# Optimizing corridor placement using simulated annealing

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how many different chapter ones will i have hmmm

# 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.

# 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,

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

# Simulation of data for testing the algorithm

## Simulation of occupancy dynamics

## Simulation of landscapes

# 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***

# Discussion