

# Optimizing corridor placement using simulated annealing

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how many different chapter ones will i have hmmm

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## Introduction

Human activity has rapidly reshaped the face of Earth's surface, leaving fragments of patchy habitat. Although there is no shortage of debate as to the effects of fragmentation *per se* on biodiversity and ecosystem function (**cite?**), it is generally accepted that the combination of habitat and ensuing subdivision produce negative outcomes for ecosystem function and services (**resasco?** review).

In order to mitigate the consequences of landscape change on ecosystems, developing landscape *corridors* has seen much attention in the last several decades. Bit more evidence for corridors here. But still, the spatter of fragments in a landscape, where should ecologists choose to use their limit resources to build a corridor?

Here we propose to answer that question by proposing an algorithm to estimate the landscape modification that results in optimizing a specific ecosystem process (in this paper maximizing the time until extinction of a metapopulation, although the algorithm and associated software can be generally applied to any process-based model with a quantifiable target state).

Although algorithms have been proposed for this (**peterman?** etc), they are focused on finding the where the paths of least existance for a given species is given data on that species dispersal.

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## An algorithm for optimizing corridor placement

Start with some definitions and notation.

The set of possible landscape modifications,  $\mathbb{M}$ .

The transition probability function,  $q$ , which gives the probability of moving from one modification  $i \in \mathbb{M}$  to a new proposed state  $j \in \mathbb{M}$ , as a function of a chains temperature.

Here we define  $q(i, j)$  using a logistic function,

$$q(i, j) = \frac{1}{1 + e^{\alpha(s(j) - s(i))}}$$

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## Simulation of data for testing the algorithm

### 3.1. Simulation of occupancy dynamics

### 3.2. Simulation of landscapes

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## Results

*MTE versus epoch fig*: shows the chains move toward higher extinction times over time, i.e. it works.

*Some type of performance fig vs. raster size and budget figure*

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## Discussion