



# **Oracle State Park Center for Environmental Education**

## **International Dark Sky Park (Silver Tier) 2016 Annual Report**



**Prepared by the Oracle Dark Skies Committee (ODSC)**

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## 1. Letter of Submittal



Oracle Dark Skies Committee  
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Oracle, AZ 85623-5323

520-289-3402

mweasner@mac.com  
[www.weasner.com/ODSC](http://www.weasner.com/ODSC)

26 September 2016

IDA Board of Directors  
International Dark-Sky Association  
3225 North First Avenue  
Tucson, AZ 85719-2103

On behalf of Arizona State Parks, it is an honor for the Oracle Dark Skies Committee to submit the second "International Dark Sky Park" annual report for Oracle State Park Center for Environmental Education.

The past year has been an active one at Oracle State Park, with many night events. Unfortunately, the weather was not always cooperative with the scheduled events or with acquiring night sky quality readings. Events and SQM readings are documented in the appropriate sections in this report.

The Oracle Dark Skies Committee continues its public outreach in support of the Park's IDSP designation. The most significant accomplishment was at a local Circle K, finally completing an action initiated in 2014 at the start of the IDSP nomination process. The accomplishment is documented in this report.

Oracle State Park and the Oracle Dark Skies Committee has more events planned for 2017 and everyone looks forward to showcasing our International Dark-Sky Park.

Sincerely,



Mike Weasner  
Chair, Oracle Dark Skies Committee  
Preserving Arizona's Oldest Natural Resource: the Night Sky



## 2. General

### 2.1 Brief History of Oracle State Park Center for Environmental Education

The Kannally Ranch was donated to The Defenders of Wildlife (DOW), a non-profit organization, in 1976. The will of Lucille Kannally gave the 4000-acre ranch to DOW with the stipulation that the property be perpetually used as a wildlife reserve. The DOW held this property (called the Oracle Wildlife Refuge) for ten years. In 1985, the DOW decided to offer the property to the State for a State Park.

The Park was continually available for environmental education programs on a reservation basis. Oracle State Park was officially dedicated and opened to the public October 1, 2001.

The above history is from the book *Arizona State Parks: The Beginning* edited by Charles R. Eatherly, and used with permission. Copyright Arizona State Parks.

The Park received the IDA “International Dark Sky Park” (IDSP) Silver Tier designation in October 2014.



## International Dark-Sky Association

*"...to preserve and protect the nighttime environment and our heritage of dark skies through environmentally responsible outdoor lighting."*

3223 North First Avenue, Tucson, AZ 85719, USA  
tel +1.520.293.3198 | fax +1.520.293.3192  
www.darksky.org | ida@darksky.org

13 October 2014

**Interim Executive  
Director**

W. Scott Kardel

**Emeritus**

David L. Crawford, Ph.D.

Mr. Bryan Martyn, Executive Director  
Arizona State Parks  
1300 W. Washington Street  
Phoenix, AZ 85007

Dear Mr. Martyn:

On behalf of the IDA Board of Directors, it is with great pleasure that I write to inform you that the Board has approved the nomination of Oracle State Park to become the world's twentieth IDA International Dark Sky Park.

The Board is impressed by the efforts undertaken at OSP to preserve the natural nighttime environment there for the benefit of future generations of Arizonans, and we hope that the IDA designation will help spread the word about the Park and its activities so that Park visitors from all over may enjoy an authentic dark-skies experience for themselves.

We look forward to a long and productive collaboration with Arizona State Parks to protect dark skies both at Oracle and other properties in your system.

Kind regards,

Jim Dougherty, President  
IDA Board of Directors

cc: Mr. Steve Haas (Manager, Oracle State Park)  
Mr. Michael Weasner (Oracle Dark Skies Committee)

**Board of Directors**

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Scott Roberts • USA  
Leo Smith • USA

**IDA Offices**

Hever, Belgium | Turramurra, New South Wales, Australia

## 2.2 New Welcome Sign at the Park

In late 2015 a new Welcome Sign was erected at the entrance to the Kannally Ranch House patio. Among the sign's highlights is the International Dark Sky Park.

# Welcome to Oracle State Park



*The park is a 4,000 acre wildlife refuge in the foothills of the Catalina Mountains with over 15 miles of hiking, biking, and equestrian trails*

### Center for Environmental Education

This property was once part of the **Kannally** family ranch. The Kannally siblings represent one of the earliest cattle ranching families to arrive in Oracle in the early 1900s. The Kannally Ranch House is listed on the **National Register of Historic Places**. Guided tours of their four level Mediterranean-influenced ranch house are offered. Most of the ranch was sold to the Magma Copper Company in the 1950s to become the town of San Manuel, and part of nearby Mammoth.



Hedgehog cactus are small, cylindrical cactus native to the southern United States and Mexico. In spring they make large, beautiful flowers.

The park also serves as an environmental learning center for the public and for visiting school groups who participate in trail programs. These programs explore the oak-grassland habitat and consider the interrelationships between plants, animals and people. The high Sonoran Desert overlaps with oak-grasslands here to create a transition zone filled with a variety of wildlife, including including javelina, bobcat, desert tortoise, gila monster, and great horned owls.

Additionally, the **National Scenic Arizona Trail** passes through the park.

### International Dark Sky Park



In October 2014, the park was awarded **International Dark Sky Park** status by the International Dark-Sky Association (IDA). Founded in 1988, IDA calls attention to the hazards of light pollution and works to protect and preserve the night sky for future generations. Throughout the year, the park hosts evening Star Parties where you can see the wonders of the night sky through telescopes and learn about conserving Arizona's oldest natural resource — dark skies.

### Kannally Ranch House



White-tailed Deer



Arizona State Parks  
AZStateParks.com

### **2.3 IDA Contacts**

Jennifer Rinio, Ranger, Oracle State Park, [jrinio@azstateparks.gov](mailto:jrinio@azstateparks.gov)

Mike Weasner, Chair, Oracle Dark Skies Committee, [mweasner@mac.com](mailto:mweasner@mac.com)

### **2.4 Tier Status Upgrade Plans**

Since receiving the “International Dark Sky Park” designation, Oracle State Park and the Oracle Dark Skies Committee have been working to raise awareness of the issue of Light Pollution using a “Go for the Gold” public outreach approach. The hope is that over time, the current Silver Tier sky can achieve Gold level. When it does, a Tier Status Upgrade will be submitted.

### **2.5 Park Visitors During Past Year**

From October 2015 through September 2016, Oracle State Park had 7000 visitors attend events of various types, a slight increase from the previous year.

Approximately 430 of these visitors attended dark sky related events (e.g. star parties, talks, workshops, “Bat Night”; see Section 8). Poor weather impacted attendance at several events during the past year.

### **3. Park Lighting**

#### **3.1 Lighting Projects in 2016**

No changes were made during the past year to Park lighting.



## 4. Oracle State Park Night Sky Quality

### 4.1 Weather Impacts

Unusually cloudy weather continued to impact southern Arizona in 2015 and 2016. Therefore, only limited opportunities occurred to obtain Sky Quality Measurements during moonless nights at Oracle State Park.

### 4.2 Sky Quality Measurements

Sky Quality Measurements were taken at Oracle State Park on different nights, at various times, and under varying sky conditions. Measurements were made using the Park's Unihedron Sky Quality Meter with Lens (SQM-L), serial number 8530. The meter measures the sky brightness in units of "magnitudes per square arc second". As most astronomers and the knowledgeable public think in terms of "what's the faintest star visible?" the following chart developed by K. Fisher (<http://www.unihedron.com/projects/darksky/images/MPSASvsNELM.jpg>) provides a conversion to visual magnitudes.

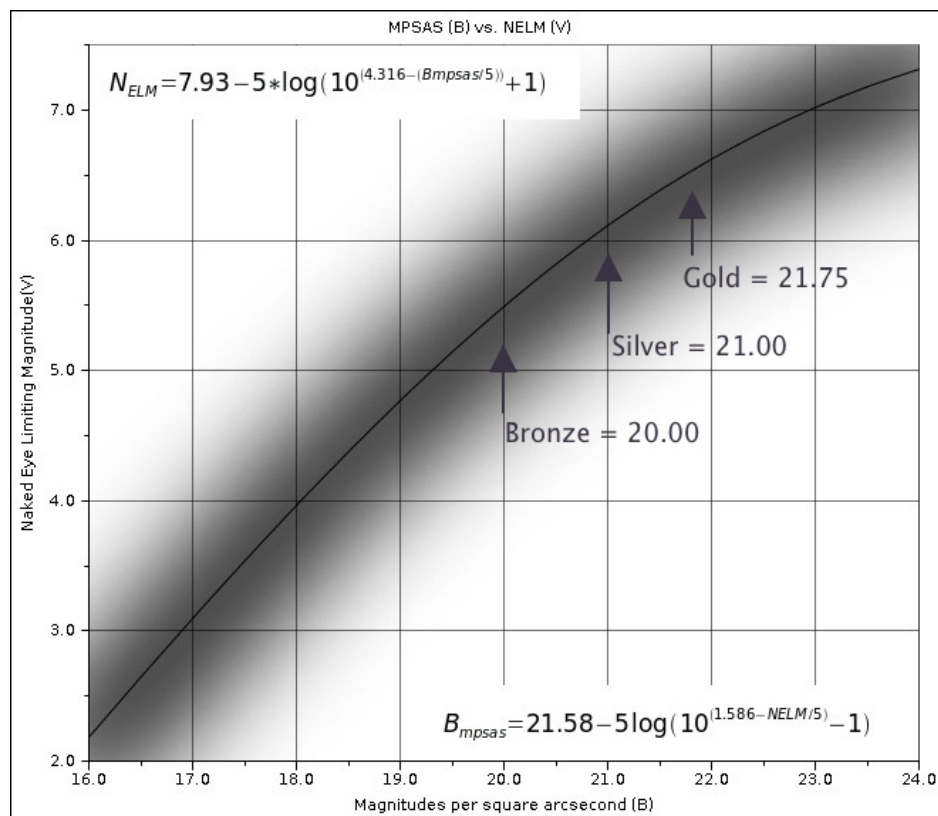


Figure 4.1 Sky Quality Chart vs IDSP Tiers

The "International Dark Sky Park" levels of Gold, Silver, and Bronze have been added to the chart.

Table 4.1 shows the night sky quality measurements taken at the Park from October 2015 through September 2016 (the large gap in 2016 is due to weather and the Moon).

### Oracle State Park - Sky Quality Measurements

Site	Date/Time	Lat/Long	Elevation	Conditions	SQM
AZ Trail Walk-In parking lot	10/01/15 2030 MST	N 32° 37' 17.2" W 110° 44' 47.7"	4290 ft	Clear. Milky Way overhead.	21.17
Kannally Ranch House patio	10/10/15 2100 MST	N 32° 36' 32.4" W 110° 43' 58.9"	4384 ft	Thin clouds. (Measured by IDA)	21.50
AZ Trail Walk-In parking lot	11/05/15 2042 MST	N 32° 37' 17.2" W 110° 44' 47.7"	4290 ft	Clear, some humidity, some thin clouds west/south	21.07
AZ Trail Walk-In parking lot	12/29/15 2026 MST	N 32° 37' 17.2" W 110° 44' 47.7"	4290 ft	Clear	21.27
AZ Trail Walk-In parking lot	02/04/16 1950 MST	N 32° 37' 17.2" W 110° 44' 47.7"	4290 ft	Clear, Zodiacal Light visible to near Zenith, Winter Milky Way	21.16
Kannally Ranch House patio	09/22/16 2330 MST	N 32° 36' 32.4" W 110° 43' 58.9"	4384 ft	Clear, high humidity	21.46
Kannally Ranch House patio	09/25/16 2330 MST	N 32° 36' 32.4" W 110° 43' 58.9"	4384 ft	Clear	21.79

Table 4.1 Oracle State Park Sky Quality Measurements

During the time frame of SQM readings the overall average SQM at Oracle State Park was 21.35, which is consistent with the previous year's report. The darkest sky during the period was 21.79. This sky quality maintains Oracle State Park in the Silver tier range. For reference, the sky quality measurements documented in the 2014 Nomination Package was an average of 21.37, with the darkest reading at 21.46.

Sky Quality Measurements will continue to be done at the Park when conditions permit using the Park's Unihedron SQM-L, serial number 8530. To increase the number of readings, the on-site Park Ranger will be taking the SQM readings for inclusion in next year's report.

### 4.3 Night Sky Photographs

The Milky Way photograph on the cover of this report is actually a magnet now on sale in the Oracle State Park gift shop. The original photograph was by Mike Weasner, Chair, Oracle Dark Skies Committee, local amateur astronomer, and IDA member.

The same photograph was also used by Arizona State Parks to create this postcard, also available in the gift shop:



Oracle State Park, Center for Environmental Education, is a 4,000 acre wildlife refuge with over 15 miles of hiking trails that wind through the high desert oak-grasslands in the Catalina Mountain foothills northeast of Tucson. A section of the National Scenic Arizona Trail also transects the park.

The property once belonged to one of the earliest cattle ranching families in Oracle, and includes a unique Mediterranean and Moorish style ranch house listed on the National Register of Historic Places. Constructed between 1929-33, the adobe house was built four levels up the hillside.

Recognized as an International Dark Sky Park, Oracle State Park offers exceptional stargazing opportunities.

Place  
Postage  
Here

Name / Address Here



Online Reservations 24/7 at  
**AZStateParks.com**  
Or Call Reservation Center at  
(520) 586-2283

Like & Follow  
AZStateParks



Photo Courtesy of Mike Weasner



The following photograph of the night sky at Oracle State Park, taken at an event by Mike Weasner, shows a green laser pointer being used to point out stars.




Unfortunately, most night events had skies like this, 25 June 2016:



## 5. Conservation and Research

### 5.1 Climate and Weather Data

The Park collects weather data daily throughout the year from a weather station near the Kannally Ranch House. This data is submitted to the National Oceanic and Atmospheric Administration (NOAA) and is used by researchers to monitor long-term changes in the local climate. This is the data that was submitted during September 2016:

 In cooperation with the National Weather Service, Regional Climate Centers, and National Climatic Data Center

WxCoder > Home > My Observations > Monthly

Sun, Sep 25, 2016 04:34PM MST | [Site Status](#) | [Site Map](#) | [Contact NWS](#) | [Help](#) | [Sign Out](#)

**Oracle State Park, AZ (02-6117-06, OSPA3)**

[Download this B-91 as pdf](#) | Open online B-91 for: Jan 2016 Open

**Online B-91 for Sept. 2016**

		TEMPERATURE				PRECIPITATION				WEATHER							RIVER STAGE																						
		24 HRS		AT OBS	24 HRS			Time of occurrence											Check box for all types occurring each day							Gage Reading													
lock	Day	Max	Min	At obs	Rain	Accum.	Snow	Depth	Time of occurrence											F	IP	G	T	H	DW	Gage Reading													
	1	92	70	75	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	2	92	63	84	0.44	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	3	88	60	69	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	4	92	53	78	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	5	92	55	87	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	6	94	57	M	M	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	7	88	63	M	M	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	8	94	57	67	1.20	3			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	9	79	67	77	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	10	86	70	79	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	11	90	62	75	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	12	88	64	70	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	13	83	56	81	0.43	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	14	83	56	69	0.23	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	15	84	54	68	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	16	83	51	M	M	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	17	84	52	77	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	18	86	53	76	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	19	91	58	82	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	20	90	65	79	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	21	83	60	81	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	22	88	56	76	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	23	84	61	67	0.08	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	24	84	45	60	0.01	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	25	77	45	60	0.00	1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	26					1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	27					1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	28					1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	29					1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
	30					1			12	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11							
sum/avg		87.0	58.1	74.4	2.39		0.0		Sum: rain & snowfall. All others are averages.																														



## 5.2 Phenology Data

The Park documents seasonal changes that occur in local plants and animals to monitor timing of these changes and the effects of climate and weather on the Park's habitat. Park Rangers and volunteers complete the following form during walkabouts at the Park:

### NATURE'S NOTEBOOK PLANT DATASHEET

#### What is Phenology

Phenology is the study of recurring plant and animal life cycle events, such as leafing and flowering of plants, emergence of insects, and migration of birds. Many of these events are sensitive to climate and are simple to observe.

#### What is Nature's Notebook

Nature's Notebook is a national plant and animal phenology observation program. You can join thousands of other individuals who are providing valuable observations that scientists, educators, policy makers and resource managers are using to understand how plants and animals are responding to climate change and other environmental changes. Your observations will make a difference!

#### How to participate

Enjoy a stroll along Oracle State Park's Granite Overlook Trail and look for signs identifying the Nature's Notebook plant species.

- Look for the **wooden signs with green painted edges** that indicate the observable plants.
- There are 10 plants on this datasheet - observe as many as you like.
- Use the form to record your observations. Record the date and time at the top. Observe the plant and record whether or not each phenophase description is occurring {yes (y), no (n), or uncertain (?)}.  
\*\*\*\*\*
- When you finish, return the binder and datasheet to the Main Office.

Date: \_\_\_\_\_ Time: \_\_\_\_\_

<b>1. Netleaf Hackberry</b>  Do you see. . ? Young leaves    y   n   ? Falling leaves    y   n   ? Flowers or flower buds    y   n   ? Open flowers    y   n   ? Pollen Release    y   n   ? Fruits    y   n   ? Ripe Fruits    y   n   ? Recent fruit or seed drop    y   n   ?  Comment:		<b>2. Velvet Mesquite</b>  Do you see. . ? Leaves    y   n   ? Flowers    y   n   ? Pollen release    y   n   ? Fruits    y   n   ? Recent fruit or seed drop    y   n   ?  Comment:	
<b>3. Emory Oak</b>  Do you see. . ? Leaves    y   n   ? Falling Leaves    y   n   ? Flowers    y   n   ? Pollen release    y   n   ? Fruits    y   n   ? Recent fruit or seed drop    y   n   ?  Comment:		<b>4. Buckbrush</b>  Do you see. . ? Young leaves    y   n   ? Flowers or flower buds    y   n   ? Open flowers    y   n   ? Fruits Ripe fruits    y   n   ? Recent fruit or seed drop    y   n   ?  Comment	

<b>5. Pointleaf Manzanita</b>	Do you see. . ? Breaking leaf buds y n ? Young leaves y n ? Flowers or flower buds y n ? Open flowers y n ? Fruits y n ? Ripe Fruits y n ? Recent fruit or seed drop y n ? Comment:	<b>6. Arizona White Oak</b>	Do you see. . ? Leaves y n ? Falling Leaves y n ? Flowers y n ? Pollen release y n ? Fruits y n ? Recent fruit or seed drop y n ? Comment:
<b>7. Soaptree Yucca</b>	Do you see. . ? Flowers or flower buds y n ? Open flowers y n ? Fruits y n ? Ripe Fruits y n ? Recent fruit or seed drop y n ? Comment:	<b>8. Beargrass</b>	Do you see. . ? Flowers or flower buds y n ? Open flowers y n ? Fruits y n ? Ripe Fruits y n ? Recent fruit or seed drop y n ? Comment:
<b>9. Sotol - Desert Spoon</b>	Do you see. . ? Flowers or flower buds? y n ? Open flowers? y n ? Fruits? y n ? Ripe fruits? y n ? Recent fruit or seed drop? y n ? Comment:	<b>10. One-Seed Juniper</b>	Do you see. . ? Pollen Cones y n ? Open Pollen Cones y n ? Pollen Release y n ? Unripe Seed Cones y n ? Ripe Seed Cones y n ? Recent fruit or seed drop y n ? Comment:

- To learn more about Natures Notebook or to create your own account and observation deck from home, visit [www.usanpn.org/natures\\_notebook](http://www.usanpn.org/natures_notebook).

The data is submitted to the USA National Phenology Network as part of the Nature's Notebook Project ([https://www.usanpn.org/natures\\_notebook](https://www.usanpn.org/natures_notebook)).

“Phenology Days” have been conducted at the Park. This is a flyer from one held in late 2015:

# **TODAY @ NOON**

In the Kannally Ranch House Living room,  
followed by optional short trail walk

## **PHENOLOGY DAYS**

Phenology refers to key seasonal changes  
in plants and animals from year to year –

*such as flowering, emergence of insects and migration of birds –  
especially their timing and relationship with weather and climate.*

Join LoriAnne Barnett

Education Coordinator for the USA National Phenology Network, to  
learn about a new ‘Citizen Scientist Project’ at Oracle State Park.

**30-40 minute talk,**

**followed by a trail walk at 1pm**

along OSP’s new Phenology Observation Trail.

This presentation is part of a larger Phenology Days week-long  
celebration of seasonal change in the Sonoran Desert

### 5.3 Bat Research

A “bat acoustical monitoring station” has been approved for installation at the Park. It will be used by bat researchers and will be documented in the 2017 Annual Report.

## **6. Funding**

Not applicable for 2016.

## 7. Arts and Culture

### 7.1 Art of Astrophotography

Adam Block, Mt Lemmon SkyCenter, exhibited some of his astrophotography in the Oracle State Park Kannally Ranch House living room in late 2015 (see Section 8).



## 8. Outreach

### 8.1 Star Party with Telescopes and Live Music

On 10 October 2015, before dark there was live music on the Ranch House patio with Michael P. and the Gullywashers of Tucson, performing Soul and Funk, with a Surf instrumental twist. Then there was stargazing on the Kannally Ranch House patio with telescopes provided by Tucson Amateur Astronomy Association, Saddlebrooke Stargazers Club, and the International Dark-Sky Association.







## 8.2 Beginner Digital Astrophotography Workshop

On 17 October 2015, local amateur astronomer Mike Weasner conducted an introductory digital astrophotography workshop that included a description of camera equipment options, such as point-and-shoot, DSLR, or any smart phone.



Mike shared techniques for beginners so they could take astro photos using any digital camera for hand-held photography at night as well as with a tripod or telescope. There was to have been a 'play session' after sunset using moon and planets for night sky photography using one of the Park's telescopes, but clouds and storms in the area prevented that.

## 8.3 Mt Lemmon SkyCenter Astrophotography Exhibit

Adam Block of the University of Arizona's Mt Lemmon SkyCenter is recognized around the world as a leading astrophotographer. The images he produces as part of public outreach programs are published in magazines, books, posters and widely on the Internet. He was the 2012 recipient of the Hubble Award among several notable highlights to his career. Oracle State Park was honored to have six of his out-of-this-world images on display at the Kannally Ranch House from 7 November 2015 to 20 December 2015.

An Exhibit Grand Opening was held on 7 November. Mike Weasner, local amateur astronomer, astrophotographer, and Chair of the Oracle Dark Skies Committee, gave



an introduction to astrophotography and Block's work. The Oracle Dark Skies Committee provided refreshments.



On 20 December 20, Adam Block gave a presentation and film about his astrophotography at the Park.



#### 8.4 “Adventures with the Moon” Evening Interpretative Program

The Moon, Earth’s only natural satellite, with its mystery and intrigue continues to provide interest to Earth’s humans. On 23 January 2016, Oracle State Park volunteer, Dick Boyer, took Park visitors to the Moon and back through interactive family friendly activities and displays. Telescope viewing, hosted by the Oracle Dark Skies Committee, had been planned beginning at sunset, however cloudy skies prevented it. This is the rising Moon obscured by clouds:



The clouds did not detract from the excellent evening program presented by Dick Boyer, assisted by his wife Dorothy.







### 8.5 Celebrate Connections to Nature

This special Event at Oracle State Park on 5 March 2016 was to Celebrate Connections to Nature. Activities included:

- “Beginner Digital Astrophotography” Workshop, given by Park volunteer Mike Weasner.
- Hike on the Nature Trail with “Signs and Sounds”, visiting the new educational signage along the one-mile trail highlighting wildlife, vegetation, geology and water resources of the park, while enjoying the sounds of live instrumental music featuring violin, mandolin, flute, drums and guitar.
- Star Party to celebrate Oracle State Park becoming an IDA “International Dark Sky Park” in 2014, the first in the Arizona State Parks system. Tucson Amateur Astronomy Association had planned to provide telescopes and interpretation of night-sky objects.
- Kids’ activities throughout the day included skull identification and making dials to tell time by the sun and stars.

Unfortunately, the star party was clouded out:





### 8.6 Arizona Trail Workgroup Star Party

The Oracle Dark Skies Committee supported a star party at Oracle State Park for volunteers of the Arizona Trail Association on 19 March 2016. Many of the volunteers took advantage of the early evening clear sky and enjoyed some good views of the waxing gibbous Moon, the Orion Nebula, and Jupiter and its four Galilean Moons. The Park's Explore Scientific 152mm refractor was used this night, seen here aimed at the Moon shortly after being set up:



The volunteers also learned some things about the night sky, why it is important to protect it, and how Oracle State Park became an IDA "International Dark Sky Park" in 2014. Clouds began interfering with the views about 8:30 PM. The star party ended at 9:30 PM.



### 8.7 Special Talk “The Lost Constellations”

On 9 April 2016 Oracle State Park celebrated International Dark Sky Week with a program by Dr. John C. Barentine from the International Dark-Sky Association. Dr. Barentine presented a talk on “lost constellations” with a slideshow presentation in the Kannally Ranch House living room.



The talk was followed by a “constellation tour” outside. A Star Party was held with telescopes courtesy of the Saddlebrooke Skygazers Club.



### 8.8 Live Music and Star Party

The Oracle Fire Department message display announced this event to be held on 25 June 2016:



The music was a success but cloudy skies cancelled the star party:



Visitors kept asking if the sky would clear up for the Star Party. Unfortunately, although many people waited until past 9 PM, the sky never cleared sufficiently to begin telescope use. However, many visitors did watch a demonstration given by the Oracle Dark Skies Committee of one of the effects of Light Pollution.

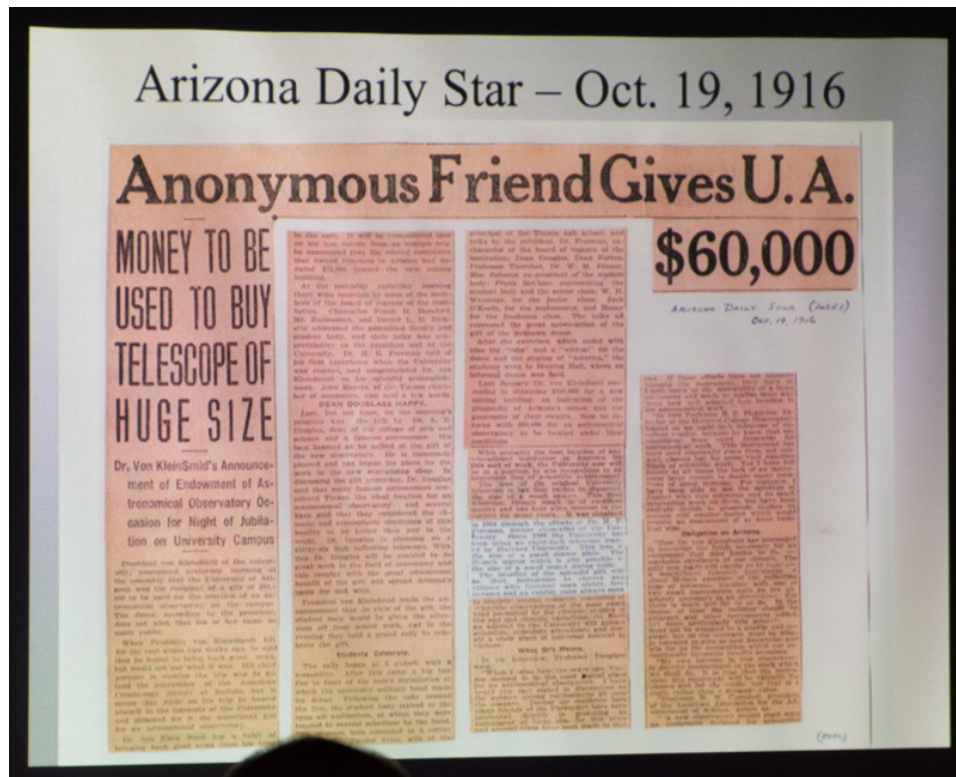


### 8.9 Star Party and Guest Speaker

On 10 September 2016, Dr. Thomas A. Fleming, gave a presentation on the history of the Steward Observatory to a packed room. The Steward Observatory is the research arm of the Department of Astronomy at the University of Arizona in Tucson. 2016 marks their centennial celebration.



In 1916, Mrs. Lavinia Steward of Oracle, Arizona, was a wealthy widow with an interest in astronomy. She memorialized her husband's name with a generous donation to the University to be used to purchase 'a telescope of huge size'.



Before the talk, the weather at the Park did not look good with a Monsoon storm approaching:





However, by the end of the talk, the sky was mostly clear and the Tucson Amateur Astronomy Association, the Oracle Dark Skies Committee, and the Park set up telescopes for public nighttime sky viewing at the Ranch House. Here a member of the ODSC explains the live view of the Moon as seen on a video monitor to a group of fascinated Park visitors:



The last of the Park's visitors left about 9:30 PM.

#### **8.10 Live Music Concert and Star Party in the Park**

On 25 September 2016, Heather "Lil Mama" Hardy, described as a soulful female electronic blues violinist, and her band performed to 50 Park visitors on the upper patio of the Kannally Ranch House. Some clouds threatened during the afternoon but the sky began clearing as the time of the event approached.

The Oracle Dark Skies Committee set up an information table and a telescope along with one of the Park's telescopes:



After the band completed its last number at 6pm to the excited and well-entertained Park visitors, Mike Weasner of the Oracle Dark Skies Committee made an announcement about an upcoming event and reminded everyone of telescope viewing after sunset.

As the Sun set the two telescopes were initially pointed at the planet Venus, providing several of the visitors the opportunity to see the planet that was shining brightly in the western sky. As the evening progressed, the planets Saturn and Mars were also viewed through the telescopes. The last remaining Park visitors were thrilled to be viewing these objects in the sky, and reluctantly had to leave at 7pm, thus ending the star party.



## 9. Community and Media Relations

### 9.1 Oracle Dark Skies Committee

The Oracle Dark Skies Committee continued to do local and county-wide dark sky awareness activities to ensure preservation of the dark sky at Oracle State Park and elsewhere in 2016. The Committee continued to hold its monthly meetings at Saddlebrooke Ranch to bring in additional members from the nearby community. Additional meeting locations will be added in late 2016 and into 2017 to bring in even more members.

On 25 July 2016, Mike Weasner, Chair of the Oracle Dark Skies Committee and Dr. John Barentine, International Dark-Sky Association, gave a presentation to the Arizona State Parks Executive Director, Sue Black, and some of her staff:



The Committee also developed a tri-fold brochure in 2016 to hand out at public outreach events. The brochure is also available at the Oracle State Park and at the Tri-Community Visitor Center in Oracle.



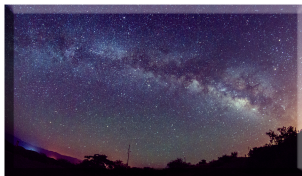
In October 2014,  
ORACLE STATE PARK  
Center for Environmental Education  
was selected as the 20th

"INTERNATIONAL DARK SKY PARK"  
in the world and the first within the  
Arizona State Parks system.

<http://azstateparks.com/Parks/ORAC>



#### MILKY WAY OVER ORACLE STATE PARK



YOU CAN HELP PROTECT THIS VIEW!

#### WHAT IS LIGHT POLLUTION?

Any outdoor lighting (business, residential, and government) that is:

- \* Aimed outward or upward
- \* Unshielded with visible bulb
- \* Brighter than necessary
- \* Shines beyond needed area
- \* Turned "on" when it could be "off"

#### WHAT ARE LIGHT NUISANCE and LIGHT TRESPASS?

Light that infringes on a neighbor's home or property and is considered a "nuisance" and "trespasses" onto their property.

#### LIGHT POLLUTION HAS WIDESPREAD EFFECTS!

##### PRESERVATION OF OUR NIGHT SKY SUPPORTS: HUMAN HEALTH

The medical profession now recognizes that light pollution negatively impacts human health and has been implicated as a contributing factor in many chronic diseases (e.g., cancer, Parkinson's, Alzheimer's, obesity, high blood pressure).

##### ARIZONA'S ECONOMY

Light pollution threatens \$300 Million of revenue that astronomy brings to Arizona annually.

##### ENERGY CONSERVATION

Three billion dollars of energy costs are wasted on light pollution annually in the US alone. Wasted energy costs impact you, the consumer.

##### SAFETY

Ineffectively shielded and improperly lit areas create unsafe conditions (e.g. traffic & pedestrian hazards, increased criminal opportunities).

##### WILDLIFE

Light pollution negatively affects the natural day/night, seasonal, and migration cycles of many species of wildlife.

##### CULTURAL HERITAGE

Many cultures honor the night sky. Encroaching light pollution threatens dark skies that are part of everyone's heritage.

To learn more about light pollution see:  
<http://www.darksky.org>

#### HOW CAN I HELP?

Use smart outdoor lighting per the Pinal County Outdoor Lighting Code 2.195. Some examples:

**BEST:** Full-cutoff pole-mounted and building-mounted luminaires. The lamp is completely recessed into the luminaire, and the lens is flat. No light is produced above the horizontal.



**OK:** Cutoff pole-mounted and building-mounted luminaires. The lamp is completely recessed into the luminaire, but the lens sags/curves downward. Up to 2.5% of the light is produced above the horizontal.



**POOR:** Semi-cutoff pole-mounted and building-mounted luminaires. The lamp visibly protrudes downward into a sag/curved lens. Up to 5.0% of the light is produced above the horizontal.



**VERY POOR:** Non-cutoff pole-mounted and building-mounted luminaires (which are not allowed under this code). The lamp is substantially exposed. Little or no attempt is made to control the light produced above the horizontal.



In April 2014, the  
ORACLE DARK SKIES COMMITTEE  
formed to pursue the designation of

"INTERNATIONAL DARK SKY PARK"  
for

ORACLE STATE PARK  
Center for Environmental Education

Having achieved this goal, the  
Oracle Dark Skies Committee  
continues their mission to preserve  
Arizona's oldest natural resource:  
THE NIGHT SKY.



<http://www.weasner.com/ODSC>

#### ELIMINATING LIGHT POLLUTION DOES NOT MEAN "NO LIGHTS"

Be smart in your use of outdoor lights and light fixtures.

You can easily check your home or business for improper lighting. Stand at various places along your property line at night with your outdoor lighting turned ON. Can you see the bulbs? Is the light casting strong shadows on and outside of your property? Is your light illuminating your neighbor's land or home or business? Is your lighting aimed upward or horizontally?

If your fixtures are "POOR" or "VERY POOR" per the Pinal County code, please consider replacing them. Dark Sky compliant lighting fixtures are available at Home Depot and Lowe's. Alternatively, simple "shields" can be added to existing fixtures to prevent your light from going beyond your property. Properly shielded lighting can reduce your electricity costs because you can lower the wattage of the bulbs you use.

Turn OFF or DIM your lights when not needed.

#### WHAT ABOUT LEDs?

LEDs can save on energy costs due to their long lifetime and reduced energy need. However, they can be exceedingly bright and emit harmful "blue light". The use of shielded low brightness lights with "warm" or "orange" LEDs is better for you and the environment.



## 9.2 Circle K Convenience Store

As part of its work in 2014 during development of the Oracle State Park IDSP Nomination Package, the manager of a Circle K Convenience Store in Oracle was contacted regarding lighting at the store. The lighting of concern illuminated the pump area and, while compliant with the Pinal County Outdoor Lighting Code 2.195 under the “grandfathered” clause, it was not compliant to the revised code and not dark sky compliant as there were unshielded lights that extended below the ceiling. As a result of the Oracle Dark Skies Committee working with the Arizona Circle K Regional Office in Phoenix, the lights were upgraded to dark sky compliant lighting in early 2016 with dramatic affect, as seen in these before and after photos:



## 10. Miscellaneous Materials

### 10.1 IDA Dark Sky Defender Award 2015

Mike Weasner, Chair, Oracle Dark Skies Committee, was recognized for his efforts to protect dark skies with an International Dark-Sky Association “Dark Sky Defender” award for 2015. Here is Dr. John Barentine, IDA (left), presenting the Award to Mike (right):



### 10.2 Friends of Oracle State Park

The Friends of Oracle State Park is a membership group that provides ongoing support and volunteers to both Oracle State Park and the Oracle Dark Skies Committee. The dedication of this group to dark sky activities is notable and much appreciated.

## 11. Document Revisions

0.1	6 September 2016	Initial Committee review draft
0.2	13 September 2016	Arizona State Parks review draft
1.0	26 September 2016	Final version for submittal to IDA