



Find your next career at
Johnson & Johnson

WILEY Job Network

Apply today! ▶

Optimal design of agricultural landscapes for pollination services

1. Berry J. Brosi¹,
2. Paul R. Armsworth²,
3. Gretchen C. Daily¹

Article first published online: 12 MAY 2008

DOI: 10.1111/j.1755-263X.2008.00004.x

© 2008 Blackwell Publishing, Inc.

Issue



Conservation Letters

Volume 1, Issue 1, ([/doi/10.1111/conl.2008.1.issue-1/issuetoc](https://doi.org/10.1111/conl.2008.1.issue-1/issuetoc)) pages 27–36, April 2008

Additional Information

How to Cite

Brosi, B. J., Armsworth, P. R. and Daily, G. C. (2008), Optimal design of agricultural landscapes for pollination services. *Conservation Letters*, 1: 27–36. doi: 10.1111/j.1755-263X.2008.00004.x

Author Information

1 Center for Conservation Biology, Department of Biological Sciences, Stanford University, 385 Serra Mall, Stanford, CA 94107, USA

2 Department of Animal and Plant Sciences, University of Sheffield, Alfred Denny Building,

Western Bank, Sheffield S10 2TN, UK

*Correspondence Berry J. Brosi, Center for Conservation Biology, Department of Biological Sciences, Stanford University, 385 Serra Mall, Stanford, CA 94107, USA. Tel: +1-650-450-3715; fax: +1-650-723-5920. E-mail: bbrosi@stanford.edu (<mailto:bbrosi@stanford.edu>)

Publication History

1. Issue published online: 4 JUL 2008
2. Article first published online: 12 MAY 2008
3. Received: 18 October 2007; Revised 26 October 2008; accepted 6 January 2008.

- Abstract
- [Article \(/doi/10.1111/j.1755-263X.2008.00004.x/full\)](/doi/10.1111/j.1755-263X.2008.00004.x/full)
- [References \(/doi/10.1111/j.1755-263X.2008.00004.x/references\)](/doi/10.1111/j.1755-263X.2008.00004.x/references)
- [Supporting Information \(/doi/10.1111/j.1755-263X.2008.00004.x/supinfo\)](/doi/10.1111/j.1755-263X.2008.00004.x/supinfo)
- [Cited By \(/doi/10.1111/j.1755-263X.2008.00004.x/citedby\)](/doi/10.1111/j.1755-263X.2008.00004.x/citedby)

[View Full Article with Supporting Information \(HTML\) \(/doi/10.1111/j.1755-263X.2008.00004.x/full\)](/doi/10.1111/j.1755-263X.2008.00004.x/full)
[Get PDF \(193K\) \(/doi/10.1111/j.1755-263X.2008.00004.x/pdf\)](/doi/10.1111/j.1755-263X.2008.00004.x/pdf)

Keywords:

Pollination; agriculture; ecosystem services; bees; spatial modeling; landscape design

Abstract

Developing landscape design principles for the provision of ecosystem services is crucial to efficient and widespread implementation of environmental service-based projects. We investigate optimal farm design for agricultural pollination services from bees nesting in native habitat, integrating ecological and economic approaches in a spatial modeling framework. We evaluate the simplest case, and then add consideration of bee metapopulation dynamics and heterogeneity in farmland productivity. We find that the need for spatially even pollination coverage across farms means that bee habitat is often denser at the edges, rather than the centers, of optimally designed farms, and also highly constrains the ability of farmers to site bee habitat in less-productive areas of farms with spatial gradients in agricultural fertility. Optimal farm configuration is not purely a matter of uniform size and spacing of bee habitat: in some circumstances, farms combine large parcels—to ensure bee population persistence—with smaller, dispersed patches to provide spatially continuous pollination services. The highest-yield farm designs are those with a relatively small (but non-zero) area of pollination reservoirs, suggesting a conservation strategy of small parcels of service-providing habitat interspersed throughout working landscapes. The design principles outlined here are likely general and applicable to other ecosystem services supplied at local scales, such as agricultural pest control.

[View Full Article with Supporting Information \(HTML\) \(/doi/10.1111/j.1755-263X.2008.00004.x/full\)](/doi/10.1111/j.1755-263X.2008.00004.x/full)

[Get PDF \(193K\) \(/doi/10.1111/j.1755-263X.2008.00004.x/pdf\)](#)

More content like this

Find more content:

- [like this article \(/advanced/search/results?articleDoi=10.1111/j.1755-263X.2008.00004.x&scope=allContent&start=1&resultsPerPage=20\)](#)

Find more content written by:

- [Berry J. Brosi \(/advanced/search/results?searchRowCriteria\[0\].queryString="Berry J. Brosi"&searchRowCriteria\[0\].fieldName=author&start=1&resultsPerPage=20\)](#)
- [Paul R. Armsworth \(/advanced/search/results?searchRowCriteria\[0\].queryString="Paul R. Armsworth"&searchRowCriteria\[0\].fieldName=author&start=1&resultsPerPage=20\)](#)
- [Gretchen C. Daily \(/advanced/search/results?searchRowCriteria\[0\].queryString="Gretchen C. Daily"&searchRowCriteria\[0\].fieldName=author&start=1&resultsPerPage=20\)](#)
- [All Authors \(/advanced/search/results?searchRowCriteria\[0\].queryString="Berry J. Brosi" "Paul R. Armsworth" "Gretchen C. Daily"&searchRowCriteria\[0\].fieldName=author&start=1&resultsPerPage=20\)](#)