Night Sky Protection and Restoration in U.S. National Parks

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A Landscape-Scale Partnership for Night Skies Conservation

Dan Duriscoe - NPS

COLORADO PLATEAU
DARK SKY COOPERATIVE

NPS Night Sky Program

So…you want to start a Dark Sky Cooperative?

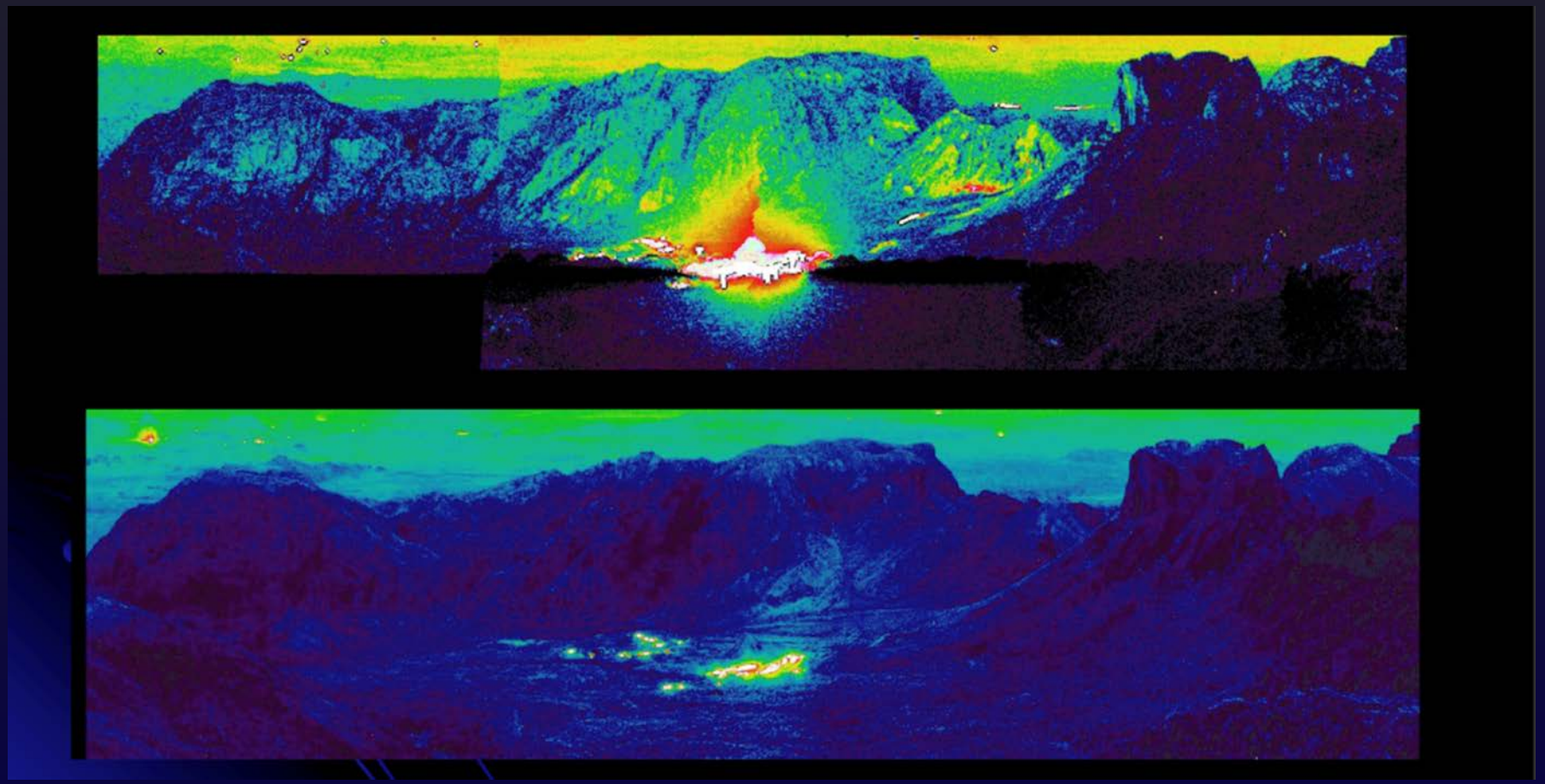
- Call to Action #27 – Starry Starry Night
- NPS is the leader
- America's first Dark Sky Cooperative

Tim Hanko

A <u>voluntary</u> effort to link communities, tribes, businesses, state agencies, federal agencies, and citizens…

…in a collaborative effort to celebrate the view of the cosmos,…

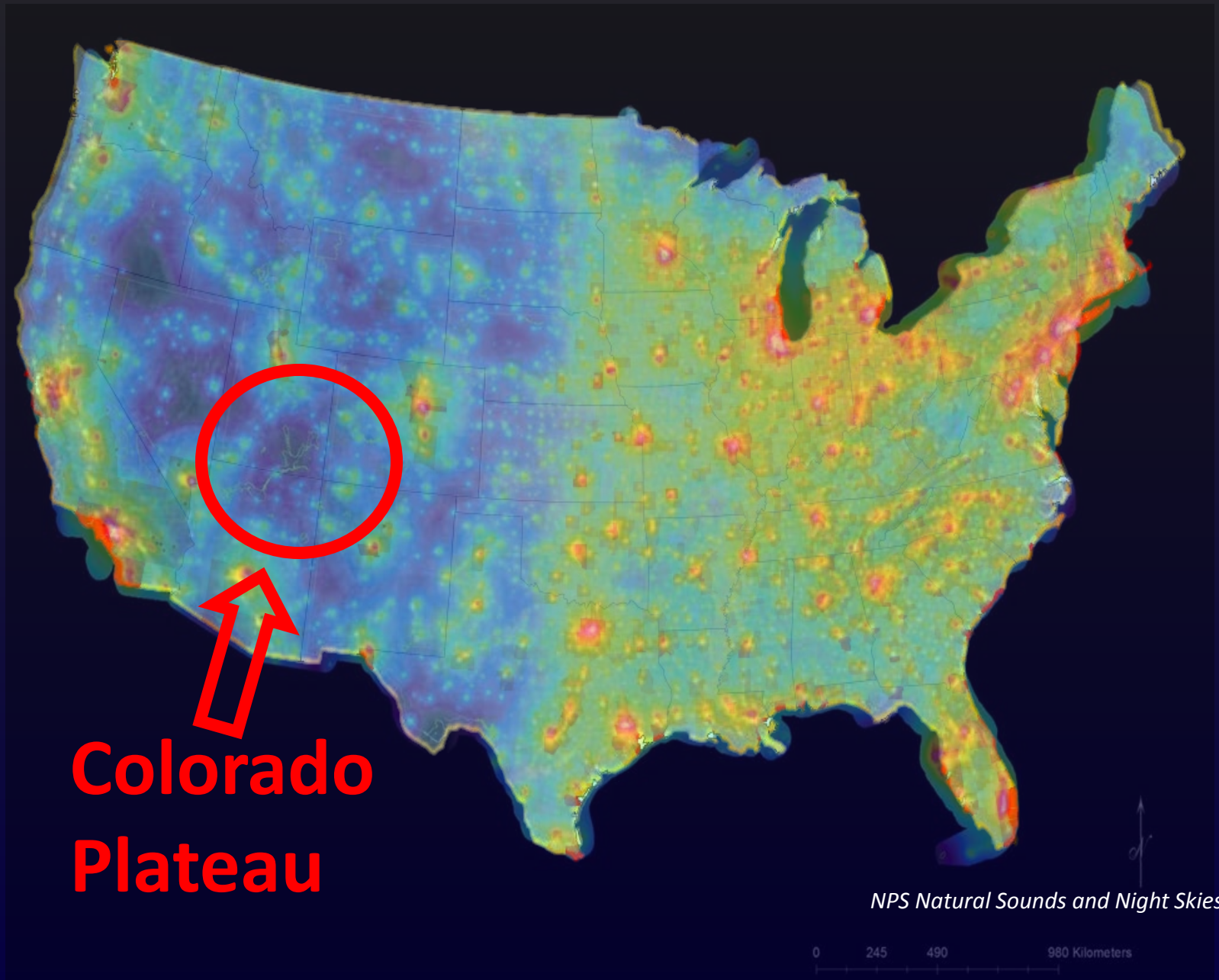
…minimize the impact of outdoor lighting,…

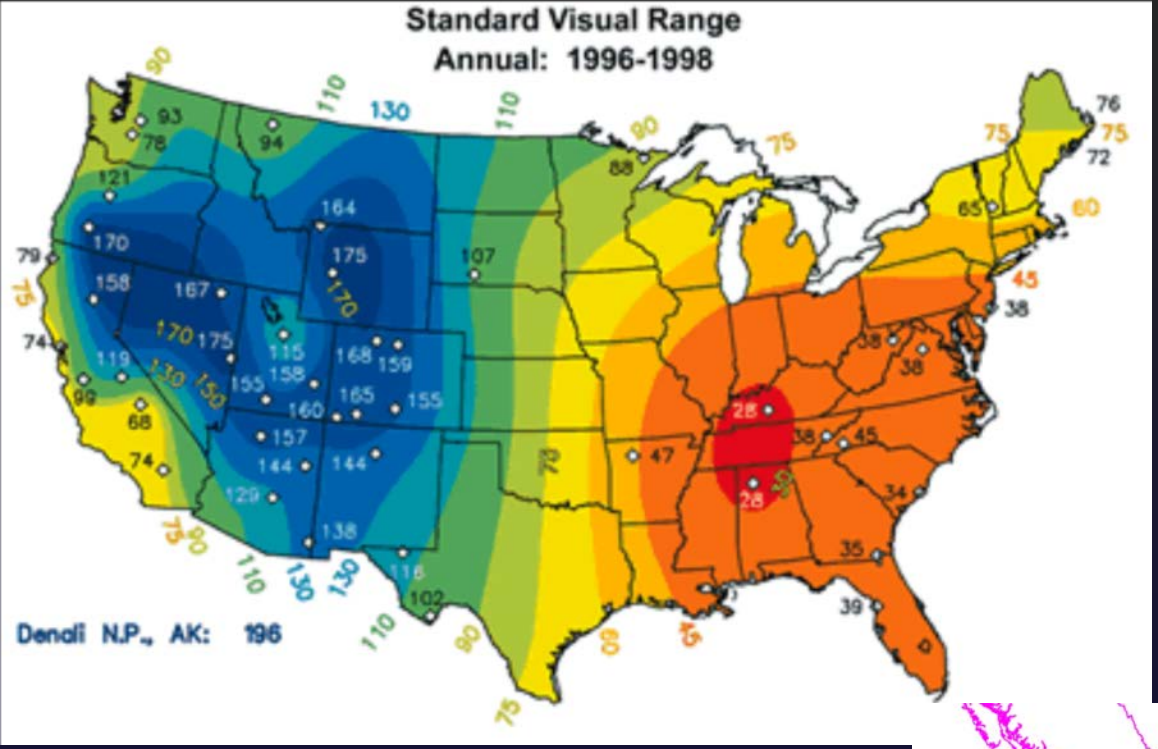


NPS Natural Sounds and Night Skies Division

…and ultimately restore natural darkness to the area.

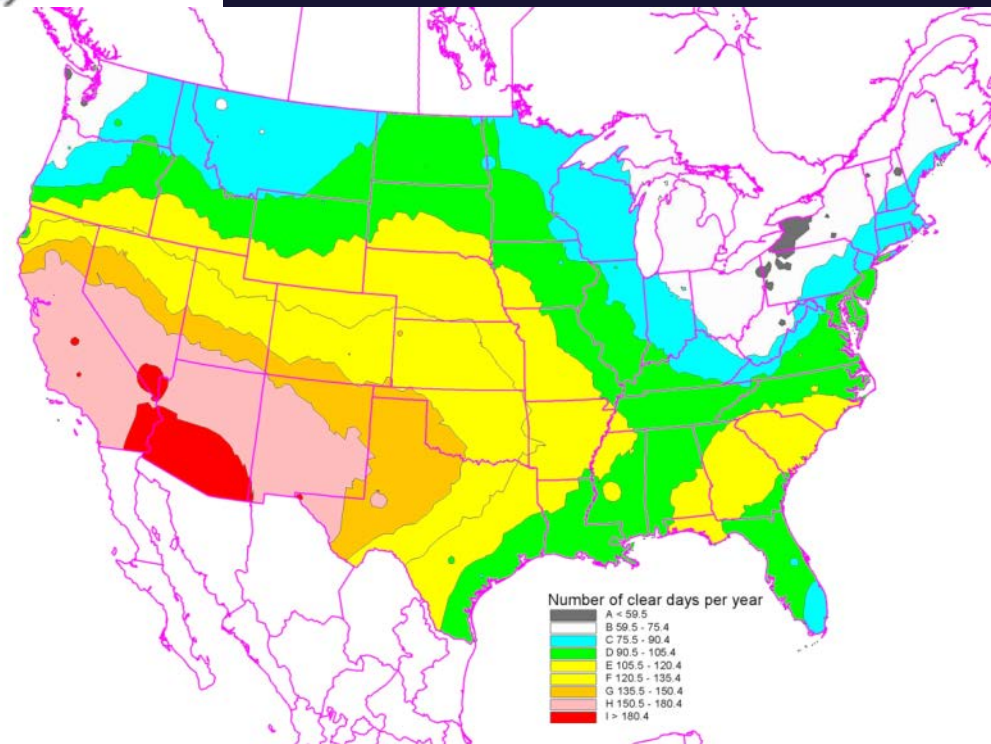
Why the Colorado Plateau?

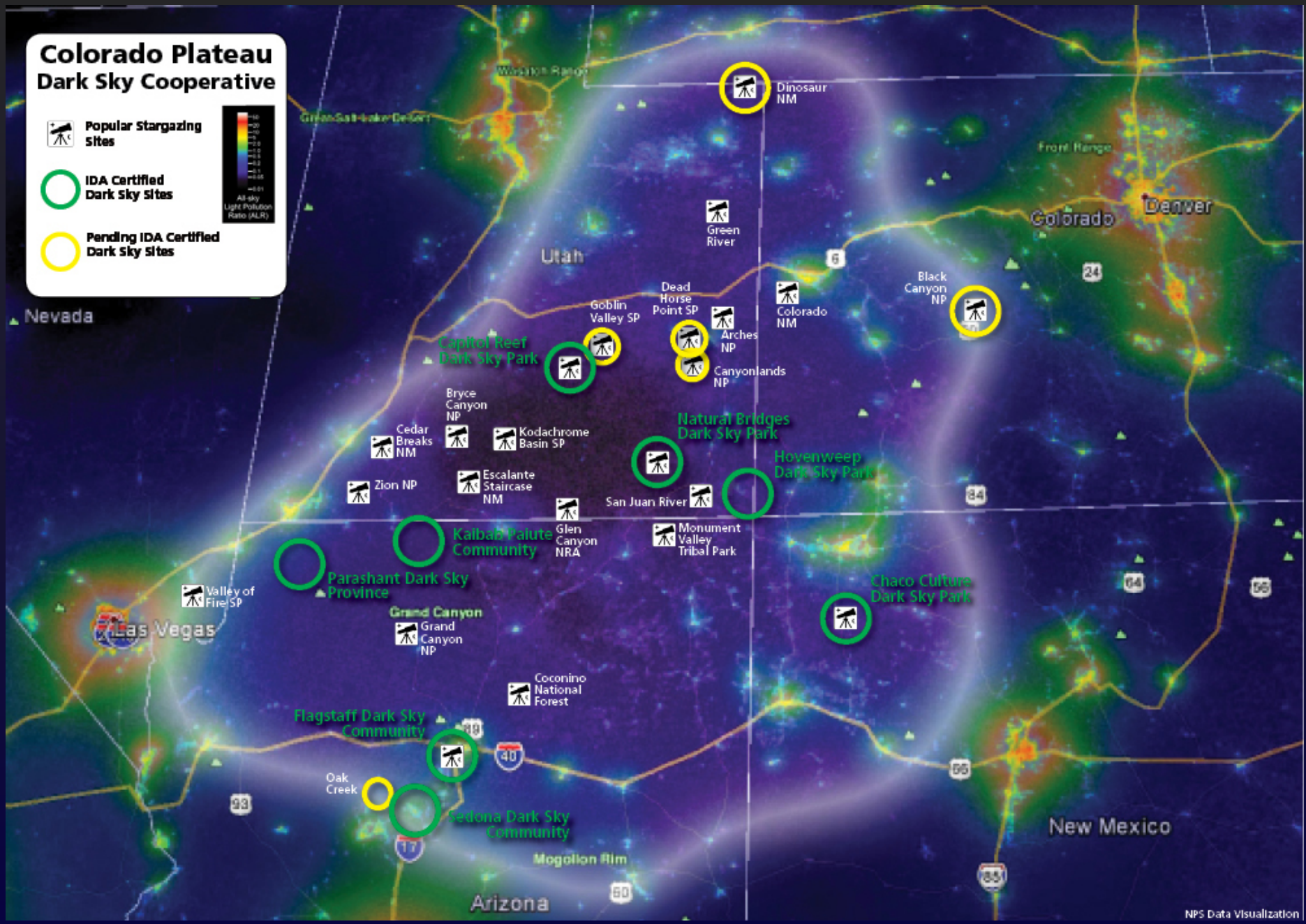

Colorado
Plateau
NPS Natural Sounds and Night Skies Division
0
245
490
980 Kilometers

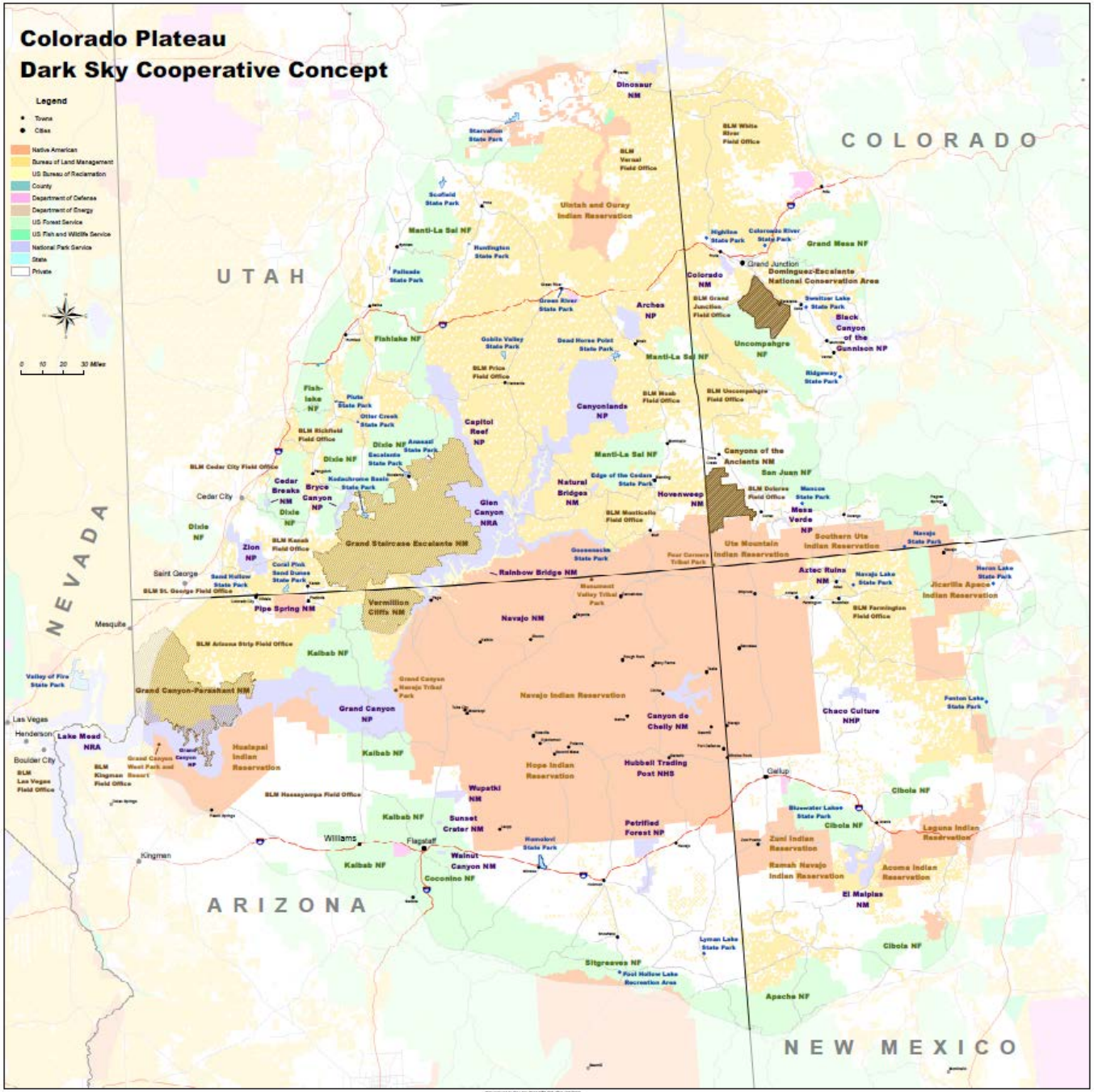


- High Elevation
- Low Precipitation
- # of clear days
- Clear, unpolluted air

- Low population density
- Dramatic landscape
- Worldwide visibility
- Large amount of public land




Colorado Plateau
Dark Sky Cooperative
Popular Stargazing Sites
IDA Certified Dark Sky Sites
Pending IDA Certified Dark Sky Sites
All-sky Light Pollution Ratio (ALR)
Dinosaur NM
Green River
Utah
Nevada
Colorado
Denver
Front Range
Black Canyon NP
Colorado NM
Goblin Valley SP
Dead Horse Point SP
Arches NP
Canyonlands NP
Capitol Reef Dark Sky Park
Bryce Canyon NP
Cedar Breaks NM
Kodachrome Basin SP
Natural Bridges Dark Sky Park
Hovenweep Dark Sky Park
Escalante Staircase NM
Zion NP
San Juan River
Glen Canyon NRA
Monument Valley Tribal Park
Kaibab Paiute Community
Parashant Dark Sky Province
Valley of Fire SP
Las Vegas
Grand Canyon
Grand Canyon NP
Chaco Culture Dark Sky Park
Coconino National Forest
Flagstaff Dark Sky Community
Oak Creek
Sedona Dark Sky Community
Mogollon Rim
Arizona
New Mexico
NPS Data Visualization


Colorado Plateau
Dark Sky Cooperative Concept
Legend
Towns
Cities
Native American
Bureau of Land Management
US Bureau of Reclamation
County
Department of Defense
Department of Energy
US Forest Service
US Fish and Wildlife Service
National Park Service
State
Private
0 10 20 30 Miles
COLORADO
UTAH
NEVADA
ARIZONA
NEW MEXICO
Dinosaur NM
Starvation State Park
BLM White River Field Office
BLM Vernal Field Office
Uintah and Ouray Indian Reservation
Scofield State Park
Manti-La Sal NF
Huntington State Park
Palisade State Park
Highline State Park
Colorado River State Park
Grand Mesa NF
Grand Junction
Dominguez-Escalante National Conservation Area
Colorado NM
BLM Grand Junction Field Office
Sweitzer Lake State Park
Black Canyon of the Gunnison NP
Uncompahgre NF
Ridgway State Park
Arches NP
Green River State Park
Fishlake NF
Gobbs Valley State Park
Dead Horse Point State Park
BLM Price Field Office
BLM Moab Field Office
BLM Uncompahgre Field Office
Canyonlands NP
Fish-lake NF
Piute State Park
Otter Creek State Park
BLM Richfield Field Office
Capitol Reef NP
Dixie NF
Anasazi State Park
Escalante State Park
Kodachrome Basin State Park
BLM Cedar City Field Office
Cedar Breaks NM
Bryce Canyon NP
Cedar City
Dixie NF
Glen Canyon NRA
Natural Bridges NM
Edge of the Cedars State Park
Hovenweep NM
BLM Monticello Field Office
Canyons of the Ancients NM
San Juan NF
BLM Dolores Field Office
Mesa Verde NP
Mancos State Park
Dixie NF
Zion NP
BLM Kanab Field Office
Grand Staircase Escalante NM
Coral Pink Sand Dunes State Park
Saint George
Sand Hollow State Park
BLM St. George Field Office
Pipe Spring NM
Vermillion Cliffs NM
Gooseneck State Park
Four Corners Tribal Park
Ute Mountain Indian Reservation
Southern Ute Indian Reservation
Navajo State Park
Rainbow Bridge NM
Monument Valley Tribal Park
Aztec Ruins NM
Navajo Lake State Park
Heron Lake State Park
Jicarilla Apache Indian Reservation
BLM Farmington Field Office
Navajo NM
Mesquite
BLM Arizona Strip Field Office
Kaibab NF
Valley of Fire State Park
Grand Canyon-Parashant NM
Grand Canyon Navajo Tribal Park
Navajo Indian Reservation
Canyon de Chelly NM
Chaco Culture NHP
Pinton Lake State Park
Las Vegas
Henderson
Lake Mead NRA
Grand Canyon West Park and Resort
Grand Canyon NP
Hualapai Indian Reservation
Grand Canyon NP
Kaibab NF
Hubbell Trading Post NHS
Hope Indian Reservation
Boulder City
BLM Las Vegas Field Office
BLM Kingman Field Office
BLM Hassayampa Field Office
Wupatki NM
Gallup
Cibola NF
Bluewater Lakes State Park
Laguna Indian Reservation
Zuni Indian Reservation
Ramah Navajo Indian Reservation
Acoma Indian Reservation
Kaibab NF
Sunset Crater NM
Petrified Forest NP
Homolovi State Park
Williams
Flagstaff
Kingman
Kaibab NF
Walnut Canyon NM
Coconino NF
El Malpias NM
Lyman Lake State Park
Sitgreaves NF
Pool Hollow Lake Recreation Area
Apache NF

Clear Air and Magnificent Skies

- Search “Clear Air and Magnificent Skies (Utah)”

AND

- “Grand Canyon In Depth Night Sky”

International Dark Sky Parks / Places

Importance of Interpretation and Events

Education


National Park Service
U.S. Department of the Interior
Midwest Region
An explorer's activity guide for ages 5 to 12
Junior Ranger
Night Explorer

Examples of night sky-related park contacts (2014):

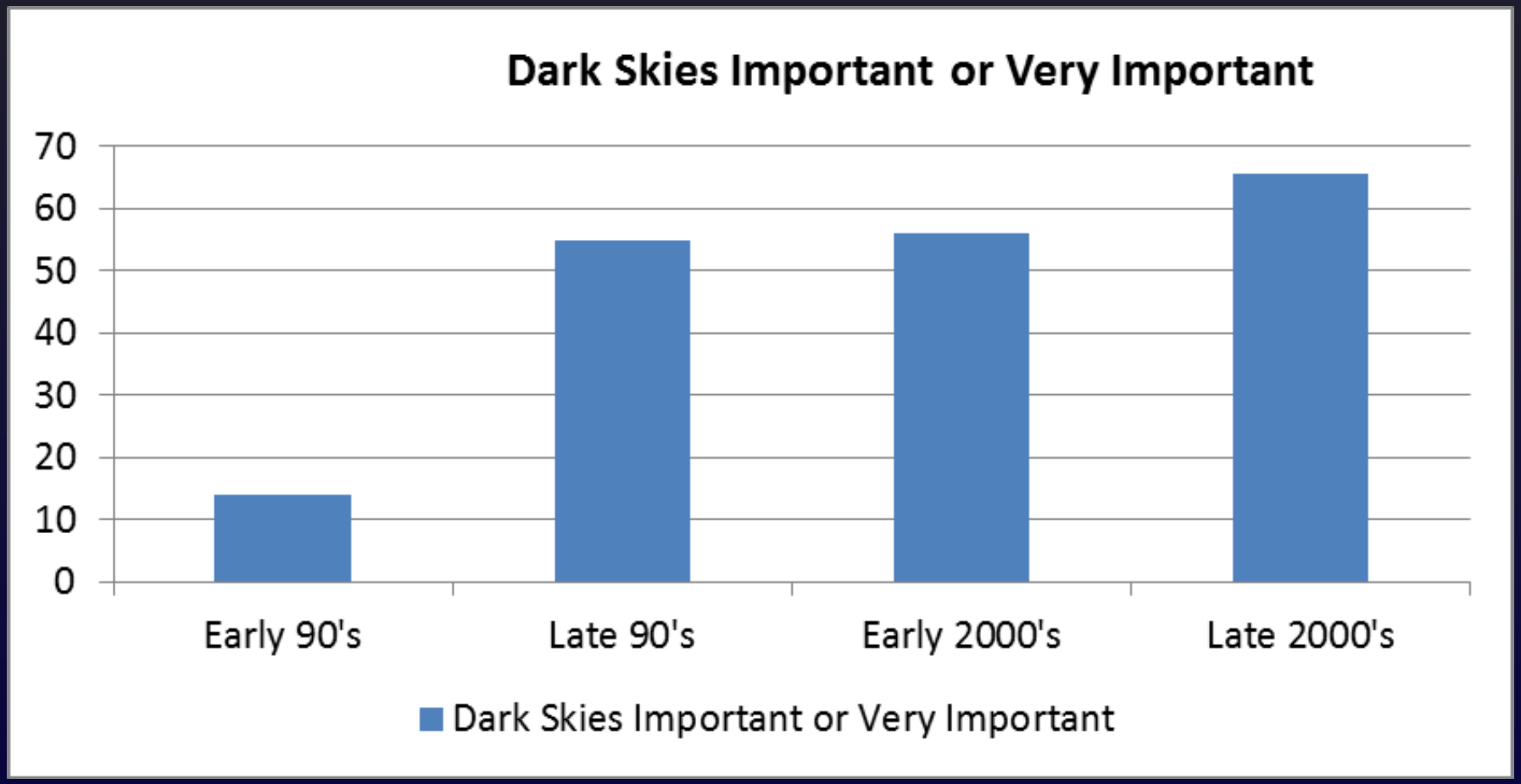
Bryce Canyon – ~30,000
Parashant – 656
Black Canyon – 6,356
Canyonlands – 761
Capitol Reef – 3,766

[Bryce Astro Festival Timelapse]

Astrotourism and Economic Benefits

- Bryce Canyon (2012) – Astronomy related attendance accounted for over 50,000 visits and $2 million contributed to local economies
- Tourism office campaigns have increased some park visitation by up to 30% (Mighty Five- Zion)

Importance to NPS visitors



(Mitchell & Gallaway, 2015)

Estimating Potential Economic Value

- Spending per party increase from $90 to $270-390 (day vs. overnight)
- Change represents an additional $1.68 billion value added to Colorado Plateau economies over 10 years
- Increase the **# of** visitors during the off-peak seasons and provide a longer more sustained period of tourism activity

Civic engagement and Partnerships

- Flagstaff is the world's first International Dark Sky City – has set standards and examples for comprehensive night sky-friendly lighting
- Sedona – recent IDSC designation
- Working with Moab, Monticello, Springdale, et al.

Work with guides and outfitters

Energy development

NPS Natural Sounds and Night Skies Division

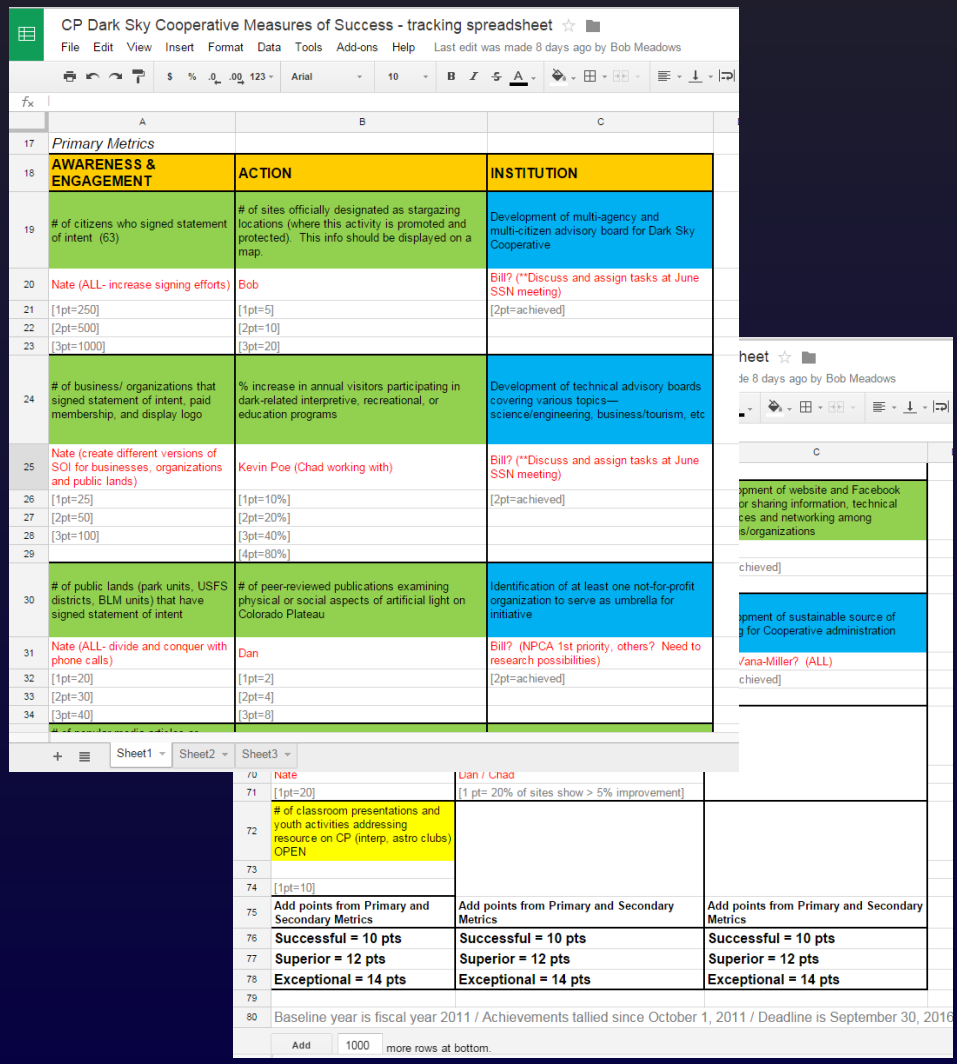
What can NPS parks do?

- Develop Lightscape Management plans for parks
- Inventory lights and plan for retrofits
- Work with NSNSD to collect night sky quality data
- Collaborate with interpreters to develop night sky resource educational materials
- Engage with gateway communities and local businesses
- Pursue Intl Dark Sky Park or similar designation

Measures of Success

Examples:

- # of light fixtures retrofitted to be night-sky friendly
- # of parks/communities designated as International Dark Sky Places
- # of guided tours that incorporate night sky education and conservation (rafting trips, expeditions, ORV tours, astro tours)



CP Dark Sky Cooperative Measures of Success - tracking spreadsheet

File Edit View Insert Format Data Tools Add-ons Help Last edit was made 8 days ago by Bob Meadows

	A	B	C
17	*Primary Metrics*		
18	**AWARENESS & ENGAGEMENT**	**ACTION**	**INSTITUTION**
19	# of citizens who signed statement of intent (63)	# of sites officially designated as stargazing locations (where this activity is promoted and protected). This info should be displayed on a map.	Development of multi-agency and multi-citizen advisory board for Dark Sky Cooperative
20	Nate (ALL- increase signing efforts)	Bob	Bill? (**Discuss and assign tasks at June SSN meeting)
21	[1pt=250]	[1pt=5]	[2pt=achieved]
22	[2pt=500]	[2pt=10]	
23	[3pt=1000]	[3pt=20]	
24	# of business/ organizations that signed statement of intent, paid membership, and display logo	% increase in annual visitors participating in dark-related interpretive, recreational, or education programs	Development of technical advisory boards covering various topics—science/engineering, business/tourism, etc
25	Nate (create different versions of SOI for businesses, organizations and public lands)	Kevin Poe (Chad working with)	Bill? (**Discuss and assign tasks at June SSN meeting)
26	[1pt=25]	[1pt=10%]	[2pt=achieved]
27	[2pt=50]	[2pt=20%]	
28	[3pt=100]	[3pt=40%]	
29		[4pt=80%]	
30	# of public lands (park units, USFS districts, BLM units) that have signed statement of intent	# of peer-reviewed publications examining physical or social aspects of artificial light on Colorado Plateau	Identification of at least one not-for-profit organization to serve as umbrella for initiative
31	Nate (ALL- divide and conquer with phone calls)	Dan	Bill? (NPCA 1st priority, others? Need to research possibilities)
32	[1pt=20]	[1pt=2]	[2pt=achieved]
33	[2pt=30]	[2pt=4]	
34	[3pt=40]	[3pt=8]	

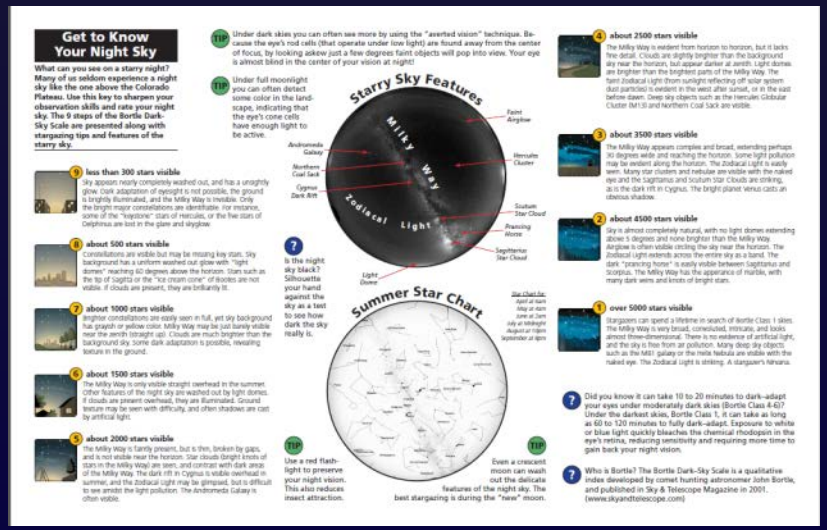
Sheet1 Sheet2 Sheet3

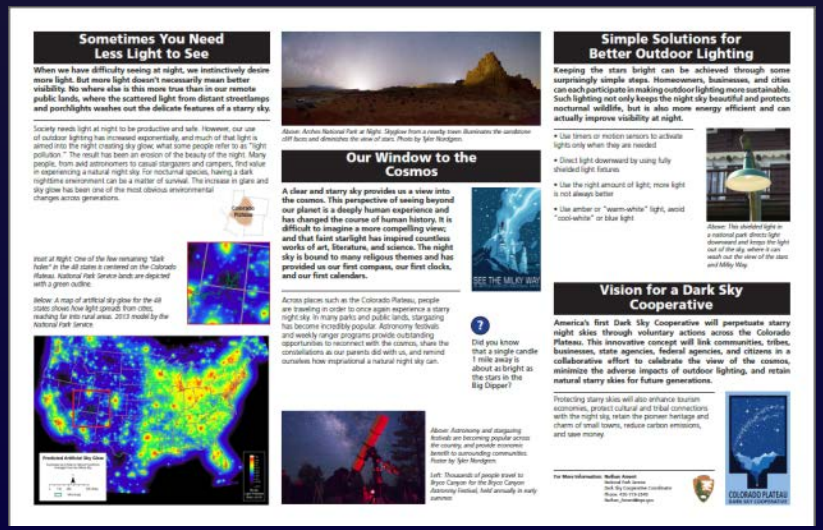
70	Nate	Dan / Chad	
71	[1pt=20]	[1 pt= 20% of sites show > 5% improvement]	
72	# of classroom presentations and youth activities addressing resource on CP (interp, astro clubs) OPEN		
73			
74	[1pt=10]		
75	**Add points from Primary and Secondary Metrics**	**Add points from Primary and Secondary Metrics**	**Add points from Primary and Secondary Metrics**
76	**Successful = 10 pts**	**Successful = 10 pts**	**Successful = 10 pts**
77	**Superior = 12 pts**	**Superior = 12 pts**	**Superior = 12 pts**
78	**Exceptional = 14 pts**	**Exceptional = 14 pts**	**Exceptional = 14 pts**
79			
80	Baseline year is fiscal year 2011 / Achievements tallied since October 1, 2011 / Deadline is September 30, 2016		

Add 1000 more rows at bottom.

Success Stories

- Created night skies curriculum and training for Colorado Plateau outdoor guides and outfitters, reaching an estimated 40,000-50,000 trip participants each year.



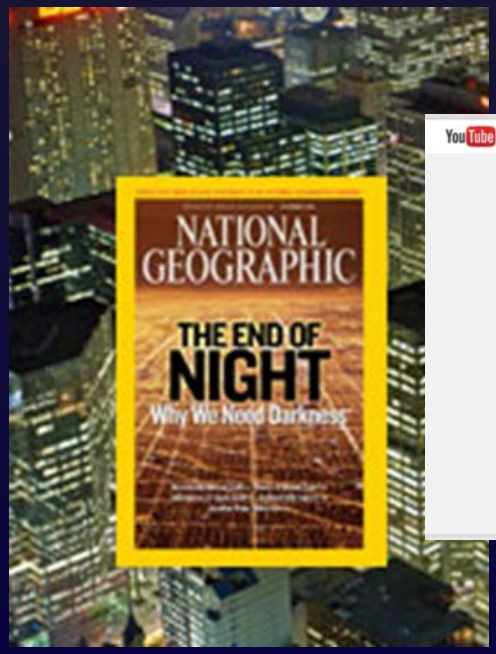


Success Stories

- 2014 – Partnered with Lowell Observatory and The Keystone Center to host the first Dark Skies and Emerging Technologies conference

Success Stories

- Since 2013, 138 new media articles and videos featuring Colorado Plateau dark skies and the Cooperative



More Success Stories

- 4 new International Dark Sky Parks since 2013 (PARA, CHCU, HOVE, CARE)
- 3 new International Dark Sky Communities
- 9 National Parks, 3 State Parks, and 3 communities pending


DARK SKIES
THEY'RE COMING

Thanks

- IMR Natural Resources Division
- NPS Night Skies Team (Bob Meadows, Jeremy White, Frank Turina, Dan Duriscoe, Chad Moore, et al.)
- Jacob Frank, Tyler Nordgren
- International Dark Sky Association
- Dark Sky Cooperative partners

Questions? Ideas?

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435-719-2349

- NPS Night Skies Team
  www.nature.nps.gov/night/
- International Dark Sky Association
  www.darksky.org

Colorado Plateau Dark Sky Cooperative is on Facebook