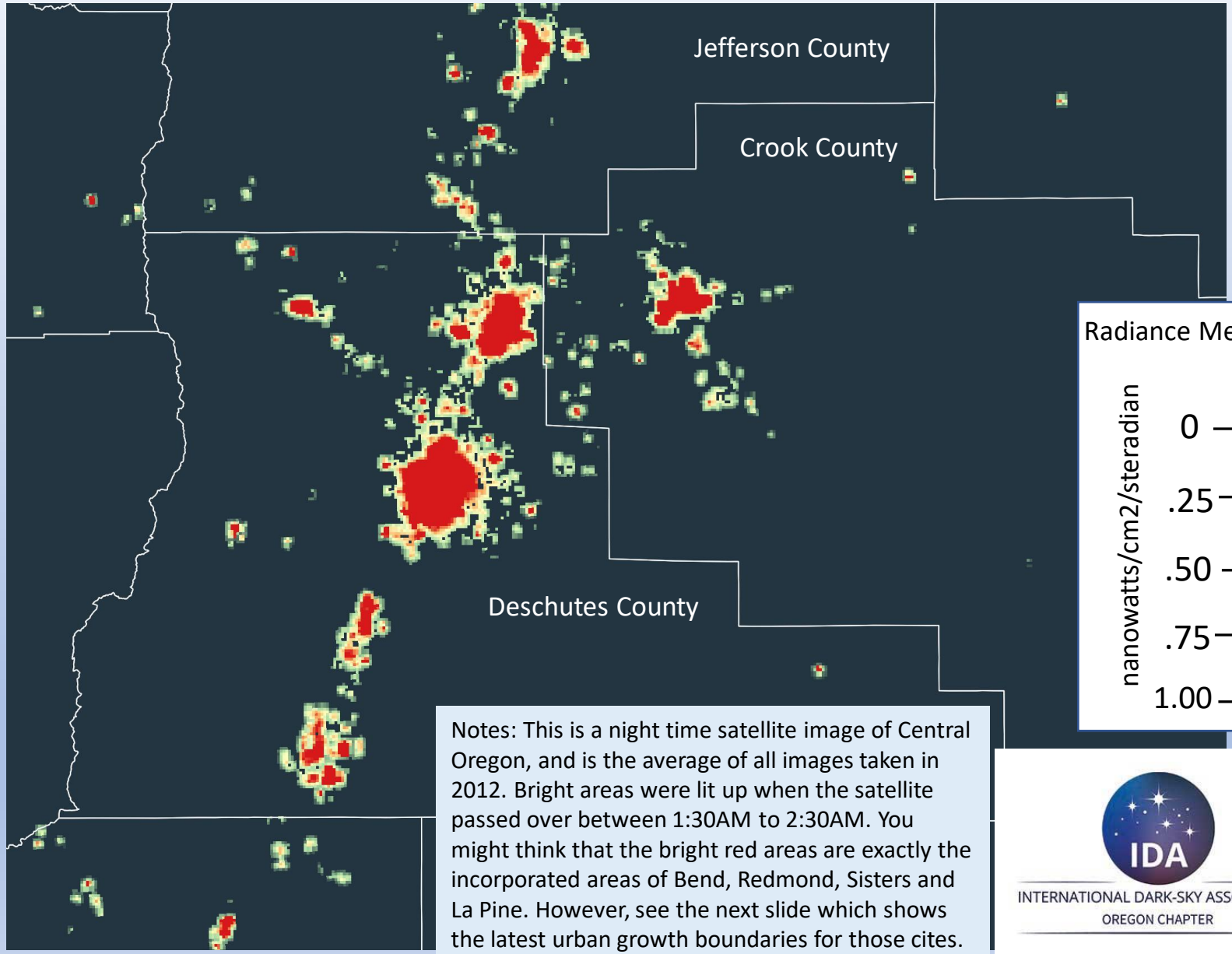
Night Time Satellite Image
2012 Annual Average

NASA VIIRS Day Night Band
Images taken 1:30 AM – 2:30 AM



Notes: This is a night time satellite image of Central Oregon, and is the average of all images taken in 2012. Bright areas were lit up when the satellite passed over between 1:30AM to 2:30AM. You might think that the bright red areas are exactly the incorporated areas of Bend, Redmond, Sisters and La Pine. However, see the next slide which shows the latest urban growth boundaries for those cites.

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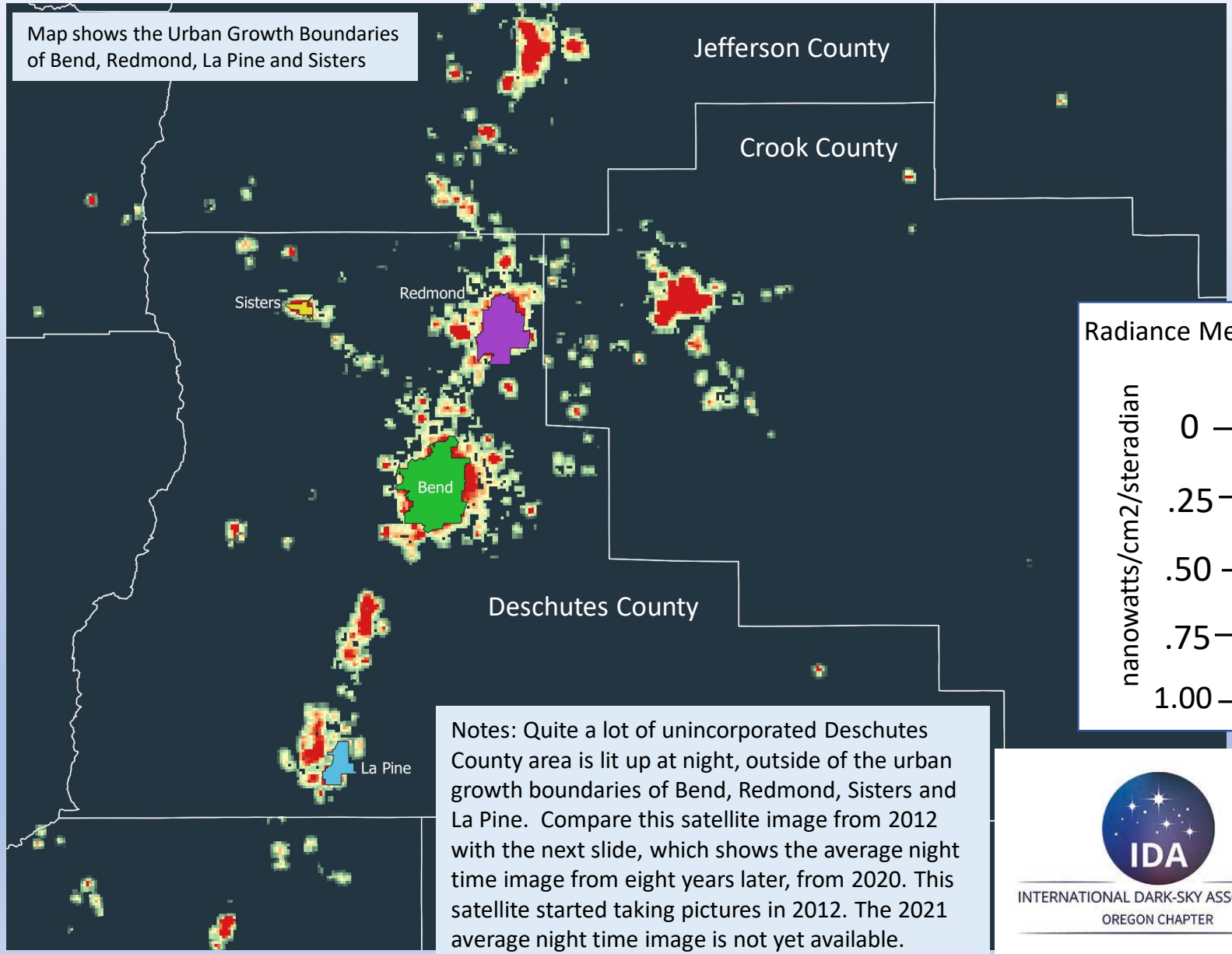
Night Time Satellite Image
2012 Annual Average

NASA VIIRS Day Night Band
Images taken 1:30 AM – 2:30 AM



Notes: Quite a lot of unincorporated Deschutes County area is lit up at night, outside of the urban growth boundaries of Bend, Redmond, Sisters and La Pine. Compare this satellite image from 2012 with the next slide, which shows the average night time image from eight years later, from 2020. This satellite started taking pictures in 2012. The 2021 average night time image is not yet available.

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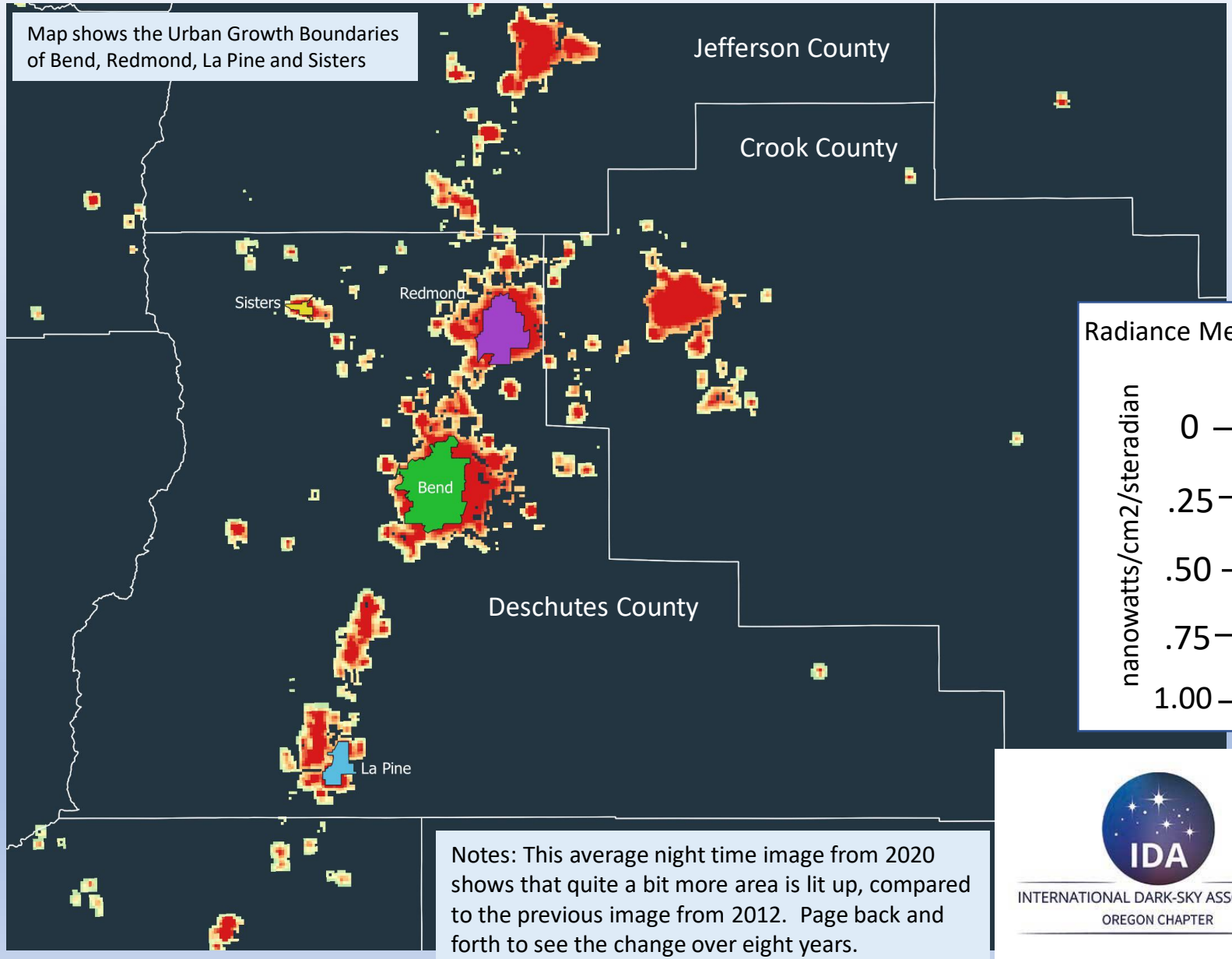
Night Time Satellite Image
2020 Annual Average

NASA VIIRS Day Night Band
Images taken 1:30 AM – 2:30 AM



Notes: This average night time image from 2020 shows that quite a bit more area is lit up, compared to the previous image from 2012. Page back and forth to see the change over eight years.

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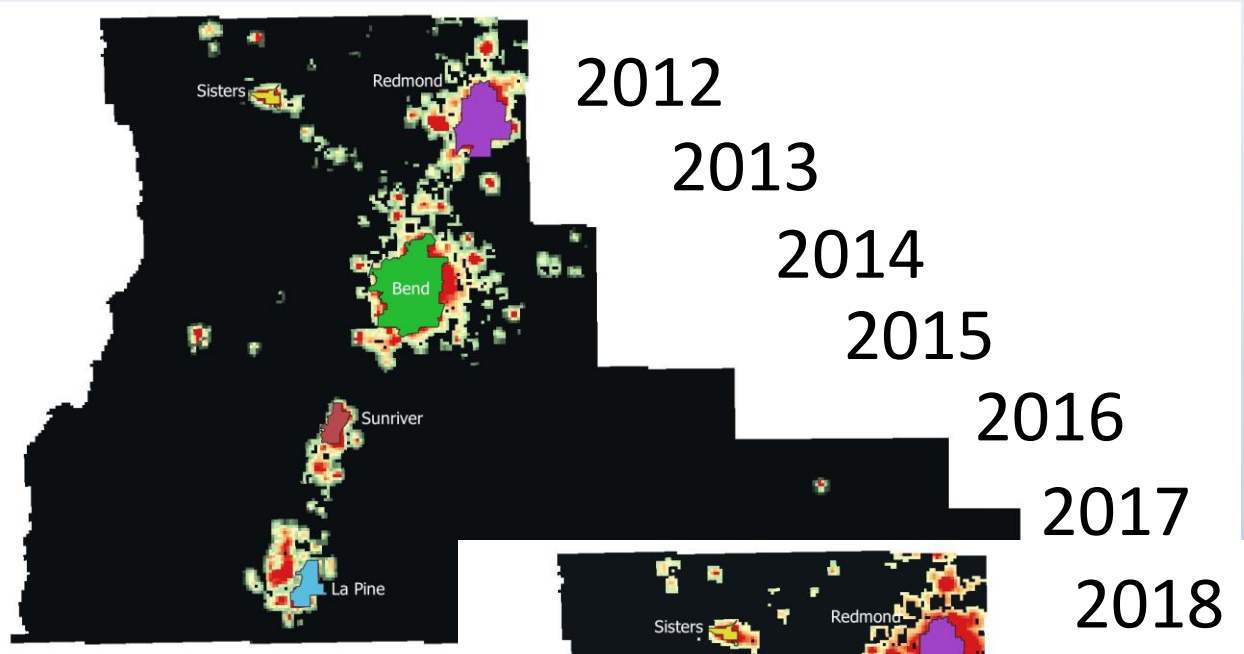
Compare Annual Nighttime Satellite Measurements from 2012 to 2020



2012

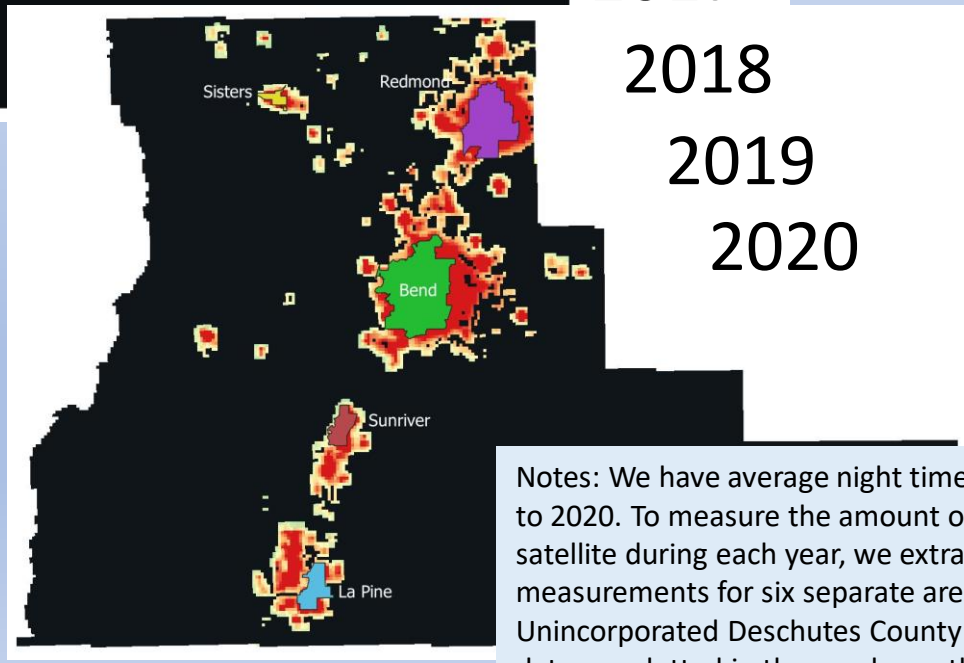
2013

2014

2015

2016

2017



2018

2019

2020

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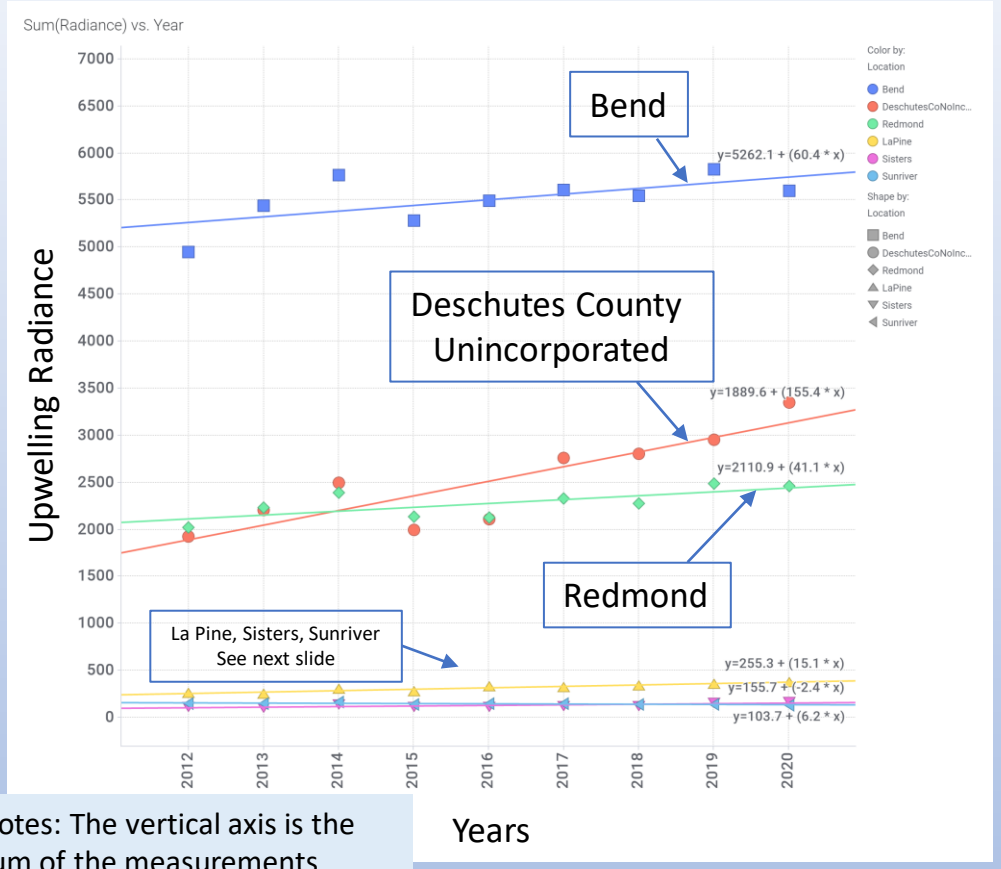
Notes: We have average night time images for all the years from 2012 to 2020. To measure the amount of upwelling light detected by the satellite during each year, we extracted and summed the digital measurements for six separate areas: Bend, Redmond, Sisters, La Pine, Unincorporated Deschutes County and out of curiosity, Sunriver. These data are plotted in the graphs on the next two slides.

Bend, Redmond, Unincorporated Deschutes County
How much upward light from each area?
How much change in each area from 2012 to 2020?



Notes: The vertical axis is the sum of the measurements taken by the satellite over these areas. Satellite data are extrapolated back to 2010 to align with the population census.

What do these data tell us? Some highlights:

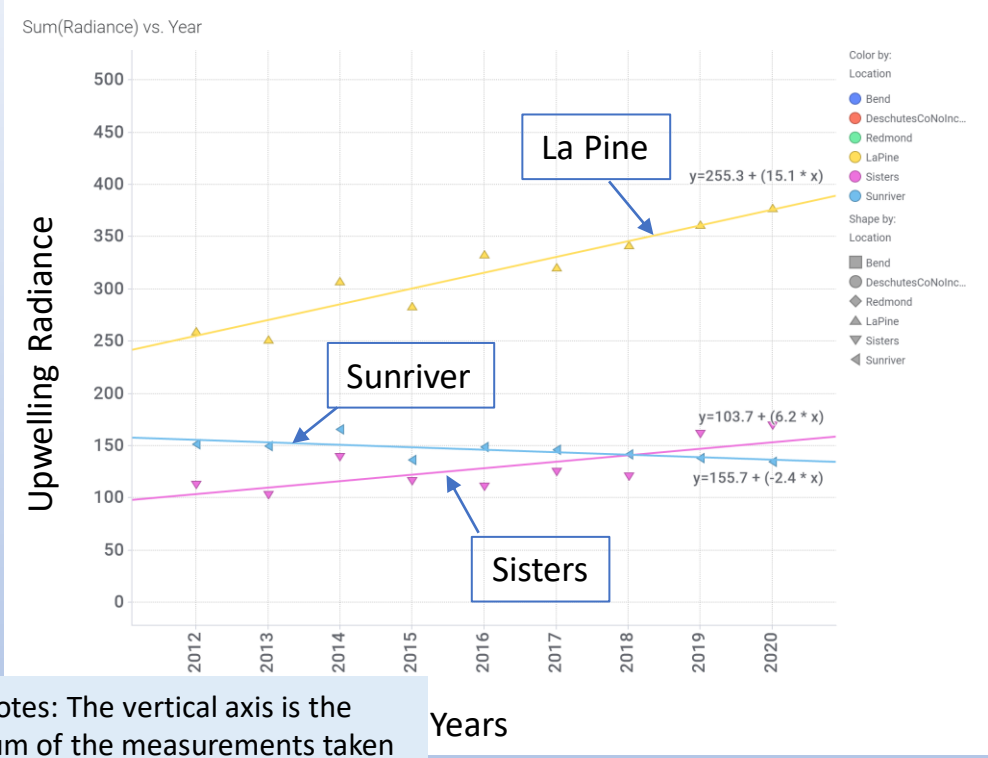
- Upward light that causes light pollution has been increasing from the cities and from unincorporated Deschutes County
- The percentage increase is steepest from unincorporated Deschutes County, doubling over the past 10 years
- The ratio of uplight increase to population growth for rural Deschutes County is a lot higher than for Bend and Redmond
- In 2020, the unincorporated area of Deschutes County was responsible for 26% of the light escaping into space
- If the increase in upwelling light continues on the same trends, in 14 years from now, the light pollution from rural Deschutes County will more than double again and be equal to the then increased uplight from Bend

	Percent of Upwelling Light per Area in 2020	Percent Change Upwelling Llight 2010 to 2020	Upwelling Rate of Change per year	Population Rate of Change per year	Ratio of Upwelling Rate to Population Rate x 100 (per incr. 100 people)
Bend	48.5	11.7	60.4	2280.9	2.6
Deschutes County Unincorporated Area	26.4	98.4	155.4	887.9	17.5
Redmond	20.6	20.3	41.1	705.9	5.8
LaPine	3.2	67.1	15.1	85.9	17.6
Sisters	1.3	67.9	6.2	91.4	6.8
Sunriver	1.2	-14.8	-2.4	-9.9	-24.0

See slide in end section for spreadsheet details.

See next slide for enlargement of the graph for La Pine, Sisters and Sunriver

La Pine, Sisters and Sunriver
How much upward light from each area?
How much change in each area from 2012 to 2020?



Notes: The vertical axis is the sum of the measurements taken by the satellite over these 3 areas. Satellite data are extrapolated back to 2010 to align with the population census.

What do these data tell us? Some highlights:

- From 2010 to 2020, the percentage of light escaping from La Pine and Sisters increased by 67%
- Among these three areas, upward light that causes light pollution has been increasing at the steepest rate from La Pine, at a lesser rate from Sisters, and decreasing from Sunriver.
- The ratio of uplight increase to population growth for La Pine is similar to that of rural Deschutes County and is a lot higher than for Bend and Redmond
- Sunriver's population dropped between 2010 and 2020, and we understand that the Sunriver HOA has been more effectively enforcing their lighting ordinance over the past 5 years.

	Percent of Upwelling Light per Area in 2020	Percent Change Upwelling Llight 2010 to 2020	Upwelling Rate of Change per year	Population Rate of Change per year	Ratio of Upwelling Rate to Population Rate x 100 (per incr. 100 people)
Bend	48.5	11.7	60.4	2280.9	2.6
Deschutes County Unincorporated Area	26.4	98.4	155.4	887.9	17.5
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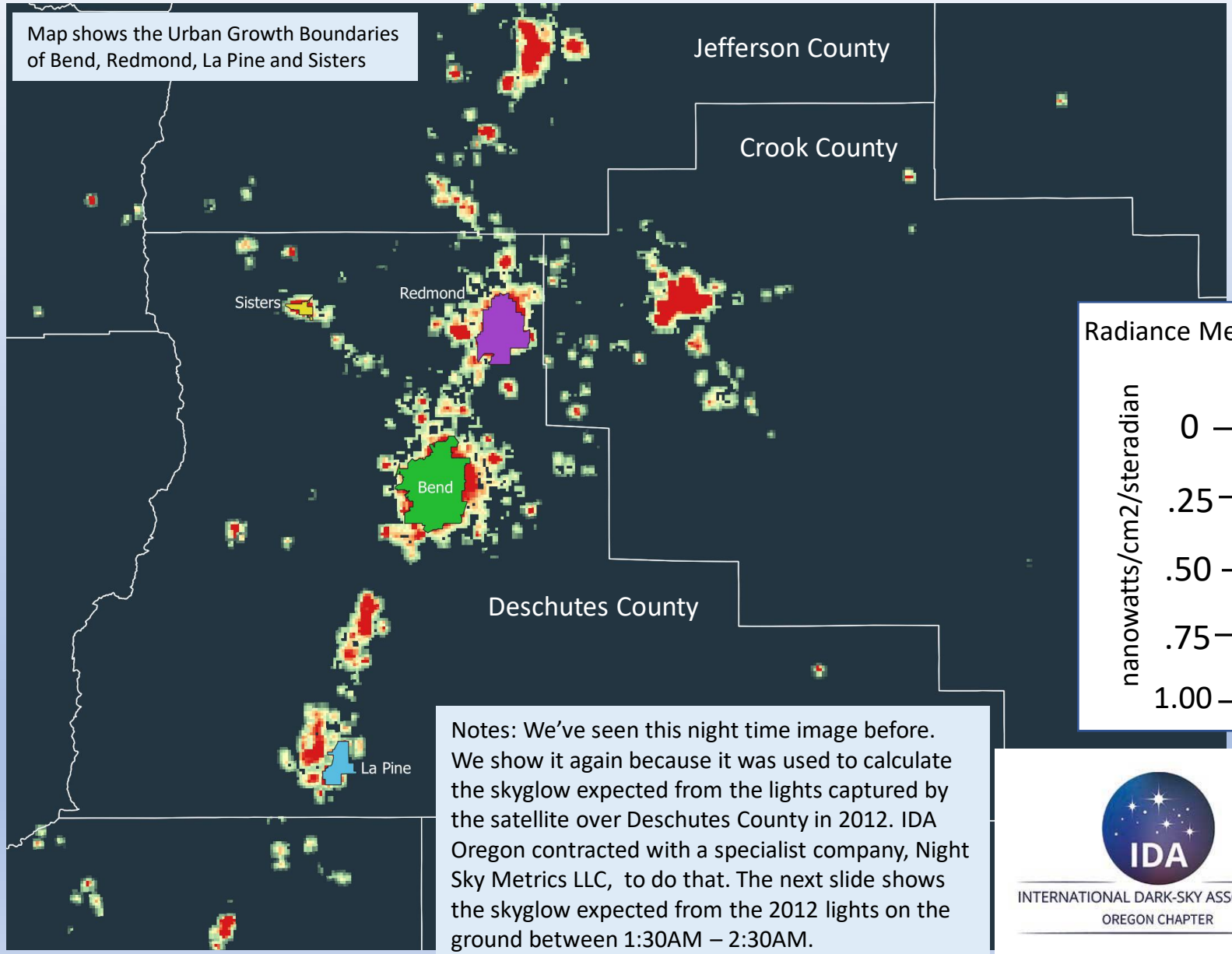
LaPine	3.2	67.1	15.1	85.9	17.6
Sisters	1.3	67.9	6.2	91.4	6.8
Sunriver	1.2	-14.8	-2.4	-9.9	-24.0

See slide in end section for spreadsheet details.

Note: Sunriver is a large resort town in unincorporated Deschutes County with strict outdoor lighting regulations enforced though its HOA.

Night Time Satellite Image
2012 Annual Average

NASA VIIRS Day Night Band
Images taken 1:30 AM – 2:30 AM



Notes: We've seen this night time image before. We show it again because it was used to calculate the skyglow expected from the lights captured by the satellite over Deschutes County in 2012. IDA Oregon contracted with a specialist company, Night Sky Metrics LLC, to do that. The next slide shows the skyglow expected from the 2012 lights on the ground between 1:30AM – 2:30AM.

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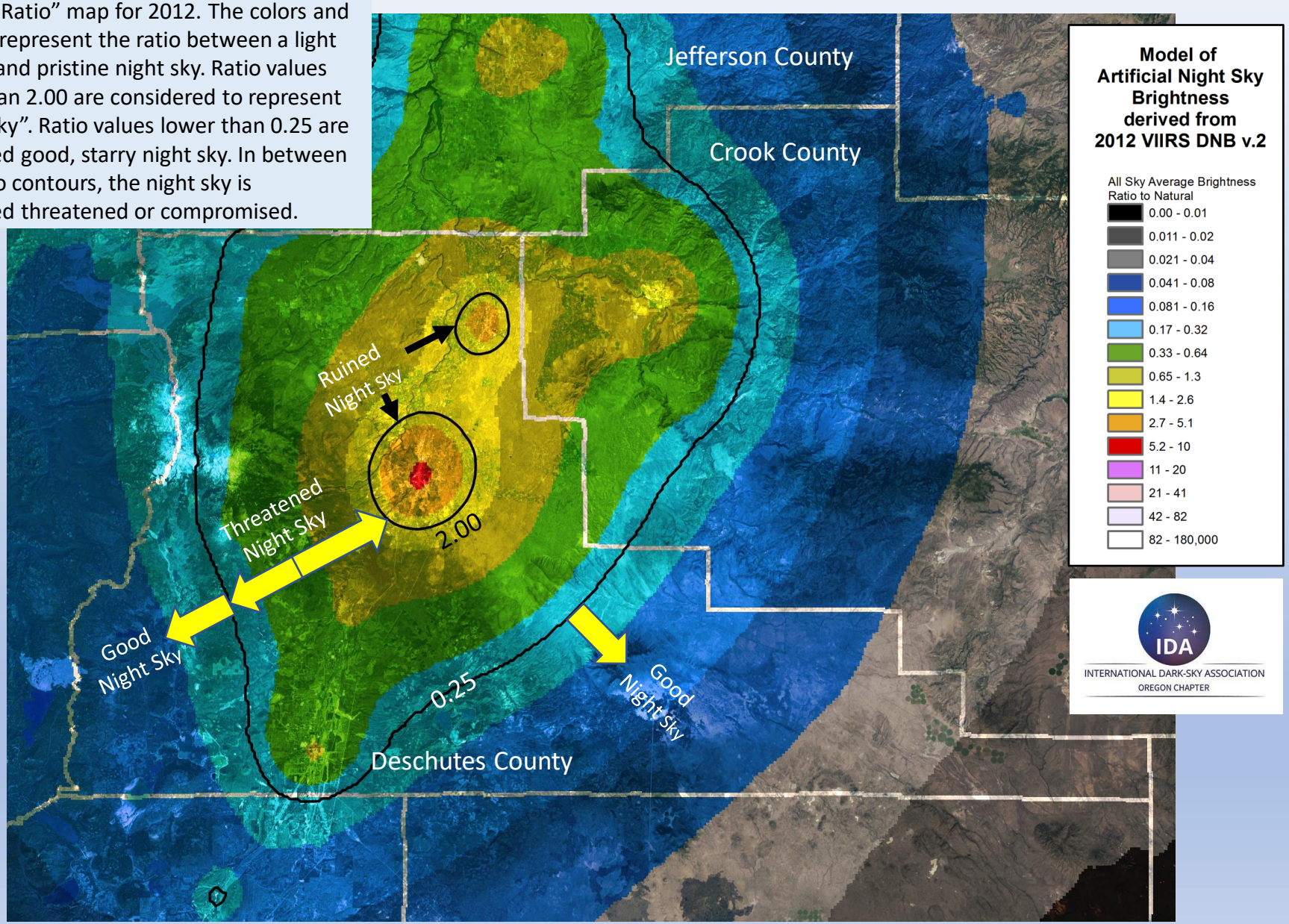
Skyglow Model 2012

All-Sky Average Light Pollution Ratio
Night Sky Metrics LLC

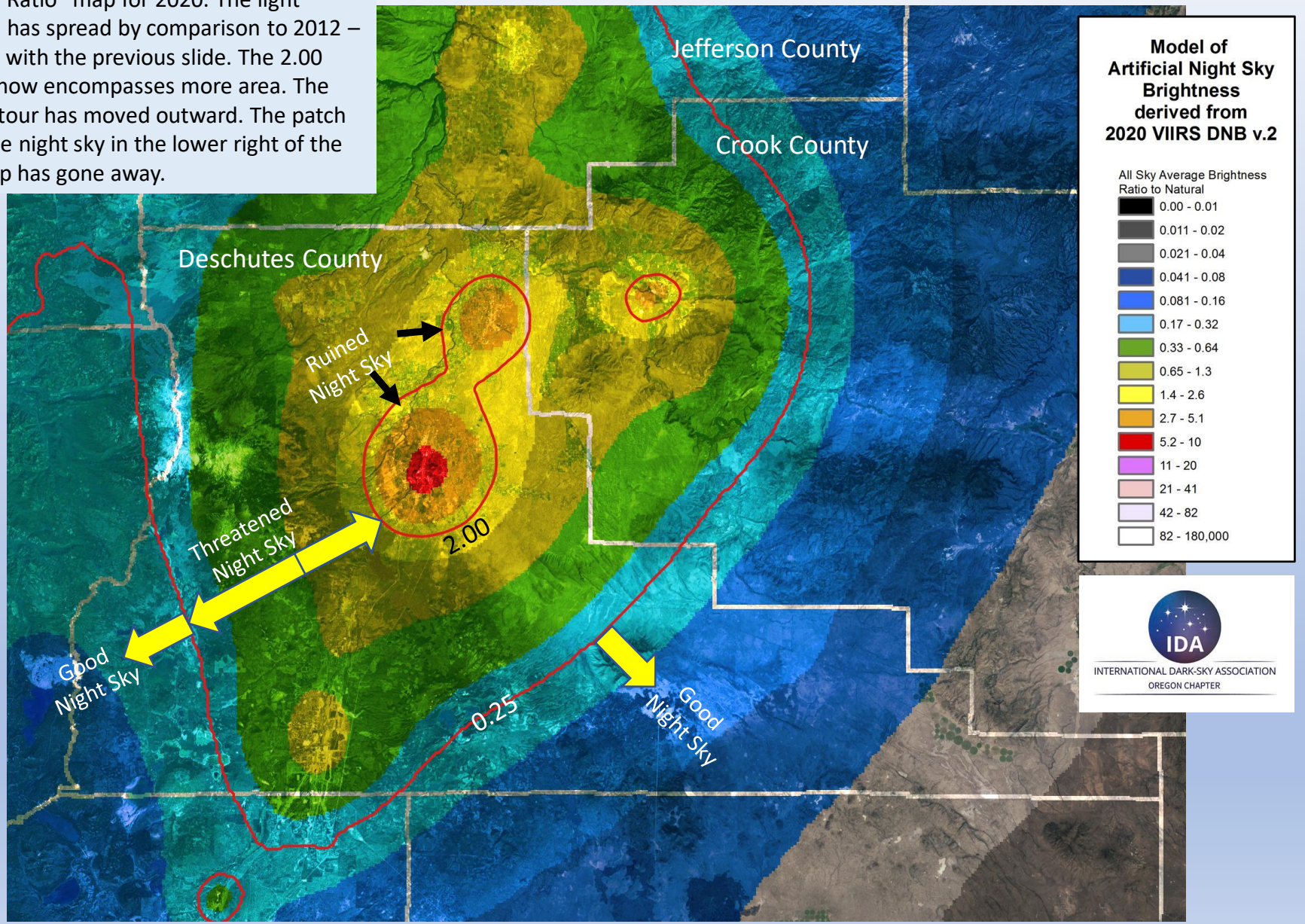
Notes: This is the "All-Sky Average Light Pollution Ratio" map for 2012. The colors and contours represent the ratio between a light polluted and pristine night sky. Ratio values higher than 2.00 are considered to represent "ruined sky". Ratio values lower than 0.25 are considered good, starry night sky. In between those two contours, the night sky is considered threatened or compromised.



Skyglow Model 2020

All-Sky Average Light Pollution Ratio
Night Sky Metrics LLC

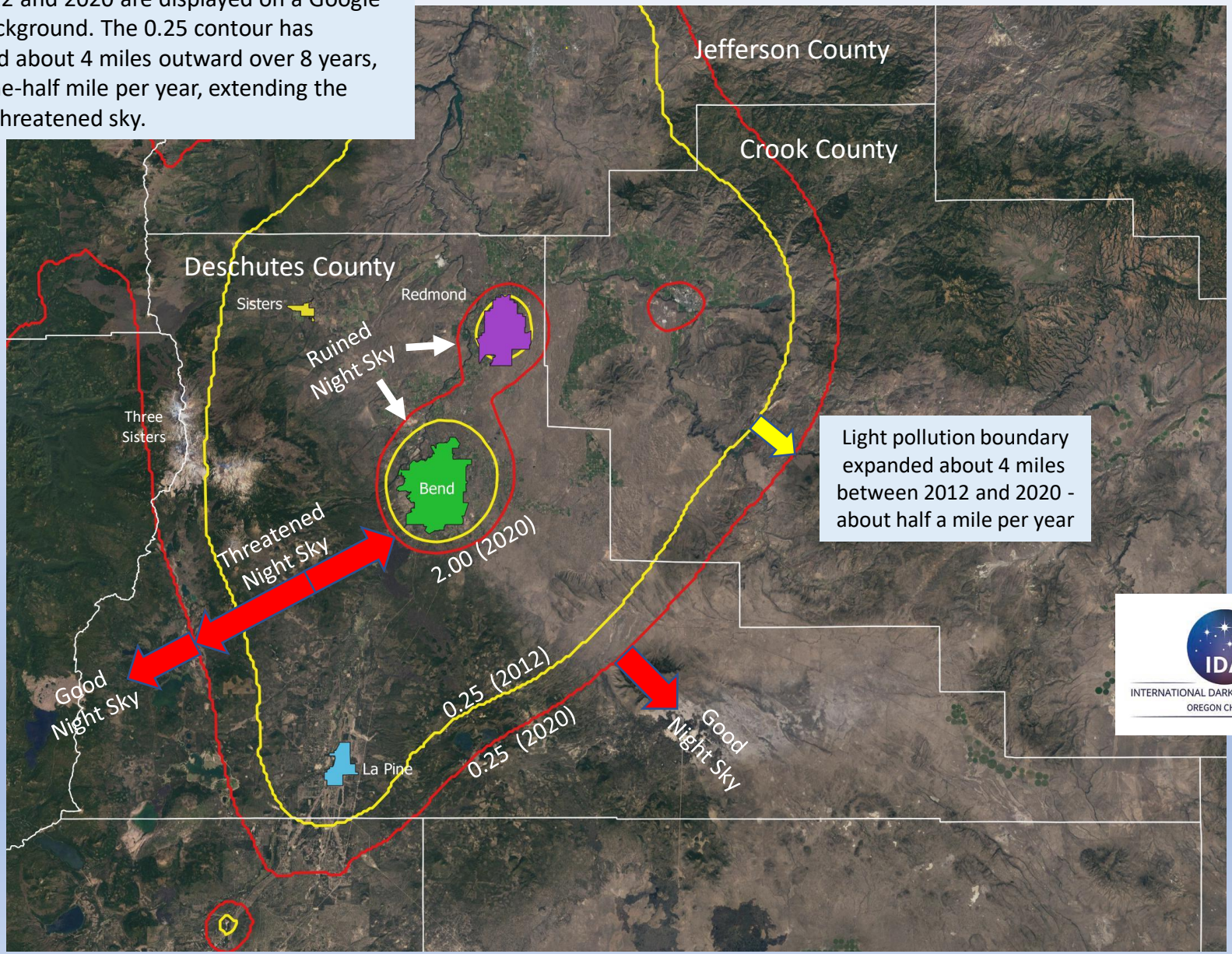
Notes: This is the "All-Sky Average Light Pollution Ratio" map for 2020. The light pollution has spread by comparison to 2012 – compare with the previous slide. The 2.00 contour now encompasses more area. The 0.25 contour has moved outward. The patch of pristine night sky in the lower right of the 2012 map has gone away.



Compare 2012 and 2020 Models

All-Sky Average Light Pollution Ratio
Night Sky Metrics LLC

Notes: The light pollution ratio contours from both 2012 and 2020 are displayed on a Google Earth background. The 0.25 contour has expanded about 4 miles outward over 8 years, about one-half mile per year, extending the zone of threatened sky.



How can we minimize light pollution? -- Adopt the Five Principles for Responsible Outdoor Lighting

Notes: These five principles are the cornerstone of responsible outdoor lighting. They emphasize outdoor lighting for safety and quality of life – by preventing light trespass, by eliminating over-lighting which produces sharp dark shadows and glare, by encouraging smart lighting and warm colored light which is more beneficial to the ecosystem than blue-rich white light. Deschutes County can improve night time safety and quality of life by adopting these principles.

Summary

- Light Pollution measurements at 10 locations in Deschutes County confirm our night sky quality – both good and bad
- The unincorporated area of Deschutes County was only responsible for 26% of the light escaping into space in 2020, but it's contribution to the pollution doubled from 2012 to 2020, far faster than the rate of population increase
- If the increase in upwelling light continues on the same trend, the light pollution from rural Deschutes County will equal the increased amount from Bend in 14 years
- Skyglow calculations from the satellite images show that the zone of threatened night sky in Deschutes County expanded outward by half a mile per year between 2012 to 2020 into previously pristine night sky
- We can minimize these trends by adoption of the five principles of responsible outdoor lighting

Before and during the 2003 Northeast blackout, a massive power outage that affected 55 million people. Photo by Todd Carlson

What can you do to help?

In order to help protect our night sky, use downward or covered lighting outside, motion sensor lights, or even turn off lights when possible. You can also help by installing light fixtures with an IDA Fixture Seal of Approval at your home or business.

Unfortunately, most outdoor lighting is ineffective, inefficient, and often unnecessary. Across America, over a million dollars are wasted due to outdoor lighting, which is over 40 pounds of CO_2 per American, per year. To save some money and help the environment, consider switching to more effective lighting. If you are unsure, look for the IDA seal of approval when purchasing light fixtures.

Responsible outdoor lighting has a clear target, is not brighter than necessary, is not constantly on, and is a warmer color if possible. Help out by turning off lights outside of your home that do not have a clear purpose. This not only helps to limit light pollution but will lower your energy bill as well.

You may notice that observatories, including the Oregon Observatory, use red lighting. Red lights are lower energy and do not interfere with wildlife or human night vision as much. For the same reason, warmer light is better than cooler light.

What is the future of Dark Sky?

The future of the International Dark-Sky Association is to continue educating the public about the impacts of light pollution and to ensure that there are cost-effective lighting options that protect our night sky. It is working towards this goal with its education programs and public outreach to grow support for its mission to protect our skies.

In order to ensure that there are accessible night sky-friendly lights, the IDA has a seal of approval that can be found on light fixtures that meet its standards. The promotion of quality lighting is one of the main ways in which the IDA can protect the night sky.

In working to achieve this vision the IDA supports a future in which the night sky is preserved for all generations to cherish.