

Using GIS to Find Critical Habitat at Risk From Light Pollution

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GIS can be used to analyze and identify a variety of natural resources. One of the resources which can be easy to overlook, but can play such a vital role in an ecosystem's health, are dark sky areas. Many species, including humans, have evolved over thousands of years to react when lighting conditions change in the natural world. The circadian rhythm is probably the best example since it pertains directly to humans, yet it has been observed that many different groups of organisms have responses (which are usually negative) to changes in night lighting. Nighttime light pollution has been shown to impact many types of species' health and development ranging all the way from trees (Massetti 2018) to amphibians (Wise 2007) as well as many higher invertebrates (Gaston et al. 2013).

Due to its energy savings LED lighting is likely not going to stop its expansion in the years to come. Therefore, GIS can be a useful tool in identifying areas which may need to have the outdoor lighting dimmed, removed, or adjusted so that its impact on the surrounding environment can be mitigated if not eliminated.

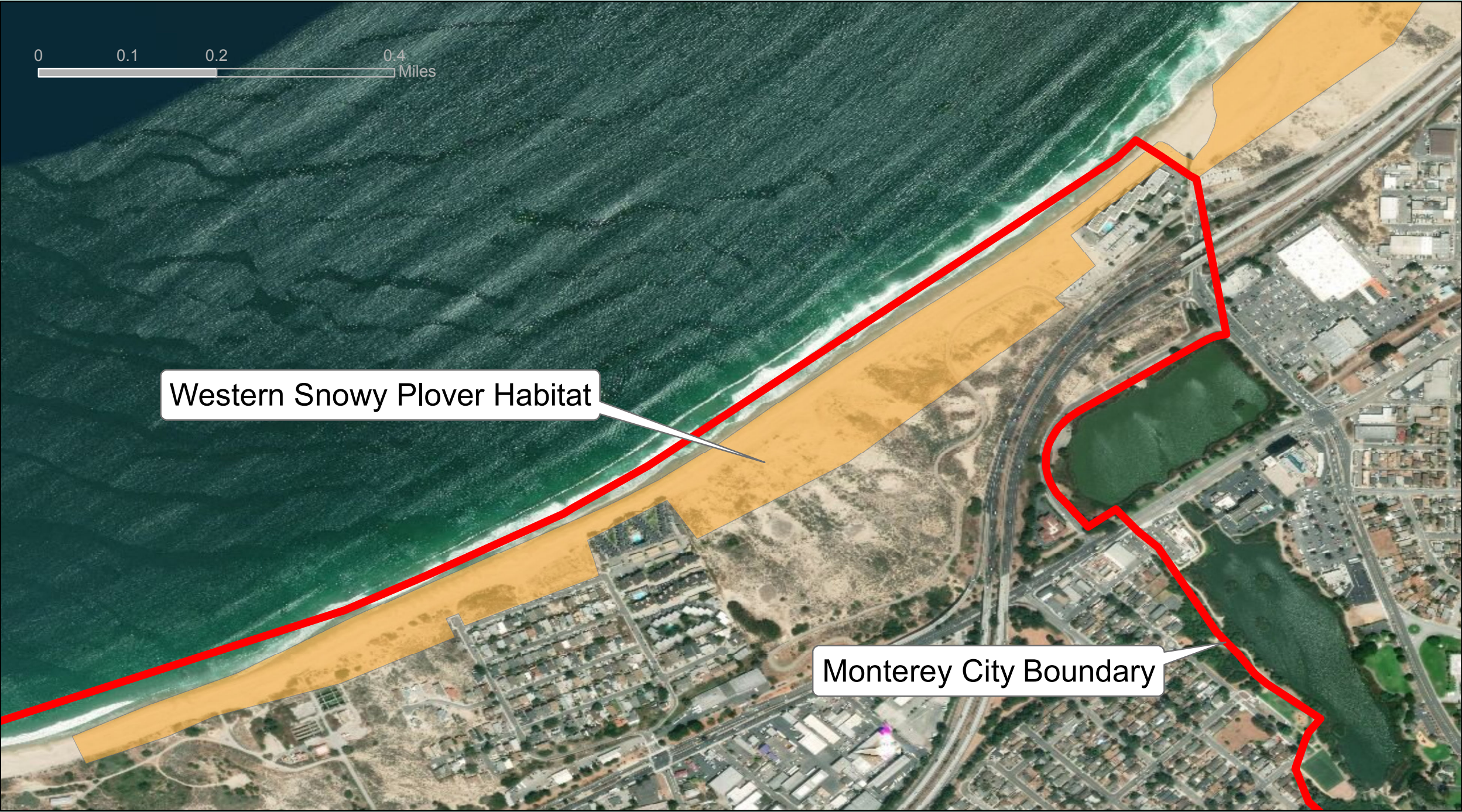
Sources

Human and Environmental Effects of Light Emitting Diode (LED) Community Lighting
L. Kraus 2016

Assessing the Impact of Street Lighting on Platanus x acerifolia Phenology
Massetti 2018

The Ecological Impacts of Nighttime Lightpollution: a Mechanistic Appraisal
Kevin J. Gaston, Jonathan Bennie, Thomas W. Davies, and John Hopkins 2013

Studying the Ecological Impacts of Light Pollution on Wildlife: Amphibians as Models
Sharon Wise 2007



Monterey converted to 4000K LED streetlights, which exceeds the color temperature recommended by the American Medical Association in 2016 of 3000K (Kraus 2016). Any light exceeding this threshold can be considered harmful to humans as well as any nearby organisms which rely on natural cycles of light to migrate, hunt for food, or reproduce.

GIS can be used to identify habitats which may be within or proximate to a city using a type of light (commonly LED) which may prove harmful to the species in question. Below is the city of Monterey, CA which converted to LED streetlighting in 2009. This type of light has a much more intense and white color and can interfere with the natural lifecycle of many different organisms within the same ecosystem. Many species within California, as well as the rest of the world, already have such a limited range of suitable habitat remaining that an event such as an LED conversion, or even being nearby existing outdoor lighting, could prove to have significant impacts on many different types of plants and animals.

