Lighting and Wildlife

Friends of Native Wildlife Inc.

Summary

Recent research into the effects of artificial lighting, particularly using blue/white LEDs, has revealed a wide range of potential negative outcomes to both human health and the natural environment.

We recommend that the latest best practices[1] be adhered to when planning and installing outdoor lighting, particularly in public places. These best practices include:

1. choosing LED lighting with low output at blue, violet and ultraviolet wavelengths ("warm-white" or filtered LEDs with minimal emission below 500nm, based on the spectral power distribution curve)
2. using baffles or appropriate housing design to restrict the spill of light outside the target area
3. ensuring the light is no brighter than necessary

More detail about these recommendations can be found in the National Light Pollution Guidelines for Wildlife published in 2020 by the Department of the Environment and Energy, and endorsed for International use by the 13th Conference of the Parties to the Convention on the Conservation of Migratory Species of Wild Animals (COP13) in Gandhinagar, India.[2]

While FoNW promotes these actions as being a necessary part of preserving native wildlife, these actions also reduce the likelihood of negative outcomes for both the health and security of local residents. Following these best practices is beneficial for our native wildlife as well as residents. An added benefit is that following these guidelines is likely to result in reduced running costs for the lighting.

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General Considerations

There are many studies showing that artificial lighting adversely affects native animals.

Directly relevant to the Bayside foreshore area is a local study supported by Friends of Native Wildlife Inc. (FoNW), comparing natural and lit coastal areas. It revealed the adverse effects of artificial lighting on the numbers of species of microbats which are supported in native coastal habitat.[3]

Studies also show that artificial lighting can increase wildlife mortality, partly because the lighting assists predators.[4,5,6,7,8,9]

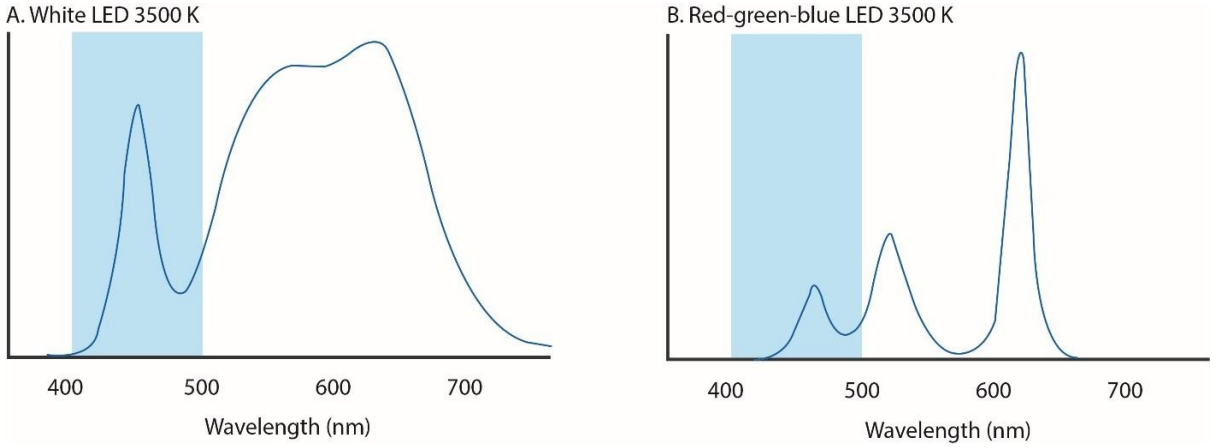
Migrating animals that fly can be confused by artificial lighting. In some cases their navigation system is affected, meaning they do not all reach their destination. For others, the lighting confuses their detection of changing seasons, affecting the timing of their migration such that they leave too early or too late. In both situations, their survival rate is reduced. This can be a slow path to extinction for both them and the animals that rely on migrating species to feed their young.[2,10,11,12]

The more sedentary wildlife can also be adversely affected by artificial lighting. Once again, the lighting can affect wildlife's detection of the changing seasons and alter breeding seasons, so the young are not born when food is most available.[13]

Animals that call after dark to attract mates, including frogs, crickets and birds, have been shown to be less successful at reproducing in the presence of artificial light, leading to a slow decline in population and potential local extinction.[9,14,15,16]

Plant pollination is also adversely affected, with fruit and seed production being reduced by as much as 13% in lit areas.[17,18] Many insect pollinators are nocturnal and use violet and ultra-violet light to find flowers. The presence of artificial light in these wavelengths makes it difficult for these pollinators to find the flowers.

While different species are affected by different wavelengths of light, the most generally problematic are wavelengths in and beyond the blue spectrum (below 500nm). As humans cannot see some of these wavelengths, it is impossible to judge by the look of the light how much is emitted in this range. The stated colour temperature of the light is also not indicative. The spectral power distribution curve should be referred to when deciding on a light source.[2]



A comparison of the blue wavelength spectral content of two LED lights with the same CCT (3500k). The blue band shows the blue region of the visible spectrum (400–500 nm). The light in A has a much greater blue light content than B yet the two appear to the human eye as the same colour. For animals with differing sensitivities to light wavelength from humans, they may appear very different. (From page 38 of National Light Pollution Guidelines for Wildlife[2])

Exceptions

While in general avoiding blue light is desirable, there are some species that can be adversely affected by longer wavelengths (for example, some bird species). We recognise it is impractical to always cater for every species that might perhaps inhabit or pass through an area. Therefore we recommend a default approach of avoiding or minimising light at wavelengths below 500nm, but reassessing this approach for any area believed to be important to a vulnerable species.

Human Health

Recent research also highlights potential negative effects to human health, particularly from long term exposure to light in the 400-490nm range. Negative effects to humans may include confusion, irritability, mood swings, age-related macular degeneration[19], increased risk of cancer and auto-immune diseases including asthma.[20]

Lighting that is brighter than necessary can reduce security and safety through increased glare, resulting in compromised vision. This is a greater risk with blue-rich light sources and aging eyes.[21],[22]

Details regarding the potential impacts on human health are beyond the scope of this document, however further information may be found on the websites of many medical authorities and journals.

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14 https://www.abc.net.au/news/science/2020-06-20/light-pollution-is-bad-for-us-and-for-wildlife/12373776
15 https://www.darksky.org/5-species-threatened-by-light-pollution/
16 https://www.froglife.org/2019/11/28/croaking-science-artificial-light-at-night-a-problem-for-amphibians/
17 https://www.nature.com/articles/nature23288
18 https://www.bbc.com/news/science-environment-40803960
19 https://www.pointsdevue.com/article/role-blue-light-pathogenesis-age-related-macular-degeneration
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