Dark Sky Parks: where astronomy, ecology and visitor experiences come together.

David Welch
Chair, Dark Skies Advisory Group
WCPA Urban Specialist Group

Presented by Jeff McNeely
Member, WCPA Urban Specialist Group

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Things to see under dark skies

- (Not just) stars …
- Planets and their moons
- Comets
- Meteors
- Our moon
- Zodiacal light, gegenschein
- Satellites
- *Aurorae*
- *Lightning and sprites*
- *Noctilucent clouds*
- **Nocturnal wildlife**
- **Bioluminescence**
- **Heritage landscapes**

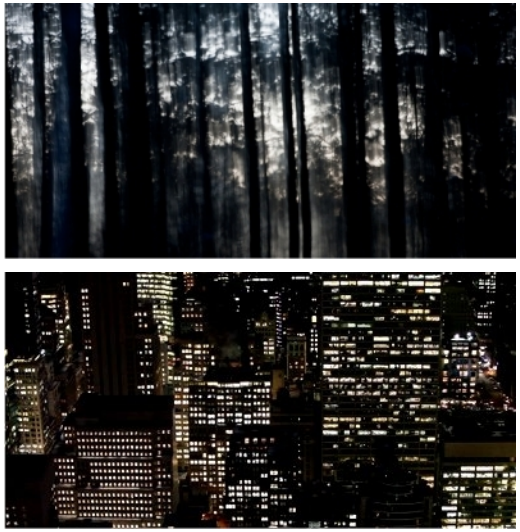
Bioluminescent protists and crustaceans
Vaadhoo Beach, Maldives

La Rioja Starlight Reserve
Core area of several biosphere reserves, Spain

Brown bear, Jasper Dark Sky Preserve
Jasper National Park of Canada

Ecological impacts of light pollution

At all levels: individual, species, ecosystem



A bird's-eye view of the urban jungle

Lights that distract and kill

- Insects: street lamps and porch lights
- Birds: transmission towers, skyscrapers, oil platforms
- Mammals: road kill

Interference with reproductive behaviour

- Corals: sky glow may reduce spawning
- Birds: mating calls reduced, movement increased
- Sea turtles: disturbance to egg-laying and hatchling orientation

Interference with predator/prey relationships

- Storm-petrels and shearwaters: increased predation by gulls
- Salmon: increased predation by harbour seals

Why all parks should be dark sky parks

Ecosystems run 24/7; half their time is dark

Visitor experience: the night should be part of ecosystem, wilderness and natural landscape appreciation

Visitors enjoy viewing and learning about the night sky in dark settings away from urban glare and sky glow

Repeat visitor and over-night stay opportunities, especially for one-visit parks such as historic sites

Respect for aboriginal and other cultural traditions, past and present

Low-hanging fruit

Light pollution prevention is a low-cost, high-gain issue, especially in terms of public participation, conservation messages and sustainable development, cooperative science and learning

What is a dark sky protected area?

A protected natural area or cultural site with all of

- Protocols and practices for light pollution prevention, including management plans, site plans, outdoor lighting guidelines, light pollution monitoring and compliance
- Outreach programmes and agreements to address sky glow and light trespass in the viewshed
- Recognition by an independent astronomy body

Sky Quality Meter

And with some of

- Night sky appreciation/education activity, e.g. star parties, wilderness astronomy
- Nocturnal ecology interpretation, guided observations, research and monitoring
- Significant commemorative or ecological values closely linked to night sky viewing or natural darkness
- Good accessibility for general public participation

NamibRand International Dark Sky Reserve
NamibRand Nature Reserve, Namibia

Outdoor lighting guidelines for protected areas

Conceived for Parks Canada
Developed by the Royal Astronomical Society of Canada
Adopted by the International Dark Sky Association

Fluorescent road markers
Mont-Megantic International
Dark Sky Reserve
Mont-Megantic National Park
of Quebec, Canada

Situations covered

- Campgrounds, buildings, developed areas
- Parking lots, roads and paths
- Wilderness areas and shore zones
- Historic sites

Addresses

- Illumination levels, colour, extent, duration, direction/shielding
- Use of retro-reflecting and fluorescent road and path markers
- Outreach within the viewshed (to address glare and skyglow)
- and more

Visitor engagement

- Night ecology talks and hikes
- Night sky talks, including cultural traditions and myths
- Star parties, amateur astronomy
- Static displays, signage
- Travelling planetaria, audio-visual presentations
- Wilderness astronomy
- Citizen science
- Media opportunities
- Increased visitation, especially in low and shoulder seasons

Star party at Torrance Barrens Dark Sky Preserve
Torrance Barrens Conservation Reserve, Canada

Dark sky protected area milestones

1993 First dark sky park, Lake Hudson State Park, Michigan, USA, recognized in local legislation

1999 First dark sky park recognized by an astronomy society, Torrance Barrens Conservation Reserve, Ontario, Canada, Royal Astronomical Society of Canada

2005 RASC dark sky preserves programme

2005 UNESCO Astronomy and World Heritage Initiative to add archaeoastronomy as an outstanding value for World Heritage Site designation

2007 International Dark Sky Association Dark Sky Places Program

2008 Starlight Initiative and Declaration of La Palma (Spain)

2010 Starlight Tourist Destinations (Fundacion Starlight and UN World Tourism Organization)

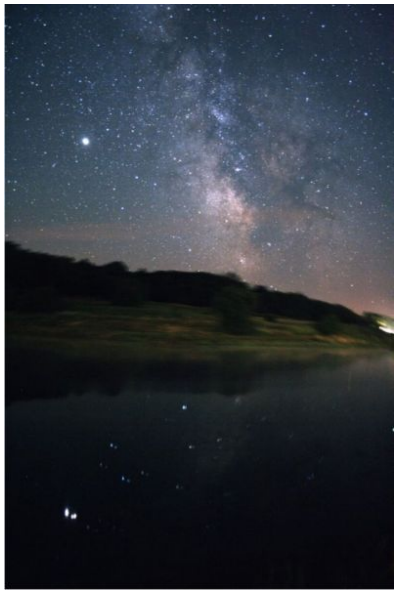
Dark sky protected areas of the world

Tracked by the Dark Skies Advisory Group

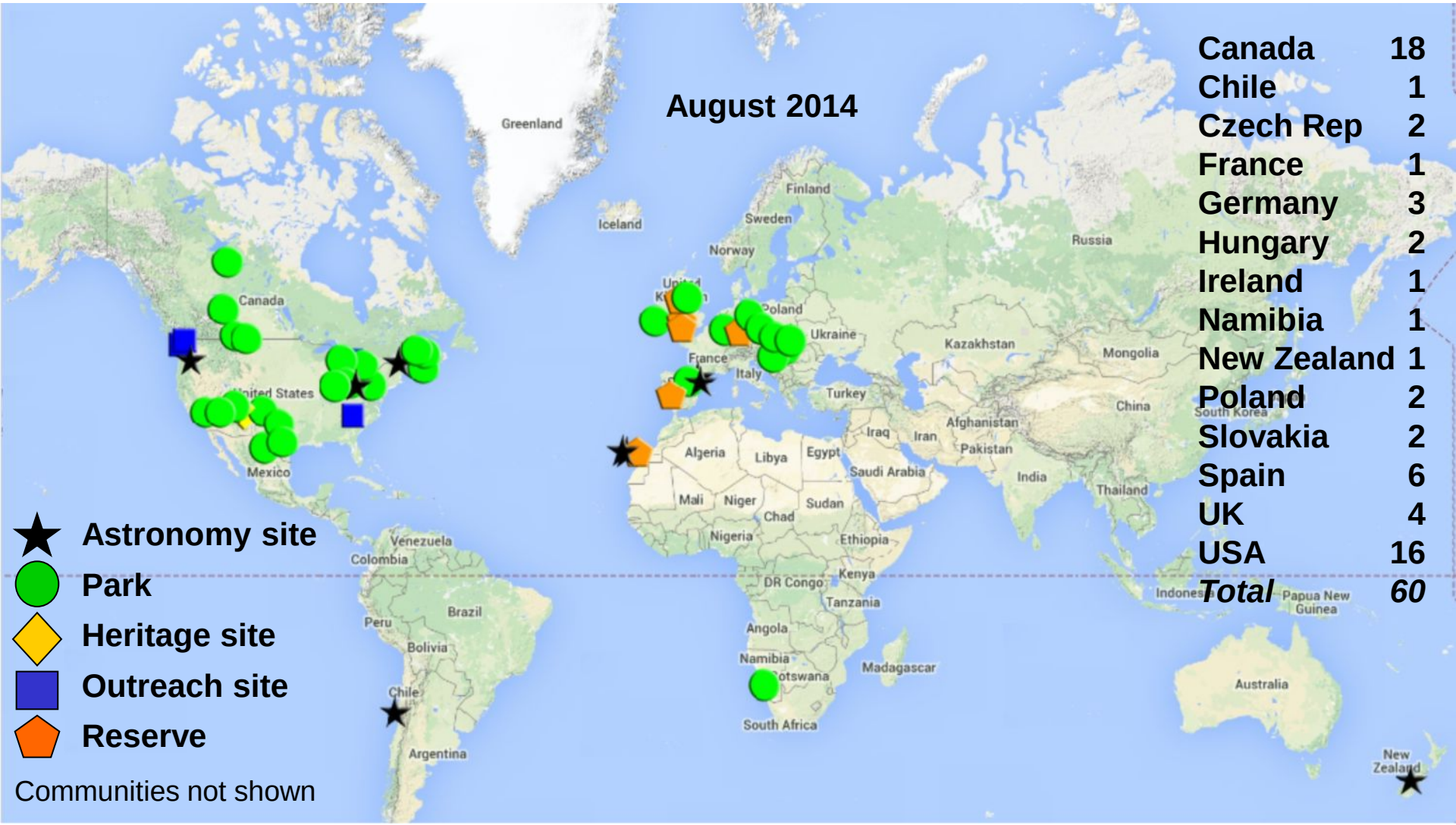
- Part of WCPA Urban Specialist Group
- Also provides conservation advice to astronomy groups
- And dark skies advice to protected areas

DSAG Dark Sky Classes			August 2014 totals
1	Dark Sky Astronomy Site: having an astronomical observatory		**10**
2	Dark Sky Park: protected natural area		**36**
	2a Park, reserve or other ecological protection	30	
	2b Area for traditional or sacred practices related to the sky	2	
	2c Rural area	4	
3	Dark Sky Heritage Site: physical heritage of mankind		**2**
4	Dark Sky Outreach Site		**6**
	4a Urban or suburban site	3	
	4b Rural site	3	
5	Dark Sky Reserve: mix of community and natural areas		**6**
6	Dark Sky Communities		**9**

Zselic International Dark Sky Park
Zselic Landsape Protection Area, Hungary
DSAG class 2a



Dark sky protected areas of the world



Two examples

DSAG class 1, Dark Sky Astronomy Site

Aoraki/Mackenzie International Dark Sky Reserve, New Zealand

Total area 436,700 ha

Contains Aoraki/Mt Cook National Park, 70,696 ha

Plus communities, agricultural areas

Functions like a biosphere reserve

Mt John Observatory and the Astrocafe

Jizera River Poland

DSAG class 2a, Dark Sky Park

Izera Dark Sky Park, Czech Republic and Poland

Total area 7,450 ha

Contains: Jizerske hory Protected Landscape Area; Bukovec Nature Reserve; Raseliniste Jizery National Nature Reserve; Rybi Loucky Nature Reserve; and Torfowiska Doliny Izery Nature Reserve

Conclusions

- Dark sky protection is an emerging and growing movement
- Natural fit with protected areas, archaeoastronomy and traditional cultural sites
- Focus still on astronomy
- North America and Europe lead
- Some urban communities manage light pollution, but …
- Only two urban star parks
- Reserve approach is preferred - core protected area ***plus*** surrounding communities that adopt light pollution controls

Wood Buffalo Dark Sky Preserve
Wood Buffalo National Park of Canada

Some recommended web sites

dsag.darkskyparks.com
darksky.org
rasc.ca/lpa
starlight2007.net
wildernessastronomy.com
nature.nps.gov/night/