

Impacts of Landscape Disturbance on Plant Reproductive Success: Are There General Trends and Patterns?

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Introduction:

- Landscape disturbance has been shown to negatively impact the overall abundance and richness of unmanaged bee species (Winfree *et al.* 2009); however the impacts of similar disturbances on plant reproductive success have not been quantitatively synthesized.
- A meta-analysis was carried out to address this question.

Methods:

- Published studies were located using ISI Web of Science using the search terms (crop success OR reproductive success OR pollen limitation) AND (disturbance).
- 37 independent data points from 13 published studies were identified.
- Effect size was calculated as Hedges' unbiased standardized mean difference (Hedges' *d*) and analyzed using random-effects models.
- Analyses were carried out using the R statistical computing program (metagen function, meta package).

Results – Overall and disturbance type:

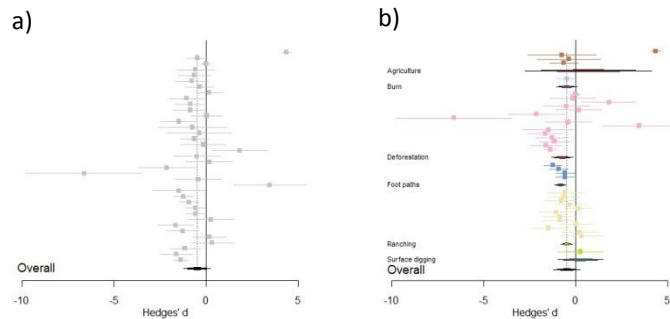


Figure 1. Effect sizes overall (a) and sorted by disturbance type (b). Dashed line indicates the weighted effect size mean for all studies, solid line indicates zero. Effects that do not overlap are considered significantly different from zero.

Results – Biome and crop type:

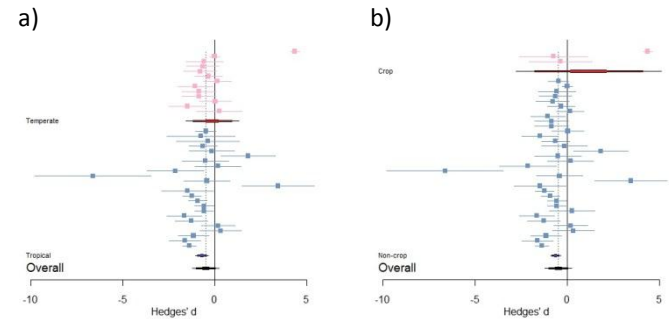


Figure 2. Effect sizes sorted by biome (a) and crop type (b). Dashed line indicates the weighted effect size mean for all studies, solid line indicates zero. Effects that do not overlap are considered significantly different from zero.

Conclusions:

- Overall, most data points show negative impacts of disturbance, however this effect was not statistically significant ($p=0.1803$).
- Some individual effects were significantly different from zero (Figures 1 and 2). Interestingly, certain types of disturbance, such as paths, deforestation and ranching had consistently negative impacts, while others, such as burns, were less consistent. We are continuing to collect data to improve the power of our analysis.

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References:

Winfree, R, Aguilar, R, Vázquez, DP, LeBuhn, G, Aizen, MA. 2009. A meta-analysis of bees' responses to anthropogenic disturbance. *Ecology* 90(8):2068-2076 .

