

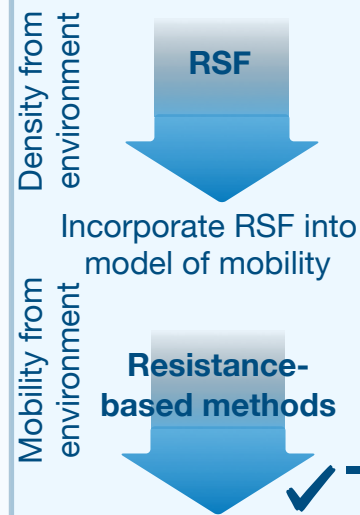
Mechanistic

Identify hypothesized mechanisms

Gather covariates and
append to points

Model density and mobility

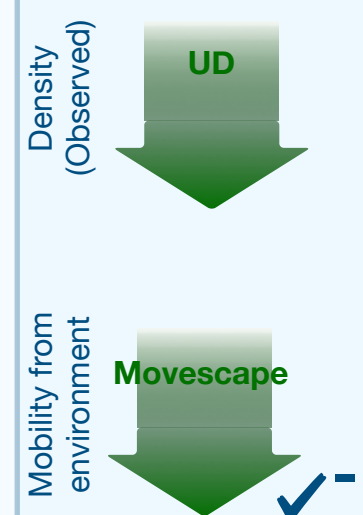
Example strategy 1: Inferred approaches



Example strategy 2: Inferred approaches



Example strategy 3: Descriptive approaches



Predict movement trajectories

Model transmission

IBMs
Metapop models
PDEs

Evaluate transportability in novel setting

Refine mechanistic expectations

Model contact

Account for lags

MoveSTIR

Segment paths

HMM
BPMM
BMS

✓ *

Network-based

Model contact

Segment paths

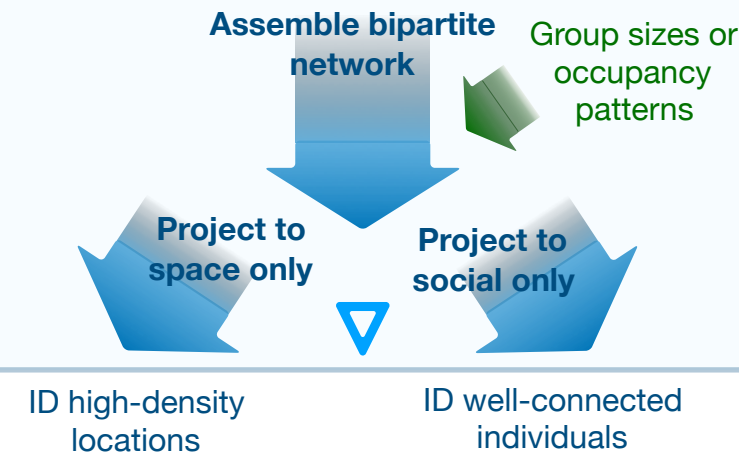
HMMs

Account for lags

MoveSTIR

✓ *

Model density and mobility



Extract node degrees or strengths

Identify hypothesized mechanisms

Evaluate links to environmental and social attributes

Model transmission

Evaluate transportability in novel setting

Refine mechanistic expectations

Mining-modeling

Identify hypothesized mechanisms

ID and produce desired features

Model density and mobility

Example strategy 1: Single focal process

Random forests for habitat selection

Long short-term memory algorithms for behavioral state-switching

Build algorithm relating movements to features

✓ *

Example strategy 2: Full trajectory

State-transitions

Behavioral classification model

Step length / turning angle

Continuous response model

Build algorithm relating movements to features

▽

Example strategy 3: Movement and disease in tandem

Movement and pathogen life-history traits

Spatial transmission traits

Build algorithm relating movements and transmission dynamics to environment

★

Cross-validate for in-sample predictive performance

Model contact

Predict movement trajectories

MoveSTIR

✓ *

Evaluate transportability in novel setting

Refine mechanistic expectations and feature sets

Model transmission

IBMs
Metapop models
PDEs

Increasingly phenomenological

✓ Many full implementations

✓ * Full implementations exist, but are rare

✓ - Full implementations exist, but some components are ad hoc

▽ Prototypical examples exist, but no extension to landscape data

★ Hypothetical only