



## **Migratory Species and Climate Change Expert Workshop**

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### **MONARCH BUTTERFLIES AND OTHER INVERTEBRATES AID IN ALPINE MEADOW HEALTH**

*(Based on a document prepared by the UK Government)*

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## **Monarch Butterflies and other invertebrates aid in Alpine Meadow health**

**Ecosystem - Meadows:** Alpine meadows in North America, typically found in high-elevation regions like the Rocky Mountains and Sierra Nevada, are ecosystems characterised by short growing seasons, extreme temperature variations, and specialised vegetation (Rundel & Millar, 2016). These meadows support diverse endemic plant and animal species with specific niches, including wildflowers, grasses, butterflies, and bighorn sheep. They play a crucial role in carbon sequestration, soil stabilisation, and water filtration. However, alpine meadows face significant threats from climate change, which affects snowpack levels, alters water availability, and shifts vegetation zones.

**Species - Monarch Butterflies:** Monarch butterflies (*Danaus plexippus*) are the only CMS listed invertebrate species. They were included in *CMS Appendix II* in 1979, recognising the species' critical ecological role and the importance of coordinated international efforts to conserve their migratory pathways (UNEP/CMS, 2017). They are renowned for their extensive migration, traveling up to 3,000 miles between their breeding grounds in North America and wintering sites in Mexico (Lopez-Hoffman *et al.*, 2010; Zipkin *et al.*, 2012). Their presence is an indicator of ecosystem health, as they are sensitive to habitat changes resulting from agricultural practices and climate shifts (Batalden *et al.*, 2019). During migration, monarchs depend on nectar-rich flowers and their life cycle is closely tied to the availability of milkweed (*Asclepias* spp.), the sole host plant for monarch caterpillars (Brower *et al.*, 2011; Zipkin *et al.*, 2012; Malcolm, 2018).

**Ecosystem services - pollination:** Pollinators support the health and biodiversity of the ecosystem by enhancing ecosystem resilience and carbon sequestration through supporting the reproduction, growth, and genetic exchange of numerous plant species, maintaining biodiversity, promoting healthy ecosystems, and reducing the impacts of habitat degradation (Brower *et al.*, 2011; Gordon *et al.*, 2020). Through stabilising soil, enhancing water filtration and retention, and acting as carbon sinks, meadow and grassland habitats serve as important buffers against climate change in North America (Pleasants & Oberhauser, 2013; Flockhart *et al.*, 2015; Thogmartin *et al.*, 2017). However, climate change poses significant threats to both monarch populations and their habitats. For instance, rising temperatures have been shown to affect the phenology of milkweed, causing shifts in flowering times that can disrupt their life cycle. The availability of these plants may also be compromised by increased drought conditions or habitat fragmentation from human development. Declines in monarch butterflies then have subsequent impacts on native species such as the American goldfinch (*Spinus tristis*) that rely on seeds produced by flowering plants (Thogmartin *et al.*, 2017; Peters *et al.*, 2018; Zylstra *et al.* 2022).

**Conservation Actions:** Primary conservation measures include protecting wilderness areas, regulating grazing, and monitoring climate impacts to preserve biodiversity. Further conservation efforts, such as habitat restoration and sustainable agriculture, are also essential. The *CMS Action Plan for Insect Pollinators* focuses on threat mitigation whilst emphasising the protection and restoration of pollinator habitats (Gordon *et al.*, 2020; UNEP/CMS, 2020; Monarch Joint Venture, 2023).

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Additional from CMS Report 1 to read:

Crewe et al. 2019; Crossley et al. 2022; Yang et al. 2022a; Batalden et al. 2014; Lemoine 2015; Svancara et al. 2019; Culbertson et al. 2022; Dingle et al. 2005; Satterfield et al. 2020.