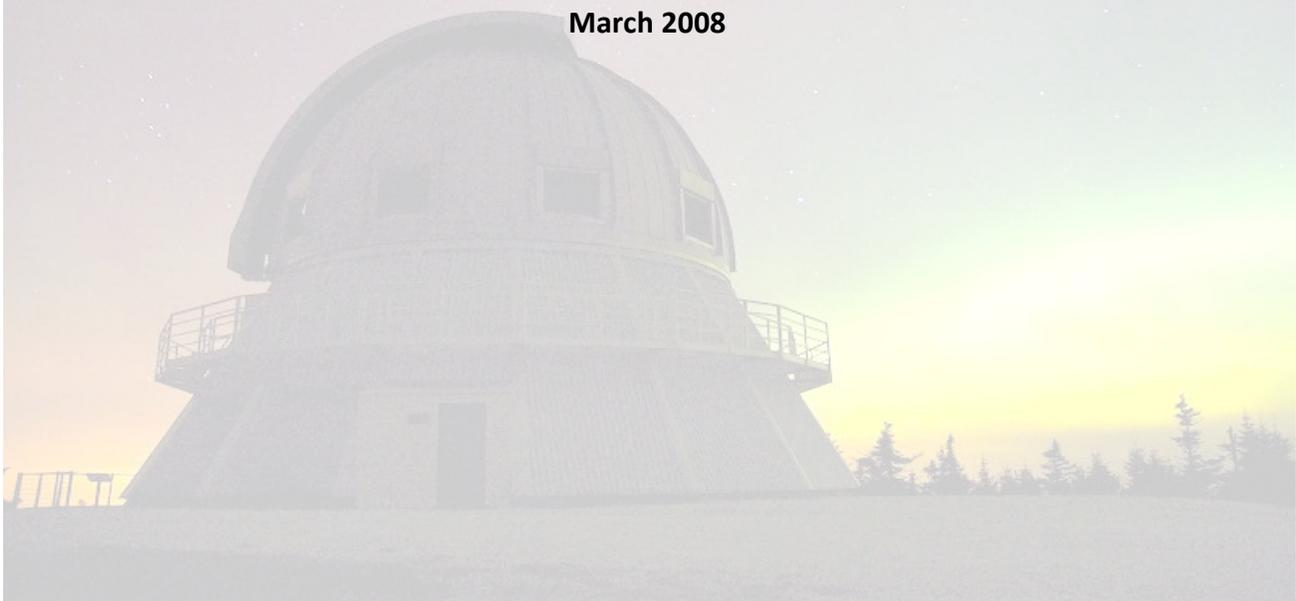


# International Dark Sky Reserve Program

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*To preserve and protect the nighttime environment  
and our heritage of dark skies through quality outdoor lighting*

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## Definition of International Dark Sky Reserve:

An International Dark Sky Reserve is a public or private land possessing an exceptional or distinguished quality of starry nights and nocturnal environment that is specifically protected for its scientific, natural, educational, cultural, heritage and/or public enjoyment mission of a large peripheral area.

The International Dark Sky Reserve consists of a core area meeting the minimum criteria for sky quality and natural darkness, and a peripheral area that supports dark sky values in the core and while receiving similar benefits. The International Dark Sky Reserve is formed through a partnership of multiple land owners and/or administrators that have recognized the value of the starry night through regulations, formal agreements, and long term planning.

## Objectives:

- A. To identify and honor public or private land and their surrounding communities with **exceptional** commitment to, and success in implementing, the ideals of dark sky preservation and/or restoration inside and surrounding the core;
- B. To encourage land administrators, surrounding communities and private interest to identify dark skies as a valuable resource in need of proactive protection;
- C. To preserve and/or restore outstanding night skies;
- D. To promote the protection of areas with an exceptional starry night. Ideal for professional and/or amateur astronomy, nocturnal habitats, culture, heritage and/or public enjoyment of the night sky;
- E. To provide international recognition for such sites;
- F. To encourage other habited or uninhabited areas formed of public and/or private entities to become environmental leaders on dark sky issues by communicating the importance of dark skies and by providing an example of the possibilities of dark sky friendly lighting.

## Benefits:

Achieving this designation brings recognition of the efforts made by the land administrators, the local communities, the citizens and any other public and private organization implied within the process of protecting the dark sky of the identified reserve area. It will encourage, consolidate, and ensure the sustainability of all actions already deployed; moreover, it will enhance awareness of all residents and visitors.

Designation as an IDSR entitles the core and its surrounding communities that are conforming to the minimum requirements to the display IDA-IDSR (International Dark-Sky Association, International Dark Sky Reserve) logo in official publications and promotions and retain the use of this logo by other groups within the community when identifying the area itself (i.e. an organization/community can say “located in Grand View International Dark Sky Reserve”). An IDSR may also choose to identify itself through various phrases stating the same effect, i.e. “In the heart of Mont-Mégantic Area International Starry Nights Reserve”. IDA will maintain a Web page identifying and describing all IDSRs available on [www.darksky.org](http://www.darksky.org).

Provisional certification for the IDSR may be approved by IDA if the designated Reserve meets certain criteria. The criteria will be determined by working with the committee. This will enable the future IDSR to encourage all communities of the identified area to be part of the reserve and help the core manager in raising funding to support the IDSR formation. The provisional certification will not allow the future IDSR to identify themselves as an IDSR or use the IDA-IDSR logo until full certification has been met.

### Eligibility (A-E must each be met):

- A. The core of the IDSR must be a public or a private land protected for scientific, natural, educational, cultural, heritage and/or public enjoyment mission AND;
- B. The core of the IDSR is encouraged to provide the opportunity for public nighttime access. A section of designated land (preferably within or near the core) may meet this requirement for a portion of time AND;
- C. The core of the IDSR must have identified the sources of light pollution through calculations, maps, photographs or any other proper method AND **clearly** identify actual and future threats to the sky quality. They must then define appropriate areas of protection outside the core AND;
- D. The peripheral area must be a minimum of 700 km<sup>2</sup> (435 miles squared) around the core (roughly equivalent to a 15 km/9.5 mile radius) OR an area sufficient to mitigate 80% of current and expected future light pollution threats AND;
- E. Core of the IDSR must have an outstanding dark sky resource relative to the population it serves and have local, regional and/or national significant dark sky resources. Core night sky quality must fit in one of the three tier qualifications *Gold, Silver, or Bronze*. [See *Sky Quality Tiers Section*]

### Minimum requirements for the Reserve (A-H must each be met):

- A. Regulation or lighting guidelines should be adopted by the communities to a proportion corresponding to at least 80% of population AND 80% of designated area of protection within the entire IDSR (core and periphery). The regulation should address all private and public owners of communities within the area of protection. Some exceptions may apply but are subject to IDA approval. In general though, the following minimum standards apply:
  1. Any lighting fixtures containing lamps emitting 1000 lm or more shall use fully shielded fixtures emitting no light at or above the horizontal, AND;
  2. The type of lamp (color, efficiency, technology) to be used has been considered by carefully choosing appropriate energy efficiency technology and methods for minimizing impact to wildlife, stargazing activities, and nocturnal scenery, AND;
  3. The appropriate amount of lighting is being used when it needs to be used for specific areas and tasks ;
    - Standards may be more restrictive when close to the core and less restrictive when farther from the core;
- B. Land and community commitment to dark skies and lightscape management, as shown by:
  1. The importance of dark skies/natural darkness and the benefits of good lighting should be part of the core's interpretation and outreach programs and of

- communities' outreach publications. If the core typically provides ranger interpretive programs (National Parks, Wilderness Area, etc.), then dark skies should be one of the central themes communicated through on-site interpretation. If interpretive programs are not typically offered, then publications, flyers, press releases, media, or other means of outreach are appropriate substitutes.
2. Two-Thirds (67%) of existing outdoor lighting fixtures **within the core** conforms to the regulation (or an alternative fraction approved by the IDA Board)AND;
  3. Almost all lighting (95%) within the CORE must conform, or must commit to conform within 5 years after the certification is delivered AND;
  4. Communities must have examples of conforming lighting installations relative to the population it serves, both on roadway AND on different private sites (industries, stores, public services, etc):
    - Each participating municipality (excluding businesses, residences, and partners without installed lighting) should have completed at least one highly visible demonstration project with night sky friendly lighting (should include more than 10 lighting fixtures) for each 5000 citizens and/or;
    - Approximately 10% of total installed fixtures within the Reserve be retrofitted or brought into compliance with the appropriate regulation or guideline and/or;
    - Approximately a 15% reduction of light pollution is measured/modeled at zenith in the core by doing a before/after measurements OR modeling, results of awareness, regulation and/or lighting fixture retrofit.
  5. Participating communities must have a program, either through education, economic incentives, permitting, or regulation, to encourage all new outdoor lighting fixtures to conform to the relevant regulation or guidelines for night sky friendly lighting.
- C. A measurement program must be maintained either by the core manager or by any other public or private organization (university, research center, IDA's section, etc) to follow the evolution of light pollution in the core of the IDSR.
  - D. Acknowledgement of the protected area, by higher than community level (county/province/etc), in a perspective that dark skies are an important scientific, natural, cultural, or scenic resource value as evidenced by the inclusion in official documents (politics, protocols, management plans, etc) for long term planning.
  - E. Once established, the core must erect and maintain a sign indicating International Dark Sky Reserve (or similar approved verbage) designation along roadway entrance, along a footpath entrance if no roadway exists, or a visitor contact center. Sign should include IDA IDSR text and logo.
  - F. Communities within the IDSR will receive a certificate verifying the community as a part of the IDSR. Those who wish to erect a sign will have to address a letter to IDA referring them as a part of the IDSR and giving specific examples of their engagement (lighting fixture replacement, outreach program, etc).

- G. Designation is permanent, but is subject to regular review by IDA and possible revocation if minimum requirements are not maintained. Under certain circumstances IDA may request stricter or alternative requirements.

### Sky Quality Tiers:

- *Gold* corresponds to nighttime environments that have negligible to minor impacts from light pollution and other artificial light disturbance, yet still display outstanding quality night skies and have superior nighttime lightscapes.
- *Silver* corresponds to nighttime environments that have minor impacts from light pollution and other artificial light disturbance, yet still display good quality night skies and have exemplary nighttime lightscapes.
- *Bronze* corresponds to areas not meeting the requirements of *Silver*, yet still offering people, plants and animals a respite from a degraded nocturnal environment and suitable for communicating the issue of light pollution and connecting people with the many aspects of the night sky.

### Core Nomination Process:

- A. Nomination by an IDA member in good standing who has inspected the land and who has appropriate documentation that proves the adopted regulation by communities along with the supporting signatures of at least two additional IDA members from outside the managing agency receiving the nomination;
- B. Official letter to IDA supporting nomination from core administrator;
- C. Official letter of support from the communities/county/province or other form of juristic state division that confirms their long term engagement and commitment towards the creation of the IDSR;
- D. Supporting documentation and information sent to IDA which demonstrates that the eligibility and minimum requirements have been met, such as the *Lighting Inventory* (see Table 1) of the core that conforms to the *Lighting Guidelines*.
- E. To obtain a provisional certification, core manager can send a nomination package to support the following needed information:
  - 1. Eligibility A-E;
  - 2. Initial sky quality measurements;
  - 3. Core manager has documented intent to create and support an IDSR;
  - 4. Three partners (municipalities, parks, organizations, etc) have documented intent to support an IDSR;
  - 5. An action plan describing how the identify reserve will meet minimum requirement.

The minimum quality night sky described under Eligibility must be met in order to attain *Bronze* IDSR designation. The determination of whether the minimum sky quality standard has been met and what tier will be awarded will be decided by IDA based on submitted information and other available information. Methods for how IDA will determine sky quality tier are found in the Submission Guidelines.

### IDA Process:

- A. Once the submission packet is received from the reserve, IDA will review the contents to determine if minimum requirements have been met and if stricter or alternative requirements should be imposed;
- B. The IDA board of directors must approve the nomination by a majority vote, or a denial with recommendations on how best to attain IDSR designation;
- C. Upon approval by the IDA board, the IDSR designation will be awarded and listed on the IDA Web site, [www.darksky.org](http://www.darksky.org);
- D. IDA will conduct periodic checks on the IDSR to ensure minimum standards are still met, objectives of the program are being upheld, and adequate progress is being made.

### Guidelines on the IDSR Submission Process:

#### Nomination:

The nomination is initiated by an active IDA member who has personally reviewed a core's and the surrounding community's outdoor lighting codes and commitment to natural lightscapes. The nomination is a joint effort between the core's administration, the surrounding communities and municipalities, and the initiating IDA member, as well as the cosignatories by two additional IDA members in good standing. Members are encouraged to correspond with IDA IDSR designee, IDSR committee, or IDA Board of Directors throughout this process—from first consideration of an IDSR through the final submission package. The following are typically included in an IDSR submission:

1. Map of the area to be designated clearly indicating the reserve and the communities surrounding the reserve.
2. Letter of nomination support from the core administrator.
3. Management documents supporting dark skies and/or natural lightscapes as a valued resource.
4. Municipality, community, and core agency or departmental policy on outdoor lighting and dark sky protection as well as the core's *Lighting Guidelines*.
5. Any documentation of sky quality, light pollution measures, satellite pictures, maps, photographs, or other evidence that demonstrates the noteworthiness of the resource.
6. Any documentation of the importance of the core. E.g. site historical research conducted there, importance to indigenous nocturnal wildlife, etc.
7. Documentation signed by core administrator showing a *Lighting Inventory* of the core and plan to bring all outdoor lighting into compliance with the *Lighting Guidelines*.
8. Brief description of interpretive program or interpretive products related to dark skies/natural darkness.
9. Documentation or description of the preservation or restoration project (e.g. community outreach, lighting retrofits, etc.) currently in action.
10. Proposed alternative wording for IDSR, if desired.

#### Approval or Denial:

Approval of an IDSR nomination requires a majority vote by the IDA Board of Directors. This decision should be made by referencing the submission package, the nomination recommendation by the IDA member, and the other communications regarding the core's and surrounding areas

suitability as an IDSR. The Board should keep in mind that the minimum requirements can be made stricter in situations where IDA feels there is inadequate commitment or the core or surrounding areas is not meeting its potential. Consider also that the submission package may vary in detail depending on the staff resources at each core and community. Once approved, the IDSR designation should be documented, posted on the Web site, and suitably announced as soon as practical.

If a nomination is denied, IDA should clearly identify the reasons for rejection and outline what steps should be taken to eventually meet IDSR requirements. Partial resubmissions should be allowed at the discretion of IDA.

IDA should designate a panel of IDA members to assist cores with IDSR certification, preparing their submission package, and providing recommendations to the Board. IDA should further designate one of the panel members as a point of contact for the program.

**Lighting Inventory:**

Producing a *Lighting Inventory* for some cores can be a lengthy task. Therefore, when there are numerous outdoor lights it is acceptable to group lights by facility or area. Whether the fixtures are fully-shielded, are special purpose fixtures under 1000 lumens, and what the lighting application is should be noted for each fixture or group of fixtures. The *Lighting Inventory* should also include a plan or stated commitment to bring all outdoor lights into compliance with the *Lighting Guidelines*. Daytime photographs or manufacturer diagrams of each fixture type should also accompany the inventory. Contact IDA for clarification or to resolve *Lighting Inventory* difficulties.

**Table 1:** A sample table from portion of a *Lighting Inventory*

Location	Fixture(s)	Fully - Shielded	Special Purpose <1000 Lumens	Application	Conformity with Lighting Guidelines
Visitor’s Center	12 fixtures on 14’ pole, 70 watt HPS	YES	NO	Parking lot, timer off at 10pm	YES
	2 overhead door lights, 100 watt MH	YES	NO	Building Egress	YES
	6 bollard (post) lights, 32 watt compact florescent	NO	NO	Walkway	NO – See Plan
Research Facility	6 glarebusters, 13 watt compact fluorescent	YES	NO	Egress, Security	YES
Storage Warehouse	6 wallpacks, unknown lumens, 250 watt MH	NO	NO	Occasional Night Operations, Security	NO – See Plan
	2 motion sensor floodlights, 300 watt Halogen	YES	NO	Egress, Security	YES

*Lamps of 1000 lumens output and less include: 60 watt incandescent and less; 60 watt tungsten (quartz) halogen and less; 15 watt fluorescent and less; 13 watt compact fluorescent and less.*

## Lighting Guidelines:

International Dark Sky Reserve *Lighting Guidelines* should meet or exceed agency or departmental policies regarding outdoor lighting and should embody good lighting ethics — using light only when it is needed, where it is needed, and in the proper amount. Thus most outdoor lighting fixtures should be fully-shielded and have appropriate use of timers and motion sensors. There should be few instances when this simple guidance is insufficient. Because night sky friendly lighting is inherently efficient, energy use and operational cost reduction goals can be incorporated in this lighting.

The IDSR program uses the term “Fully Shielded” as opposed to the more technical term “Full Cut-off.” This allows for slightly more variation in fixture type and can be identified without complex photometric reports. It should be clear that “Fully Shielded” defines not only the fixture hardware, but the mounting and installation also. Questions on whether a fixture meets this definition can be relayed to IDA in advance of the submission. Using the proper amount of light is another important element for good lighting and should be incorporated into *Lighting Guidelines*. Because of the dark surroundings found in parks or reserve cores, the required illumination levels are often much *less* than in urban or residential settings. As with proper shielding and directing of light, the proper amount is important in providing the best visibility, safety, and security. There are several optional methods to constrain lighting levels and illumination:

1. Lighting levels (illumination) may be prescribed within a range of values, typically measured in footcandles or lux. This requires the use of a light meter to verify illumination levels. Without software modeling or extensive lighting experience, it is possible that new lighting installations may produce more or less illumination than necessary, and force an expensive change. This is the most accurate method for controlling illumination levels but requires planning and a certain level of technical ability. This approach is better suited to large developed parks with more sophisticated facility management.
2. Setting a maximum and minimum lamp lumen output for types of fixtures or applications. This gives an approximate method to design illumination levels. Typically, this is done for several categories of fixture (e.g. entryway, walkway, parking lot). This is a simple approach and is suitable for most parks, but it is not as accurate as setting illumination levels (#1 above).
3. Illumination levels can be more accurately designed by integrating mounting height into lumen limits (#2 above). For example, a maximum lumen limit  $220 \times \text{pole height (in meters)}^2$  is a useful guideline: a 6 meter (20') pole would limit to about 8000 lumens; an entry light mounted 2 meters (7') above the ground by a doorway would be limited to 880 lumens. Different multiplication factors may be designated for different applications. Maximum pole heights should also be prescribed under such a system, recommended at 25'. This method adds some complexity but gives tighter control over lighting.
4. Total lumens per acre can be prescribed to developed areas. This prevents negative cumulative effects from too many lights. This method is best used when coupled with method #1, 2, or 3 above.
5. Other methods and specifications for controlling light levels are available from IDA or the Illuminating Engineering Society of North America (IESNA).

The use of lighting zones, as is done in the IDA Model Lighting Ordinance and several other city codes, is a useful tool within a lighting guideline. In cores, these may be a zone of absolutely no lighting (no equivalent in the IDA MLO), zones of minimal light use (Lighting Zone 0 in IDA MLO), and developed high use areas (Lighting Zone 1 in IDA MLO). The use of higher illumination lighting zones is probably not necessary within the core. Surrounding communities, depending on their civilian population and proportions of residential, commercial, and industrial zones, should use the best possible lighting zone in relation to the areas needs and demands.

While shielded lights typically reduce glare when viewed from the side, there are situations where even fully-shielded lights may cause an unacceptable impact. One example is when the light is elevated over surrounding terrain, perhaps on a mesa, hilltop, water tank, or similar structure. The glare from these lights can be viewed from many kilometers away and potentially pose a negative impact to wildland values, cultural landscapes, wilderness, and wildlife. This issue should be included in the *Lighting Guidelines* if it is germane to the core.

Protecting wildlife and nocturnal habitat often requires greater consideration and constraints than lighting to protect night sky visibility. Most cores will have ecological issues that need addressing in the *Lighting Guidelines*. The best approach may require consultation with wildlife experts, but a few methods are listed here for consideration:

1. Designation of wildlife corridors, buffer areas around streams, shorelines, or other ecological important edges where lighting is not allowed or is permitted only when fully shielded at very low brightness.
2. Use of narrow spectrum lighting that avoids impact to certain species. This proper color of light will vary from species to species and habitat to habitat. Yellow incandescent lamps (“bug” lights) and low-pressure sodium lighting (LPS) are frequently good choices, but are not always necessary or the proper solution.
3. Turn off lights with timers or motion sensors to minimize duration of impact. Omit lighting during certain periods of the year that are known to be critical to wildlife (e.g. bird migration periods, sea turtle nesting times, etc.).
4. Use of only strobe lights (quick flashing lights that dim completely between cycles) for buoys, towers, and markers to minimize bird disorientation.

Requirements for the IDSR allow for the use of 1000 lumen unshielded lights for special purposes. This provision is to allow for the use of historic lights or lighting required by historical preservation mandates, guidance lighting, or other unique requirements. The approved special uses should be stated in the lighting guideline. IDA will scrutinize these uses to ensure that core lighting is a suitable example of good lighting for the public and protects the nighttime environment to the maximum practical extent. IDA may request additional descriptions, photographs, or drawings of these lights. These lights are not exempt from the *Lighting Guidelines*, and must still be designed to minimize impact to the lightscape.

While outdoor lights are used mostly for safety purposes, a core may incorporate lights that have other uses. Examples include lit signs, flags, vending machines, building façades, statues and plaques. Though these are not forbidden in International Dark Sky Reserves, the *Lighting Guidelines* must provide constraints on these types of generally non-essential lighting. Such lighting should have lamp lumen or illumination limits, timing limits, and be shielded if possible. IDA will scrutinize this section of the *Lighting Guidelines* to ensure the park provides a good leadership example to the public.

Finally, each lighting application should be examined for appropriateness, timing and duty cycle, and energy efficiency. For example, it is expected that the *Lighting Guidelines* would designate areas that should have no permanent lighting. Other types of lighting such as infrequently used buildings should have motion sensor security lights. Such limitations are important in lowering the overall impact of artificial lighting, especially considering solar power lighting is now viable in remote locations.

### **Sky Quality Tier Determination:**

A variety of indicators are used to determine absolute sky quality at the *Gold*, *Silver*, or *Bronze* tier. The lower end of the *Bronze* tier coincides with the minimum sky quality requirement for IDSR designation. This objective decision is made based on many factors; with no one factor being the key decider. Indicators may conflict because of differences in geography, climate, seasonality, view of horizon, elevation, or other factors. No single indicator should force a tier determination. For example, an area may be awarded *Silver* despite only having limiting magnitude 5.8 if the majority of other factors support the *Silver* designation. In many cases, full information may not be available and the process must proceed with only readily available information.

Within a proposed IDSR boundary there will be a range of sky conditions, which presents a challenging situation from which to make an assessment. In general, the lightscape condition where night visitation and interpretation should be assessed, but IDA may require additional areas to be assessed. It should be made clear that the expectations of an IDSR to promote dark skies and natural lightscapes are equal among designees, regardless of their tier status— *Gold*, *Silver*, or *Bronze*. Table 2 (shown on the next page) provides guidance in determining tier status of an International Dark Sky Reserve.

**Table 2:** Guidelines within the reserve core for determining tier

Indicator	Gold	Silver	Bronze
<b>Philosophy</b>	Nighttime environments that have negligible to minor impacts from light pollution and other artificial light disturbance, yet still display outstanding quality night skies and have superior nighttime lightscapes.	Nighttime environments that have minor impacts from light pollution and other artificial light disturbance, yet still display good quality night skies and have exemplary nighttime lightscapes.	Areas not meeting the requirements of <i>Silver</i> , yet still offering people, plants and animals a respite from a degraded nocturnal environment and suitable for communicating the issue of light pollution and connecting people with the many aspects of the night sky.
<b>Artificial Light and Sky glow</b>	Typical observer is not distracted by glaring light sources. Light domes are only dim and restricted to sky close to horizon.	Point light sources and glaring lights do not dominate nighttime scene. Light domes present around horizon but do not stretch to zenith.	Areas with greater artificial light and sky glow than <i>Silver</i> , but where aspects of the natural sky are still visible.
<b>Visual Limiting Magnitude</b>	Equal or greater than 6.8 under clear skies and good seeing conditions.	6.2 to 6.7 under clear skies and good conditions.	5.2 to 6.1 under clear skies and good seeing conditions.
<b>Bortle Sky Class</b>	1 to 3	3 to 4	5
<b>International Astronomical Union (IAU) Definition</b>	Unpolluted sky, less than 10% artificial light increase at 45° altitude.	Light Polluted Sky (minor to moderate).	Light Polluted Sky (moderate).
<b>Schaaf Class</b>	7+	4 to 7	3 to 4
<b>Observable Sky Phenomena</b>	The full array of visible sky phenomena can be viewed— i.e. aurora, airglow, Milky Way, zodiacal light, and faint meteors.	Brighter sky phenomena can be regularly viewed, with fainter ones sometimes visible. Milky Way is visible in summer and winter.	Many sky phenomena cannot be seen. Milky Way is faintly seen when pointed out to the average person, as is the Andromeda Galaxy.
<b>Nocturnal Environment</b>	Area is devoid of obvious lights that can cause wildlife disorientation. Artificial light levels are thought to be below the threshold for plant and animal impact. Ecological processes related to nocturnality are unaltered. No lighting atop towers or buildings within park boundary.	Areas that have minor to moderate ground illumination from artificial sky glow. Lights that may cause disorientation to wildlife are distant. Disruption of ecological processes is minor with no impairment to plants or wildlife.	Areas with greater nocturnal impact than <i>Silver</i> , but where photo-based ecosystem processes are still functional.
<b>Cinzano et. al 2001 Sky Brightness Model</b>	< 0.11 artificial light contribution at zenith (as a fraction of natural background).	.11 to 3.0 artificial light contributions at zenith (as a fraction of natural background).	3.0 to 9.0 artificial light contribution at zenith (as a fraction of natural background).

Further information on the sky brightness models and methods used in table 2 can be found at the following Web sites:

Bortle Dark-sky Scale: [http://skyandtelescope.com/resources/darksky/article\\_81\\_1.asp](http://skyandtelescope.com/resources/darksky/article_81_1.asp)

Schaaf Scale: <http://laps.noaa.gov/albers/lp/gwpaper/lppaper.htm>

Sky Brightness Model by Cinzano et. al.: <http://www.inquinamentoluminoso.it/dmsp/>

Visual Limiting Magnitude:

- <http://www.imo.net/visual/major/observation/lm>
- [http://www.phys-astro.sonoma.edu/observatory/observers/limiting\\_magnitude.html](http://www.phys-astro.sonoma.edu/observatory/observers/limiting_magnitude.html)
- The George Wright Forum, published by the George Wright Society, Hancock, Michigan, USA, 18:4, 2004.

Note: According to Cinzano et al. 2001, 1% of US population lives in gold areas, 16% in silver, and 21% in bronze. Compare that to Australia at 29%, 9%, and 25% or Canada at 3%, 14%, and 12% or Germany 0%, 34% and 41%. Thus Gold DSPs will likely be designated in areas of sparse population, but may vary from country to country.

### **Reassessment of IDSP Designations:**

To assure that IDSRs continue to be exemplary in their protection and restoration of natural lightscapes, IDA will periodically re-assess IDSRs. This will assure that parks continue to meet the minimum requirements, are sustaining partnership and interpretation efforts, and are making adequate progress toward compliance with *Lighting Guidelines*. It is expected that a simple assessment will be made at approximately 5-year intervals, relying upon conversations with park management, on site checks by the original nominating member, or other creative and low cost means to ascertain the park's commitment to the IDSR designation. If questions or concerns remain after this cursory review, it may then be necessary for IDA make additional efforts and/or the IDSR to submit evidence defending their status.

## Definitions:

*Bortle Class* – A qualitative method of rating night skies based on visual observations. Developed by John Bortle, the scale ranges from Class 1 (pristine) to Class 9 (strongly light polluted).

*Dark Sky Park* – A park or other public land possessing notable starry night skies and natural nocturnal habitat where light pollution is mitigated and natural darkness is valuable as an important cultural, scenic, and natural resource. May be part of a larger Dark Sky Reserve, or may not. [International Dark Sky Parks are the focus of this document]

*Dark Sky Reserve* – A large area of high quality dark skies with associated partnerships between protected public lands, municipalities, and private interests, that has managed to minimize light pollution. Reserve status is maintained through education, formal agreements, laws, management plans, and/or codes addressing multiple aspects of natural darkness.

*Fully Shielded* – A lighting fixture that directs all light downward (below the horizontal) except for incidental reflections from supports or other structures.

*Glare* – A common condition of natural and artificial lighting caused by excessive contrast between a bright source or brightly lit area and a dark surrounding area. Glare can cause viewers to look away, squint, be annoyed, or compromise their ability to perform vital visual tasks.

*Guidance Lighting* – Lighting that provides for navigation and safety via very low brightness lamps to mark a path, edge, or roadway instead of the traditional approach of illuminating surfaces.

*Illumination* – The amount of light falling onto a surface measured in lumens per unit area. The *footcandle* is equal to one lumen per square foot. A *lux* is 1 lumen per square meter, approximately 1/10th of a footcandle.

*International Dark Sky Park* – A park or other public land possessing exceptional starry night skies and natural nocturnal habitat where light pollution is mitigated and natural darkness is valuable as an important educational, cultural, scenic, and natural resource. May be part of a larger Dark Sky Reserve or International Dark Sky Reserve, or may not [International Dark Sky Parks are the focus of this document].

*International Dark Sky Reserve* – A large area of exceptionally high quality dark skies with associated partnerships between protected public lands, municipalities, and private interests, that has managed to minimize light pollution. Reserve status is maintained through education, formal agreements, laws, management plans, and/or codes addressing multiple aspects of natural darkness.

*Interpretation* – A communication process, designed to reveal meanings and relationships of our cultural and natural heritage, through involvement with objects, landscapes [or lightscapes], and sites.

*Light Pollution* – Principally (in this document) the illumination of the night sky caused by artificial light sources, decreasing the visibility of stars and other natural sky phenomena. Also includes other incidental or obtrusive aspects of outdoor lighting such as glare, trespass into areas not needing lighting, use in areas where or at times when lighting is not needed, and disturbance of the natural nighttime landscape.

*Lightscape* – The total environment created with natural and/or artificial light (here pertaining to the outdoor nocturnal scene).

*Limiting Magnitude* – The dimmest star that can be seen by the unaided eye. Higher numbers correspond to fainter stars and thus darker skies. As light pollution increases, contrast is decreased between the background of space and stars, allowing only brighter stars (lower magnitude) to be seen.

*Lumen* – The unit used to describe the amount of light radiated by a source.

*Outreach* – Interpretation for the public that takes place outside of the park or prior to their visit.

### **IDSR Program Review:**

It is recommended that the IDSR program be reviewed 2 years from initial approval and at 5-year intervals thereafter. This will keep documentation current, provide clarification of common questions, close loopholes, and keep the program responsive to evolving public attitudes, technology, and scientific understanding. It will also be important to compare this document with other competing certifications that may arise. Other suggested considerations include: application and acceptance rate, balancing participation in the program with the prestige it bestows, open submission vs. call for applications, target participation rates at each tier, reassessment processes, and workload.

### **Contributors:**

#### **Development Committee:**

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