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“WILL MONARCH BUTTERFLIES GO EXTINCT? - THE VIEW FROM ‘DOWN UNDER’.”

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Abstract

The monarch butterfly (Danaus plexippus) is an iconic species well recognized by the public as it is often used in advertising. The species is known for its spectacular migrations, overwintering behaviour and is often used to teach school children about basic insect biology. The populations of monarchs in North America have steadily declined over the last 20 years. The likely threatening processes are deterioration of overwintering sites, climate effects on spring-summer breeding success and landscape level changes in core breeding range; the latter overlaps with corn-soybean production areas in North America. The evidence for climate change effects on spring-summer breeding success are at best weak and overwintering site deterioration has been arrested if not reversed. Changes in the agricultural landscapes have been dramatic, due to widespread adoptions of genetically modified corn and soybean that are resistant to herbicides (“Roundup Ready”) and has resulted in the decimation of milkweed (Asclepias spp.) hosts over large areas due to the increased use of glyphosate. The decline in milkweed resources can have a dramatic effect on monarch egg laying. We have developed various models to describe host-seeking behaviour over the lifetime of a monarch butterfly, which utilizes hosts both aggregated in patches and scattered across the wider landscape as a substrate for laying eggs. The potential consequences of cleaning up the matrix (i.e. the obliteration of non-crop vegetation with Roundup) and changing habitat configurations at a landscape scale on individual movement behaviours and the emergent number of eggs laid, essentially the birth term in any population model, are large. Essentially the extirpation of milkweed has potentially reduced egg laying by 30% to 90% in monarchs.