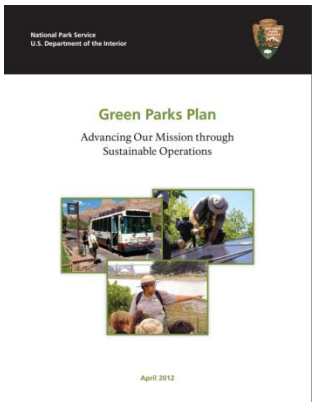
includes nine strategic goals, including continuously improve environmental performance, be climate friendly and climate ready, be energy smart, be water wise, green our rides, buy green and reduce, reuse, and recycle, preserve outdoor values, adopt best practices, and foster sustainability beyond our boundaries. Each goal is supported by performance objectives. Under the "Preserve Outdoor Value" goal the NPS states that it will minimize the impact of facility operations on the external environment.

The performance objectives listed to support this goal:

1. The NPS will reduce light pollution from park facilities with the goal of dark night sky preservation.
2. The NPS will minimize sound pollution in the outdoor environment.
3. The NPS will ensure that all facilities and operation are sustainable integrated into the park landscape to minimize impact on the natural and cultural environment.



Night Sky Team (www.nature.nps.gov/sound_night/)

Starry night skies and natural darkness are important components of the special places the National Park Service protects. National parks hold some of the last remaining harbors of darkness and provide an excellent opportunity for the public to experience this endangered resource. The NPS is dedicated to protecting and sharing this resource for the enjoyment of current and future generations.

The NPS uses the term "natural lightscape" to describe resources and values that exist in the absence of human-caused light at night. Natural lightscapes are critical for nighttime scenery, such as viewing a starry sky, but are also critical for maintaining nocturnal habitat. Many wildlife species rely on natural patterns of light and dark for navigation, to cue behaviors, or hide from predators. Lightscapes can be cultural as well, and may be integral to the historic fabric of a place. Human caused light may be obtrusive in the same manner that noise can disrupt a contemplative or peaceful scene. Light that is undesirable is a natural or cultural landscape is often called "light pollution.

Tumacácori National Historical Park Lightscape Management Plan

I. Statement of Scope

This management plan will serve as a guideline for preserving naturally dark skies at Tumacácori National Historical Park located in Tumacácori, Arizona. It will be the basis for management decisions in regards to lighting upkeep and future plans. The current light fixtures in Tumacácori that do not conform to the Light Management Plan will be mitigated to appropriate fixtures to achieve 100% compliance within ten years. This plan follows the regulations set by the International Dark-Sky Association and Royal Astronomical Society of Canada. In particular the RASC/IDA Guidelines for Outdoor Lighting, as well as, the Santa Cruz County Zoning and Development Code, were consulted when creating the following Light Management Plan (LMP).

The objectives of this Lightscape Management Plan are:

- Preserve the dark sky quality of Tumacácori National Historical Park and the surrounding area.
- To promote good lighting practices and serve as a role model for the community.
- To protect local wildlife and ecosystems by decreasing light pollution effects.
- Provide a guideline for future lighting projects within the park and ensure dark-sky designation is upheld.

Tumacácori's policy shall be to not install new outdoor lighting unless a specific public safety hazard exists that can only be mitigated with the use of outdoor light. Otherwise, permanent installations of light will not be allowed if they are not in correspondence with the Tumacácori National Historical Park Lightscape Management Plan.

II. Lighting Guidelines

All exterior lights at Tumacácori National Historical Park will be designed to eliminate excessive, misdirected, or obtrusive artificial light. Tumacácori will follow the National Park Service's direction to use artificial light on an "only as needed" basis and to minimize light impact whenever possible. NPS Management Policies also recommend a six-step process for evaluating outdoor lighting in parks and protected areas. These six-steps were utilized throughout the evaluation process for Tumacácori's light inventory and will be consulted in any future lighting projects.

- Warranting- Light only WHERE you need it
    - Lighting installations should be placed only where uses dictate.
- Controls- Light only WHEN you need it
    - Rather than defaulting to a dusk-till-dawn operation cycle, lighting controls should be designed to minimize the amount of time the light is on while still fulfilling the need meet by installing the light at that spot in the first place.
- Shielding- SHIELD lights and direct them downward
    - No fixture should emit light above the horizontal. In most cases, beams of light should be restricted even further.
- Spectrum- Select lamps with WARMER COOLERS
    a. Humans and many other animals are most sensitive to blue/white light. Most evening lighting goals can be achieved using warmer temperature lighting, which decreases the disruption to wildlife (including insects), maintains the human ability to adapt to low light conditions, and decreases sky glow.
    b. The color tint of white light is measured in Kelvins (K), a scale in which warm-toned white light has smaller values (1800-3000K) and cold-toned light has larger values (5000K and higher). Between 3000 and 5000K, light is said to be "neutral" in tone. The common incandescent lamp is 2700K.
    c. Traditional incandescent lighting is about 2700K, a warm toned light considered normal for residential and hospitality lighting in North America. For reasons of consistency and appearance, light sources should be 2700-3000K with a minimum Color Rendering Index of 70. Amber or

yellow light sources are preferable, both to limit attraction by insects and to reduce sky glow. Light sources should be chosen for energy efficiency, long life and low maintenance. Because some locations in the park experience extremes of temperature, elevation and exposure, light 41 sources must be suitable for all expected operating conditions. The following light sources are acceptable for outside use:

i. LED 2700K “warm” white lamps, yellow, or amber colored, 1, 3, or 7 watt. LED’s superior 54 life, energy efficiency, instant starting and low temperature performance are superior but some capabilities of the source are limited. Use with caution in hot climates. Use amber LEDs in most environmentally sensitive areas.
ii. Compact fluorescent, 9 watt, twin tube and 13 watt double twin tube or Edison base spiral 3, 7, 10, 13 or 26 watt (2700K only or yellow “bug lamps”). Because of low starting temperature and low cost components, this light source can be used for many basic outdoor lighting applications.
iii. Halogen IR, 20 watt, 12 volt MR16 lamp. Uses are generally limited to temporary (presence detector activated) lighting applications. Because of their low luminous efficacy they should not be used in continuous duty applications.
iv. Ceramic metal halide lamps, 20 watts, T4.5 and 39 watt, T6, 3000K only. In general, these are the most powerful light source to be used outdoors, but warm up and restrike time preclude use where frequent switching or power quality issues are present.

- Intensity- Use the MINIUMUM AMOUNT of light necessary
- Efficiency- Select the most ENERGY EFFICIENT lamp and fixture

III. Lighting Standards

To remain in compliance, all future lighting installations must conform to the following lighting standards:

1. New, current, and retrofitted lighting must meet the Park’s LMP.
2. Any lighting fixtures above 500 initial lumens are required to use **fully shielded** fixtures emitting no light at or above the horizontal.
3. Methods for determining the appropriate type of lamp (color, efficiency, technology) and fixture that should be used with goals to maximize energy efficiency and minimize impact to human vision dark adaptation/recovery time, wildlife, and the nocturnal ecology. The correlated color temperature of lamps installed in the Park shall **not exceed 4000K**, and a CCT of 2500K or less is recommended to minimize the impact on most wildlife.
4. All existing lighting and additions must follow the **Santa Cruz County Zoning and Development Code** and **NPS Management Policies**.

5. Lights should be directed downward and shielded.

IV. Existing Standards and Codes
A Royal Astronomical Society of Canada (RASC) Dark Sky Park is defined as an area whose night sky has little or no sky glow and minimal lighting within the DSP. As such, Tumacácori has created and adapted a lighting guideline outline that minimizes the lighting within the park.

The NPS Interim Outdoor Lighting Guidelines was a document developed by the Night Sky Team to “help parks immediately address lighting concerns, guide development and compliance, and provide a best management practice template to parks and park partners”.

Best management practices for outdoor lighting will:

- Curtail and reverse the degradation of the nighttime visual environment and the night sky, including casual observation, astronomy, and air quality related values.
- Minimize glare, light trespass, obtrusive light, and artificial sky glow by limiting outdoor lighting that is misdirected, excessive, or unnecessary.
- Ensure ―good neighbor lighting‖ by minimizing light trespass.
- Help minimize suspected health risks to humans from adverse exposure to light at night.
- Help protect natural ecosystems from the damaging effects of night lighting.
- Permit reasonable and rational use of outdoor lighting for nighttime safety, utility, security, and productivity.
- Help to conserve energy and resources.
- Minimize maintenance and operating costs.
- Provide some flexibility for architectural and artistic lighting within the above constraints.

Santa Cruz County Zoning and Development Code (2015)
The Outdoor Light Regulations (Article 28) listed in the Santa Cruz County Zoning and Development Code contain the following contents:

ARTICLE 28 – OUTDOOR LIGHTING REGULATIONS
--2801—ADMINISTRATION
--2802—DEFINITIONS
--2803—GENERAL REQUIREMENTS
--2804—PROHIBITIONS
--2805—TEMPORARY EXEMPTIONS
--2806—OTHER EXEMPTIONS
--2807—OUTDOOR ADVERTISING SIGNS
--2808—SPECIAL USES
--2809—LAW GOVERNING CONFLICTS
--2810— CONDITIONAL USE PERMIT
--2811— ENFORCEMENT AND PENALTY

SEC. 2803 GENERAL REQUIREMENTS