

**5<sup>th</sup> Meeting of the Sessional Committee of the  
CMS Scientific Council (ScC-SC5)**

*Online, 28 June – 9 July 2021*

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**LIGHT POLLUTION AND MIGRATORY SPECIES**

*(Prepared by the COP-appointed Councillor for Marine Pollution and the Secretariat)*

Summary:

Through Decisions 13.138 and 13.139, the Conference of the Parties (COP) to CMS requested the Secretariat and the Scientific Council to consider CMS's engagement with the issue of light pollution, noting the existing guidelines passed at COP13.

This paper provides a short overview of the work being undertaken, including some of the more recent scientific contributions, based on a review of the literature.

The Sessional Committee is expected to make recommendations to the Secretariat on the need to develop additional guidelines on taxa not covered by the guidelines already endorsed by migratory species; consider and make suggestions on how the issue of light pollution could be addressed within a WMBD campaign; and to discuss and agree on any further work of the Scientific Council on this issue.

## LIGHT POLLUTION AND MIGRATORY SPECIES

### Background

1. The Conference of the Parties at its 13<sup>th</sup> meeting (COP13, Gandhinagar, India, 2020) adopted Resolution 13.5 *Light Pollution Guidelines for Wildlife*. The Resolution acknowledges that artificial light is increasing globally and that it is known to adversely affect many species and ecological communities by disrupting critical behaviours in wildlife and functional processes, stalling the recovery of threatened species, and interfering with a migratory species' ability to undertake long-distance migrations integral to their life cycle, or by negatively influencing insects as a main prey of some migratory species. The Resolution also endorses the *National Light Pollution Guidelines for Wildlife including Marine Turtles, Seabirds and Migratory Shorebirds*, as annexed to the Resolution.
2. Through Decisions 13.138 and 13.139 *Light Pollution Guidelines for Wildlife*, COP13 mandated the Secretariat and the Scientific Council to undertake further work on the subject, notably on taxa of migratory species not covered by the guidelines. The Decisions read as follow:

#### **13.138 Decision directed to: Secretariat**

*The Secretariat shall:*

- a) *suggest to its partners that one of the next World Migratory Bird Days should be dedicated to highlighting the effects of light pollution on migratory birds (and also taking into account its effects on bats, marine turtles, insects and other affected animals);*
- b) *subject to the availability of resources, prepare guidelines for adoption by COP14 on how to effectively avoid and mitigate the indirect and direct negative effects of light pollution for those taxa not yet in the focus of the Guidelines for Wildlife, including Marine Turtles, Seabirds and Migratory Shorebirds taking also into account other existing guidance as relevant.*

#### **13.139 Decision directed to: Scientific Council**

*The Scientific Council is requested, subject to the availability of resources, to consider these issues in its first meeting of the Sessional Committee after COP13, including suggestions regarding how World Migratory Bird Day might be used to highlight the issues associated with light pollution.*

### Progress in the implementation of COP13 mandates in Decisions 13.138 and 13.139

3. World Migratory Bird Day. The Secretariat is exploring with its partners the possibility of dedicating one of the next World Migratory Bird Days (WMBD) to the effects of light pollution on migratory birds and other migratory animals. The Sessional Committee at the present meeting is expected to consider and make suggestions on how the issue of light pollution could be addressed within a WMBD campaign, taking note of other campaigns such as "Lights Out" led by other organizations.

4. Light Pollution Guidelines. The Secretariat plans to implement Dec. 13.138 b) in close consultation with the Scientific Council, through a step-wise approach, which foresees:
  - i) The initial production of an overview of the information available on the impact of light pollution on different taxa of migratory species of relevance to CMS, and of existing guidelines or similar tools to prevent or mitigate those impacts;
  - ii) Based on the overview, identify possible gaps in the availability of appropriate guidelines and decide on the need to develop additional guidelines and/or consolidate existing guidelines with a view to filling those gaps;
  - iii) Work towards the development of additional or consolidated guidelines with a view to submitting them to COP14 for consideration and adoption.
5. Thanks to a generous voluntary contribution from the German Federal Ministry for the Environment, Nature Conservation and Nuclear Safety, the Secretariat, in consultation with the COP-appointed Councillor for Marine Pollution, has been able to contract a consultant to produce an overview foreseen in paragraph 4. i) above. At the time this document is being finalized, the overview is being produced. It is expected to be made available to the 5<sup>th</sup> meeting of the Sessional Committee as an information document prior to the meeting. Some preliminary findings are summarized in the Annex to this document.

#### Discussion and analysis

6. On the basis of the review mentioned above, the Sessional Committee is requested to provide its recommendations in respect to possible gaps in the availability of appropriate guidelines to prevent or mitigate impacts of light pollution on taxa of migratory species not covered by the guidelines already endorsed by Res. 13.5, and decision on the need to develop additional guidelines and/or consolidate existing guidelines with a view to filling those gaps. Some resources are available for this purpose from the above-mentioned voluntary contribution provided by the Government of Germany.
7. Besides the specific mandate related to the production of guidelines, Dec. 13.139 provides a broader mandate to the Scientific Council to consider the issue of the effects of light pollution on migratory species, and provide advice on appropriate action that could be undertaken within the framework of the Convention to mitigate them.
8. The Sessional Committee might in particular consider linkages of the present mandate on light pollution with other mandates to the Scientific Council in relation to the mitigation of threats to taxa or groups of species, such as
  - i) Decision 13.70 *Marine Turtles*, requesting the Scientific Council to review relevant scientific information on conservation and threats to marine turtles;
  - ii) Decision 13.129 *Insect Decline and its Threat to Migratory Insectivorous Animal Populations*, requesting the Scientific Council to consider, in the meetings of its Sessional Committee after the 13th meeting of the Conference of the Parties (COP13), the following topics: a) identifying and prioritizing the main factors causing the established loss of insect biomass; b) collecting relevant information regarding the current insect decline, and assessing its cascading effects on migratory insectivorous animal species; c) developing guidelines for the most urgent or prioritized actions identified; d) publishing any such guidelines following circulation to all Parties for approval.

### Recommended actions

9. The Sessional Committee is recommended to:
  - a) take note of this document and the associated overview report submitted separately as an information document;
  - b) consider and make suggestions on how the issue of light pollution could be addressed within a WMBD campaign;
  - c) make recommendations to the Secretariat on possible gaps in the availability of appropriate guidelines to prevent or mitigate impacts of light pollution on taxa of migratory species not covered by the guidelines already endorsed by Res. 13.5, and the need to develop additional guidelines and/or consolidate existing guidelines with a view to filling those gaps; and
  - d) discuss and agree on any further work of the Scientific Council on this issue, considering links with other mandates to the Scientific Council in relation to the mitigation of threats to taxa or groups of species, such as marine turtles and insects.

**SUMMARY OF PRELIMINARY FINDINGS OF A REVIEW OF THE INFORMATION AVAILABLE ON THE IMPACT OF LIGHT POLLUTION ON DIFFERENT TAXA OF MIGRATORY SPECIES OF RELEVANCE TO CMS**

1. The increasing use of electric lights has modified the natural light environment dramatically and this can have effects on both humans and wild animals. The last century has seen an unprecedented increase in the use of artificial light at night (ALAN), with a current ongoing global increase rate of more than 6% per year (Hölker et al., 2010). Organisms have evolved many mechanisms to detect and use light and these uses include the involvement of light in mechanisms essential for growth and survival, including synchronisation of their internal circadian clocks (Falcón et al., 2020). It is increasingly recognised that hormonal synthesis and secretion are often under circadian and circannual control, meaning that perturbation of these internal clocks will lead to hormonal imbalances and other problems.
2. Until relatively recently, the effects on wild animals have received little attention (Poot et al., 2008). Helm (2021) in her recent overview article suggests that some consequences are easy to see, such as birds singing in the middle of the night under streetlamps, whereas other consequences may be more cryptic, and she provides the example of a recent study showing that light from ships can disturb the behaviour of many marine species down to a depth of 200 meters. Falcón et al. (2020) in their recent review described this situation thus '*... most of the basic functions of living organisms are controlled by... internal, genetically determined, clocks. These clocks depend absolutely on the 24 h LD<sup>1</sup> cycle to accurately synchronize their activity with solar time, and in turn they orchestrate a myriad of downstream biochemical, physiological and behavioural events so that the right process occurs at the right time. Thus, changing the natural LD cycle cannot be without consequences for biological organisms.*'
3. Numerous examples now exist in the literature of how ALAN is affecting animal behaviour and survival, including impacts on foraging, orientation, migration, seasonal reproduction and colonization (Falcón et al., 2020). Many animal species are known or expected to be affected. Whilst the underlying physiological mechanisms are different and there is less available scientific literature, invertebrates as well as vertebrates are affected by ALAN (Falcón et al., 2020). A number of studies indicate impacts on fish, although studies in the wild are, at best, rare. ALAN has clear impacts on insects and may contribute to population declines in light-polluted areas (Grubisic et al., 2018). Vowles and Kemp (2021) refer to a terrestrial bias in the available research but also state that there is 'a small but growing body of evidence highlighting negative impacts on freshwater taxa' and that light pollution is increasingly considered a major emerging threat to freshwater biodiversity. Their own research suggests it is a particular threat to the endangered European eel (*Anguilla anguilla*). Similarly, a number of studies indicate impacts on amphibians. Studies on reptiles are generally relatively few, with the exception of effects on turtle nesting activity, which is well known and well characterized.
4. A significant proportion of the available literature is focused on birds. The threat to migrating birds, which typically conduct part of their journeys during the night-time, is well recognised with a growing associated literature. Many nocturnally migrating birds die or lose a large amount of their energy reserves during migration as a result of encountering artificial light. For example, in the North Sea, large numbers of nocturnally migrating birds are attracted to the many offshore platforms (Poot et al., 2008). Novel techniques are coming forward to help analyse the artificial illumination that migrating birds are encountering (e.g. Horton et al., 2018). The recent scientific literature on mammals focuses on bats but there are also a small number of studies on nocturnal primates.

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<sup>1</sup> LD = light darkness

## References

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