

Machair Restoration and Conservation of the Great Yellow Bumblebee (*Bombus distinguendus*)

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Background: The great yellow bumblebee, once widespread throughout the UK, is now found only in the north and west of Scotland. Remaining populations of this bee are strongly associated with machair (fig. 1), a florally rich coastal grassland habitat unique to Scotland and Ireland. The rotational cropping and grazing regimes which crofters traditionally implement on the machair are responsible for maintaining the floral diversity of this habitat.



Figure 1. Northton machair, Harris

However, low intensity agriculture has become increasingly economically unviable and consequently crofting practices have been subject to considerable change. One consequence of these changes has been the loss of floral diversity on the machair (e.g. fig. 2), and this in turn has implications for populations of great yellow bumblebee which rely upon the habitat.



Figure 2. Bornish machair, South Uist

Machair Management Field Trial:

In order to establish the most effective method for restoring floral diversity to degraded machair, a field trial has been set up on the Southern Hebridean Island of Oronsay. An area of machair was ploughed in March 2007 and sown with five treatments, each with five replicates, in quasi complete Latin square design (fig.3). The availability of flowers and the abundance of foraging bumblebees in each treatment type was monitored throughout the Summer 2008 and 2009.

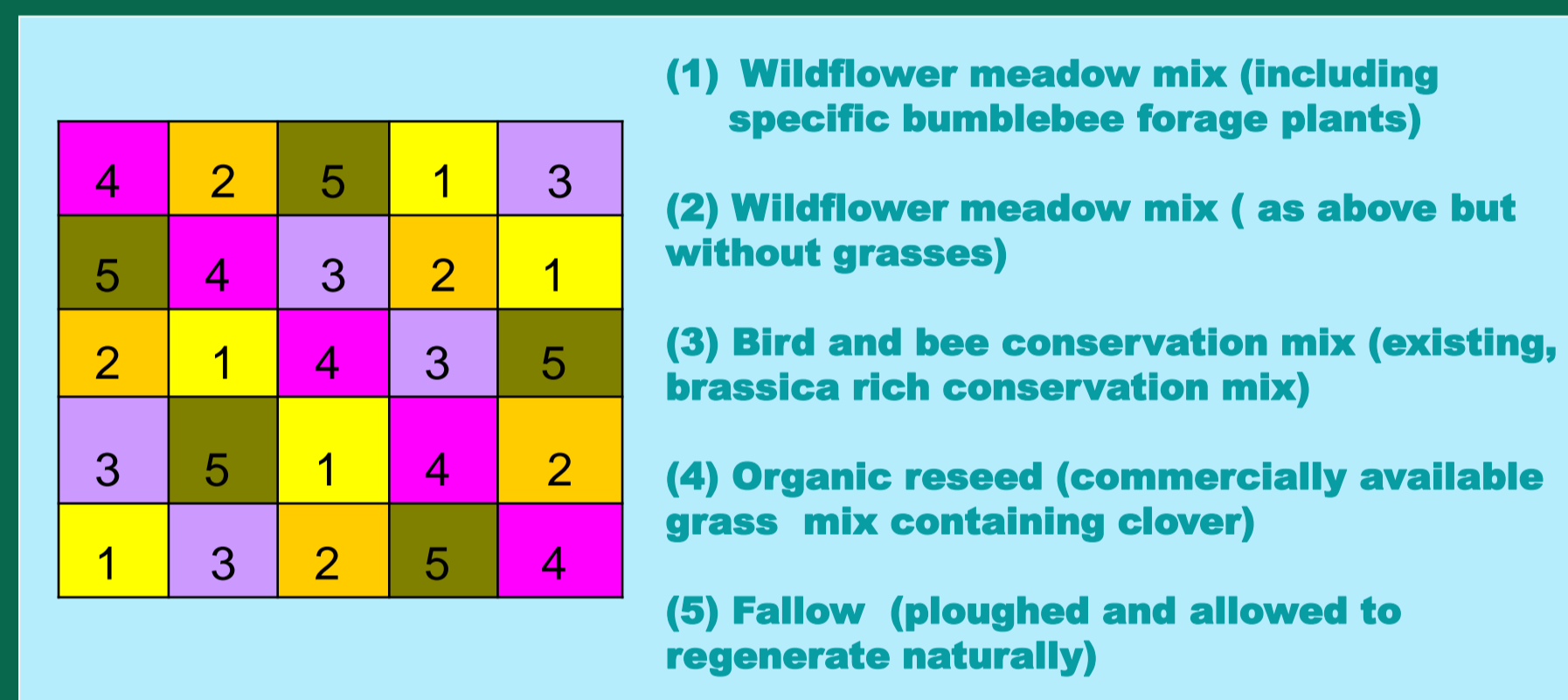


Figure 3. The arrangement of machair restoration treatments,

Results: Five *Bombus* species were recorded foraging at the site between June and August 2008 and 2009. Kruskal-Wallis tests were carried out to compare the abundance of bumblebees observed foraging on the five treatments in June, July and August.

• In July and August 2008, a significant difference was found between the number of foraging bumblebees on the five treatments ($H_4 = 15.54$ $P = 0.004$ and $H_4 = 16.05$ $P = 0.003$ respectively) (fig. 4).

• Subsequent pairwise comparisons revealed that bumblebees were observed foraging more frequently on 'wildflower 1', 'wildflower 2' and 'fallow' treatments in July. In August, the two wildflower treatments attracted significantly more bumblebees than all other treatments.



Figure 5. *Bombus distinguendus*

• In 2009, the number of foraging bumblebees was significantly different between treatments in August only. Similarly to data collected in 2008, in this month both 'wildflower 1' and 'wildflower 2' treatments attracted significantly more bumblebees than all other treatments.

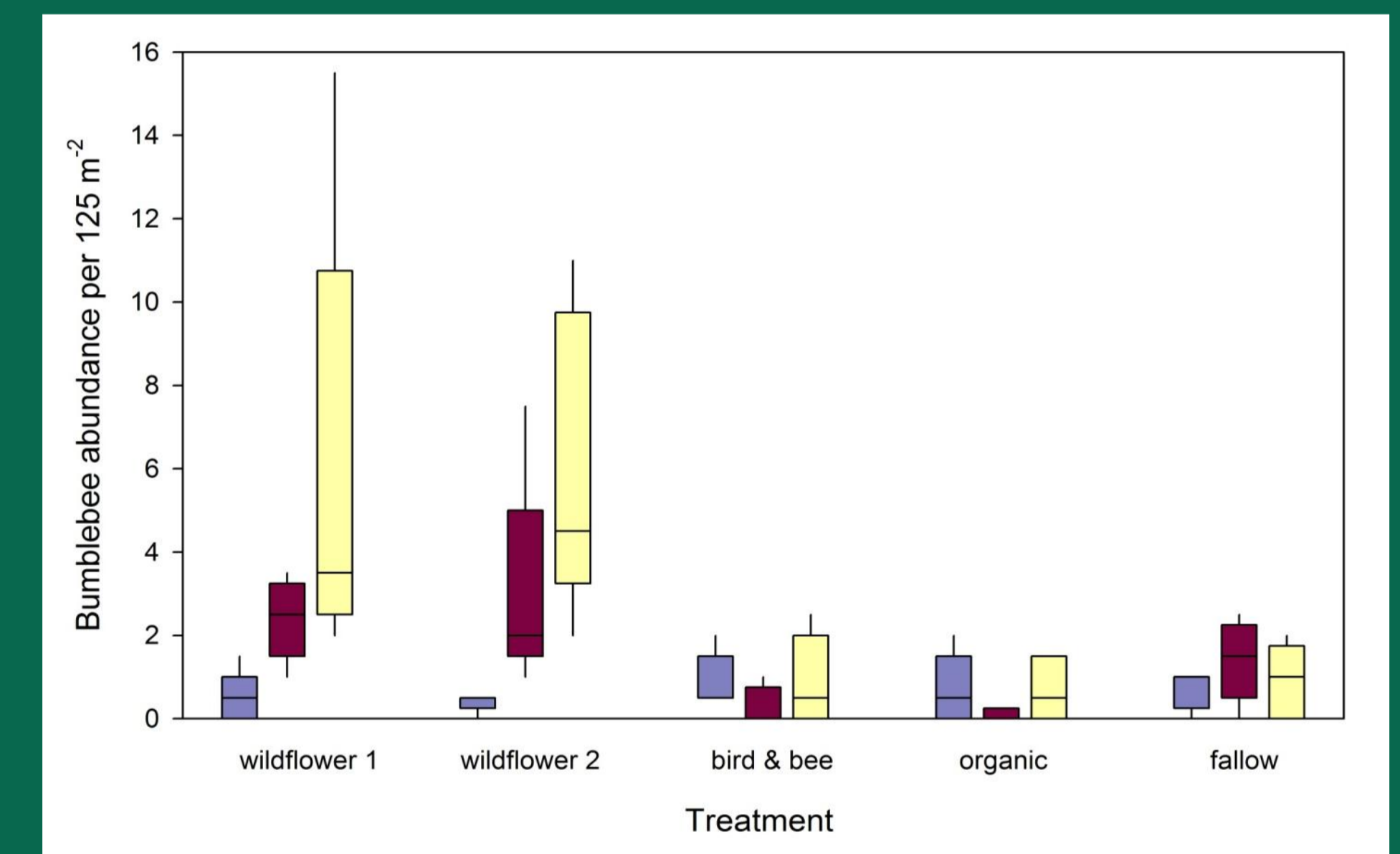


Figure 4. The median abundance of bumblebees per 125 m² of each treatment type compared across June (purple), July (red) and August (yellow) 2008.

Future work: The same surveying methodology will be employed at the field site in 2010. The data collected over this three year period will provide a realistic indication of how best to restore bumblebee forage plant material to areas of degraded machair, and in particular the plants that are important for *Bombus distinguendus* (fig. 5).