



Biodiversity: Habitat Quality and Rarity

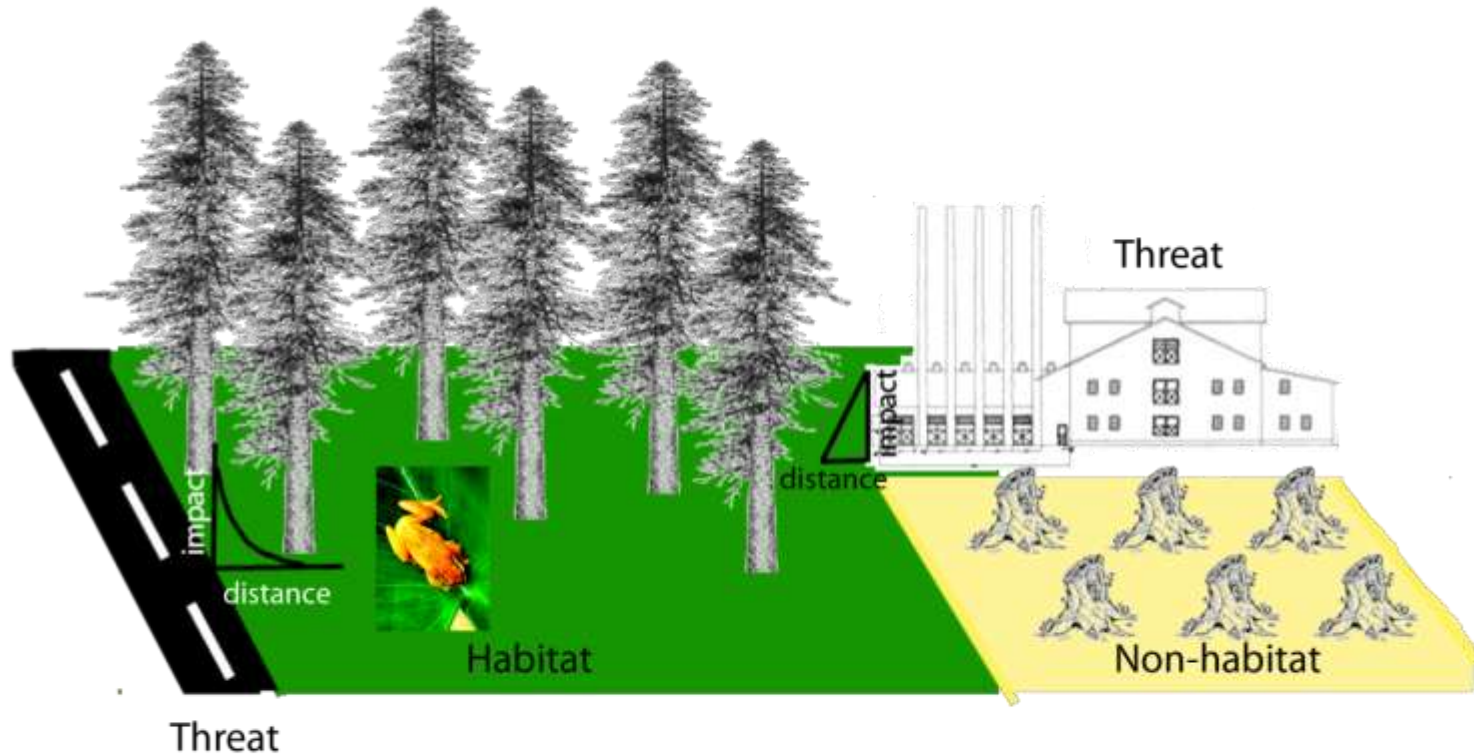
Brad Eichelberger



Model Overview

- Managing the quality of habitat allows for us to manage the associated species
- Tier 1 model produces a map of habitat quality
- Habitat is a function of conservation objective
 - Are we considering all species or just forest birds? All mammals on the landscape or just threatened mammals?
- Threats to habitat can be divided into two major categories
 - Actual removal of habitat or edge fragmentation
 - Sources of pollution (e.g., noise), roads, hunters, harvesters, etc. that degrade the integrity of habitat

Model Overview



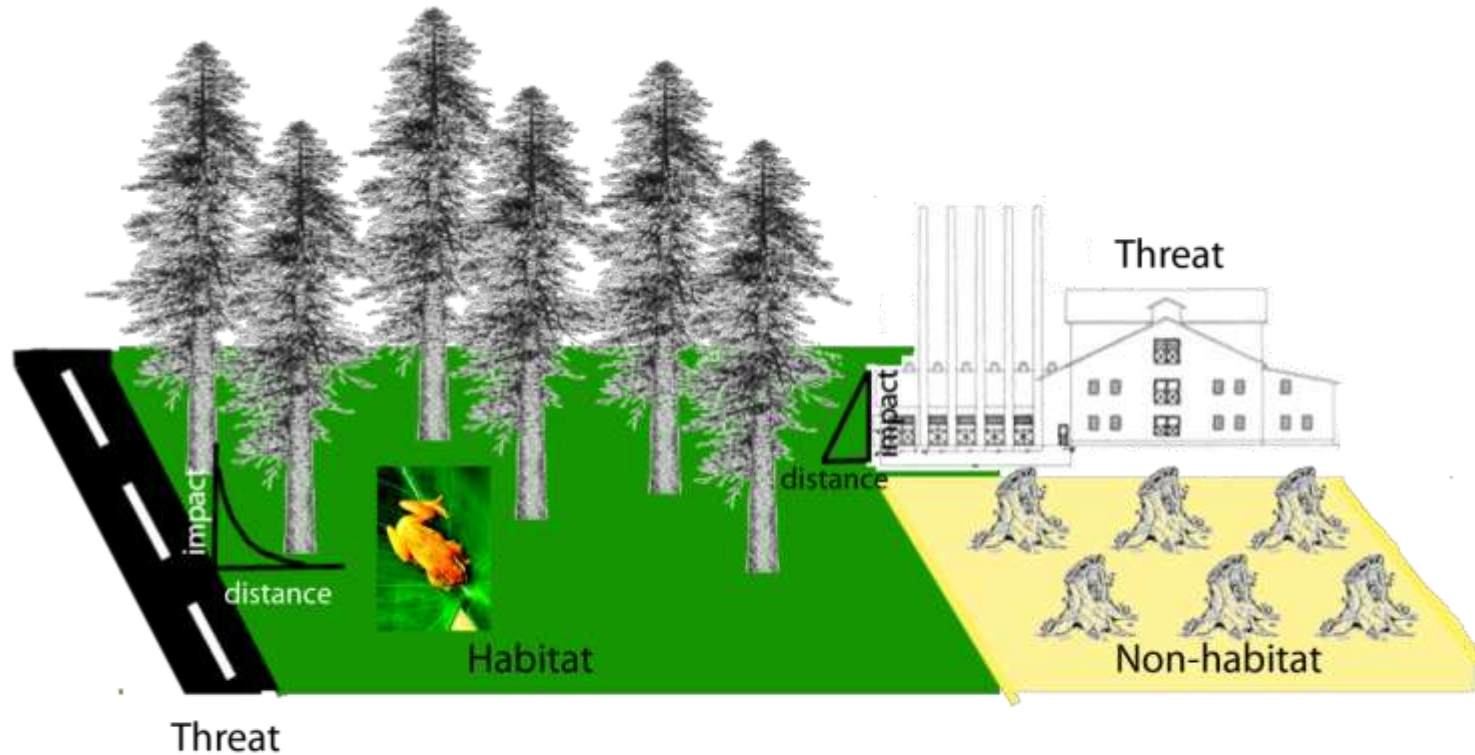
Model Overview

- Services
 - Habitat quality
 - Ability of environment to provide conditions for appropriate individual and population persistence
 - Habitat rarity
 - The relative commonness of the habitat relative to the baseline land use scenario

Alternative Models

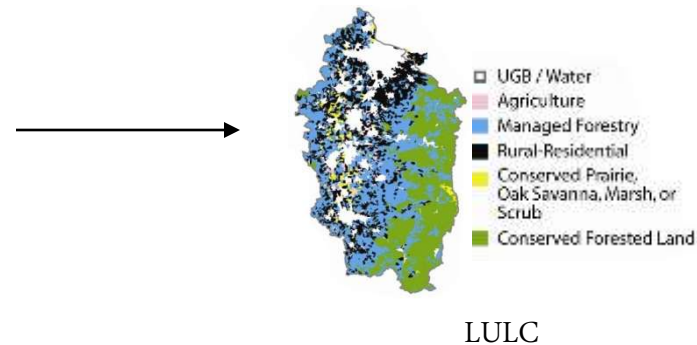
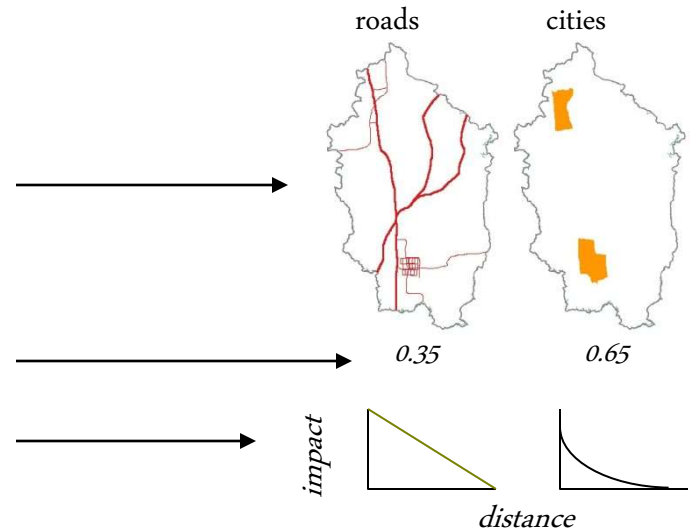
- Heuristic models – (weighted overlay, crayon and paper approach)
 - Expert knowledge
 - Not statistical
- Statistical models – (MaxEnt, logistic regression, CART, ANN)
 - Often data intensive
 - Output is probability of occurrence or conversion
- Why the InVEST model?
 - Requires basic data that is widely available
 - Habitat approach can encompass multiple species
 - Compare scenarios to a baseline
 - Incorporate the spatial impacts of threats

Habitat Quality and Rarity Model

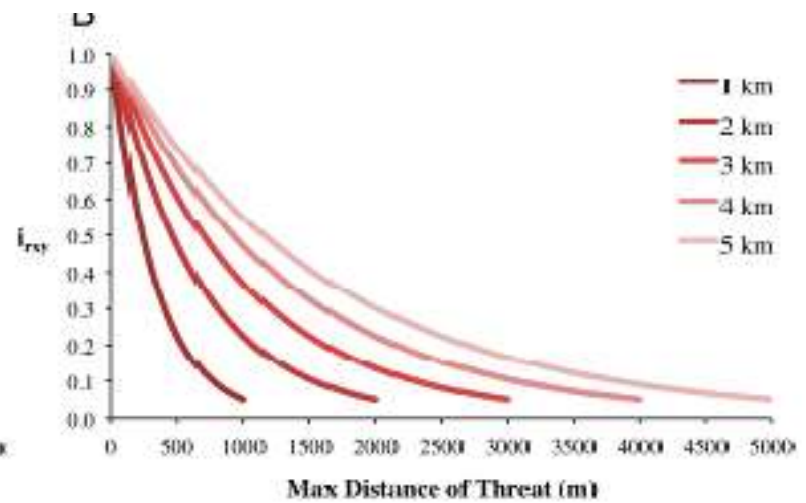
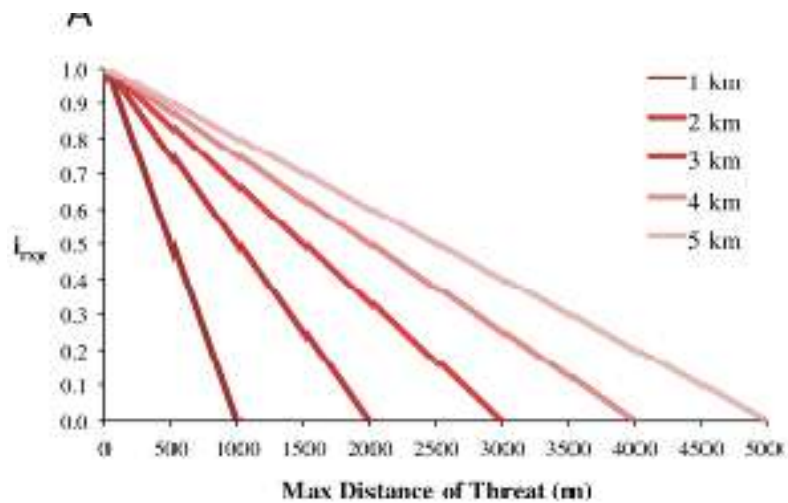


Model Inputs

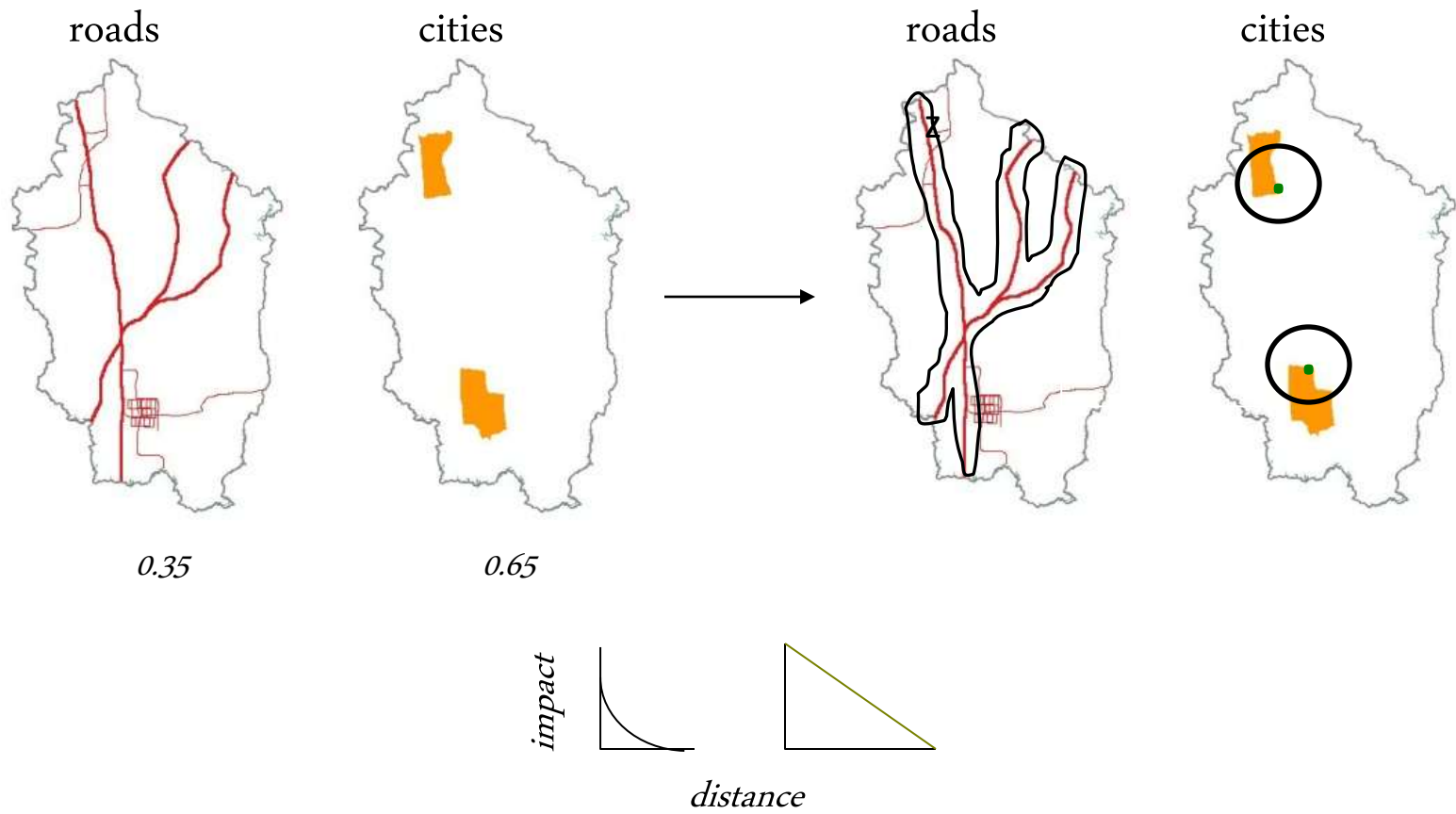
- Inputs
 - Map of each threat
 - Relative weights of threats (0.0 to 1.0)
 - Spatial impact of threats
 - Land use/land cover
 - habitat/nonhabitat
 - sensitivity of each habitat type to each threat
 - accessibility of habitat to threat (social, political, geographical restrictions)



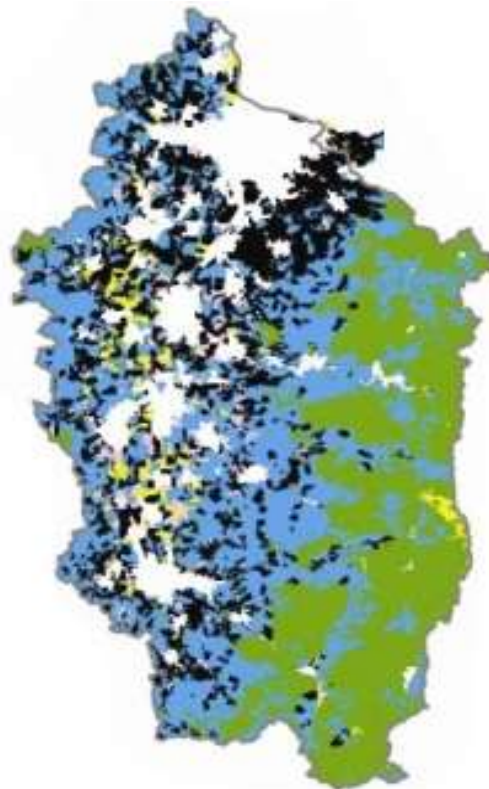
Threats



Threats



Defining Habitat

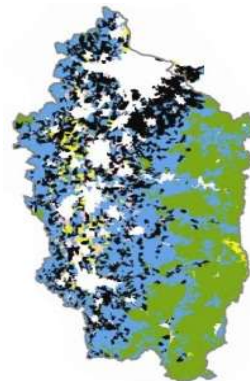


- UGB / Water
- Agriculture
- Managed Forestry
- Rural-Residential
- Conserved Prairie, Oak Savanna, Marsh, or Scrub
- Conserved Forested Land

Defining Habitat

LULC_j

Is it habitat?



- UGB / Water
- Agriculture
- Managed Forestry
- Rural-Residential
- Conserved Prairie, Oak Savanna, Marsh, or Scrub
- Conserved Forested Land

If yes, how suitable is the habitat?

0.1

0.3

0.7

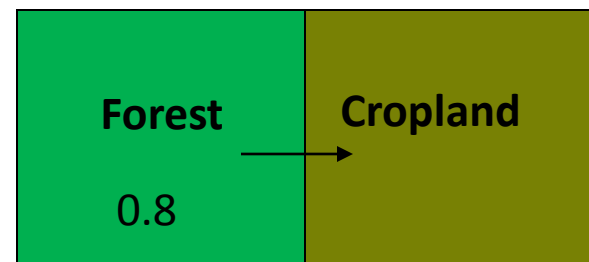
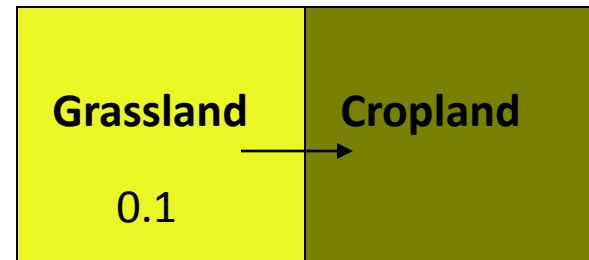
1.0

If unsuitable, then...

0.0

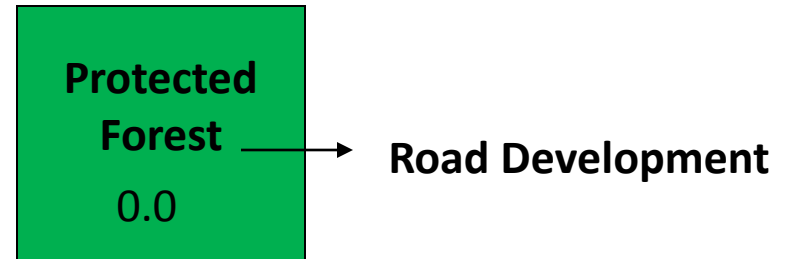
Defining Sensitivity

- How sensitive is the habitat to each threat?
- Index from 0.0 (not sensitive) to 1.0 (highly sensitive)
- Example: forest is more sensitive to cropland conversion than grassland

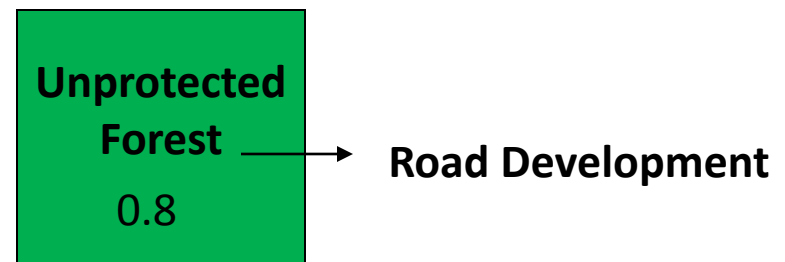


Defining Accessibility

- Accessibility of habitat to threat (social, political, geographical restrictions)

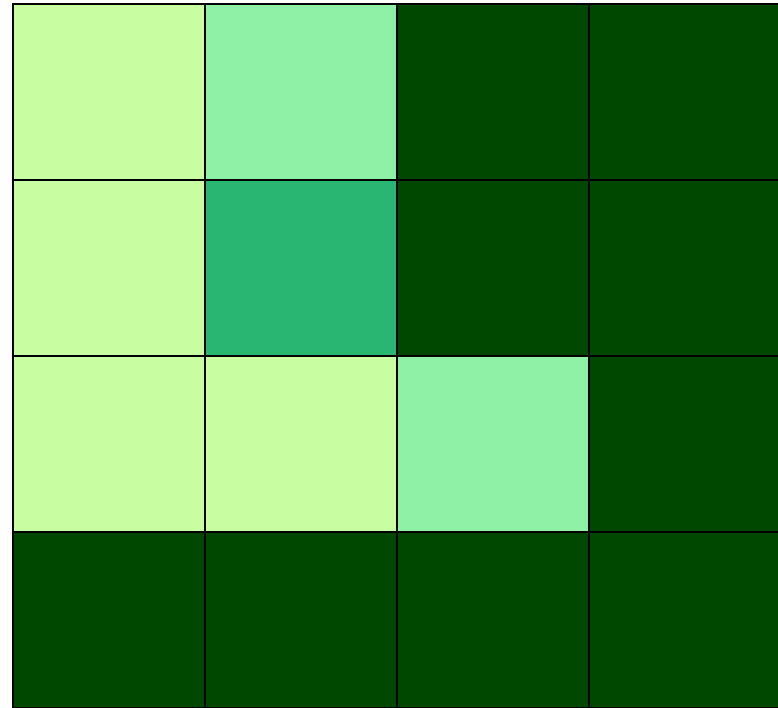


- Index from 0.0 (restricted) to 1.0 (unrestricted)



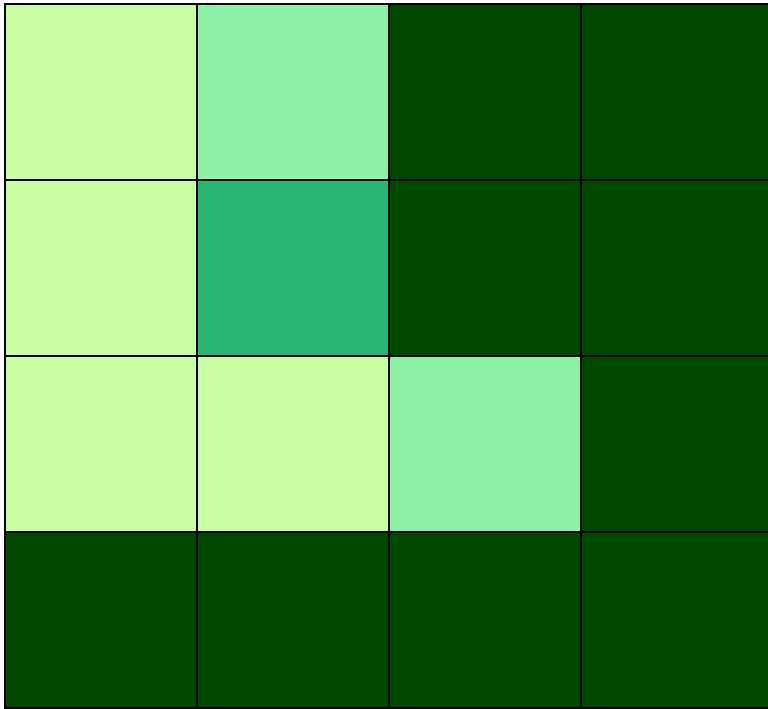
Habitat Rarity

- Relative rarity of current land use types in regards to baseline
- Identifies habitat that is likely threatened in current or projected scenario

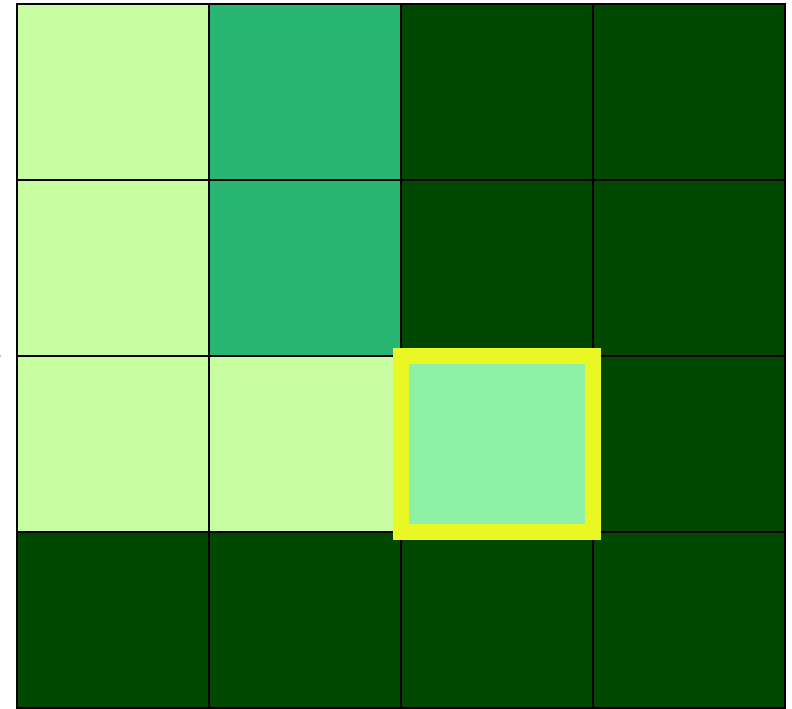


Habitat Rarity

Baseline

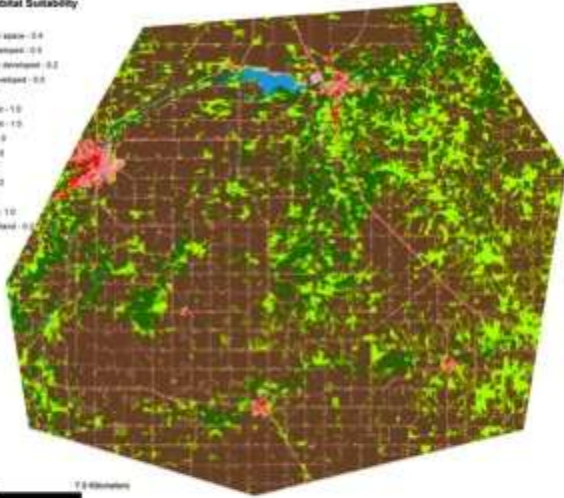
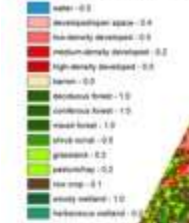


Current or Projected

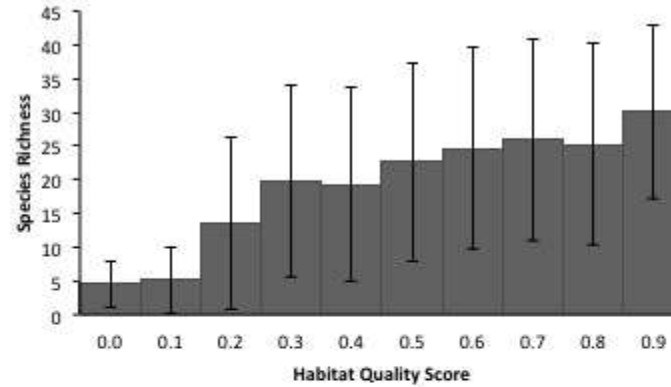


Validation of InVEST to GAP

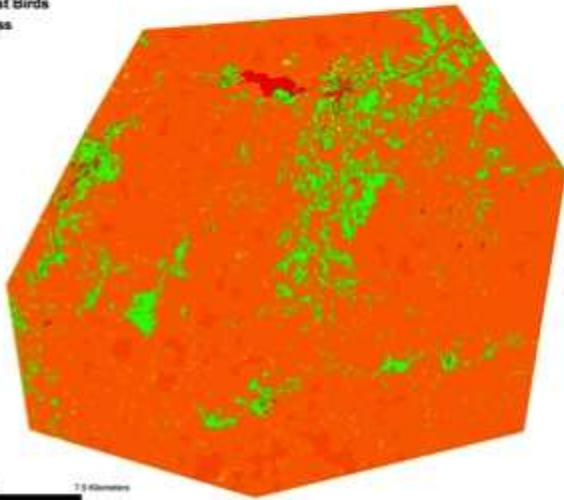
Little Cannon Watershed:
LULC Types and Habitat Suitability



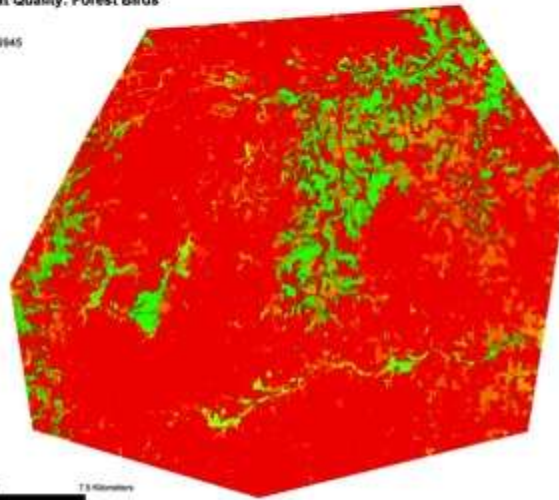
MN GAP Forest Bird Species Richness by
InVEST Habitat Quality Score



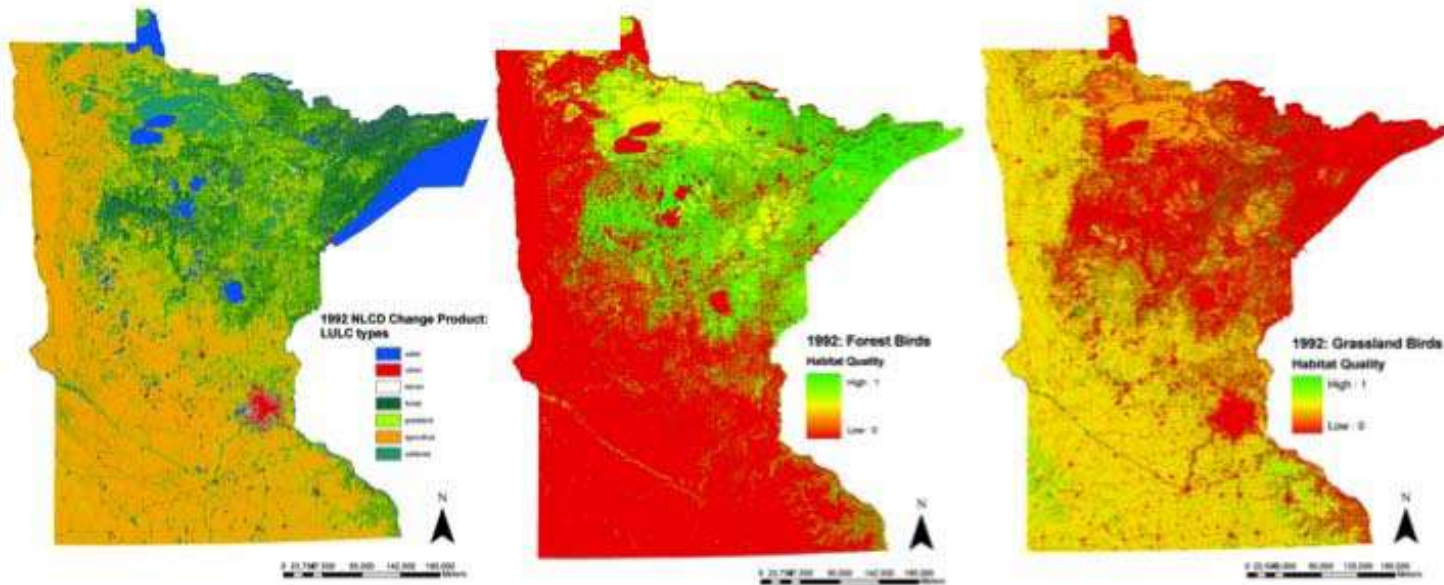
MN GAP: Forest Birds
Species Richness



InVEST Habitat Quality: Forest Birds
Score



Application of InVEST



Landscape Habitat Quality Scores	Scenarios			
	1992	2001	Change	% Change
Forest Birds	1631292	1640813	9521	0.6
Grassland Birds	1054823	1041964	-12859	-1.2

Application of InVEST

- Question for audience: “What types of questions and/or decision making can InVEST inform?”
- Conservation prioritization
- Placement of preserves/easements
 - highest quality and rarity or areas most susceptible to highest degradation
- Concentrate research for rare species

Inputs and Hands On Session

Biodiversity

Workspace
C:\InVEST_2_2_1\Biodiversity

Current land cover map
C:\InVEST_2_2_1\Biodiversity\Input\lc_samp_cur_b

Future land cover map (optional)

Baseline land cover map (optional)
C:\InVEST_2_2_1\Biodiversity\Input\lc_samp_bse_b

Threats data
C:\InVEST_2_2_1\Biodiversity\Input\threats_samp.dbf

Accessibility to threats (optional)
C:\InVEST_2_2_1\Biodiversity\Input\access_samp.shp

Sensitivity of land cover types to each threat
C:\InVEST_2_2_1\Biodiversity\Input\sensitivity_samp.dbf

Half-saturation constant
30

Resolution (desired cell size to use, in meters) (optional)
1000

Results suffix (optional)

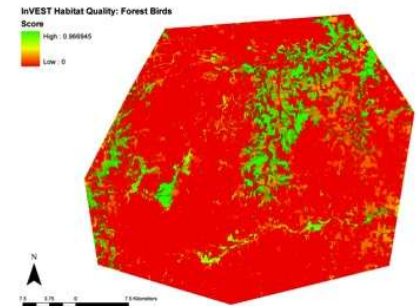
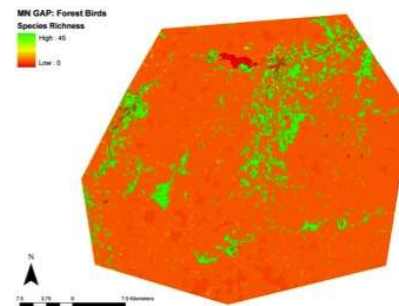
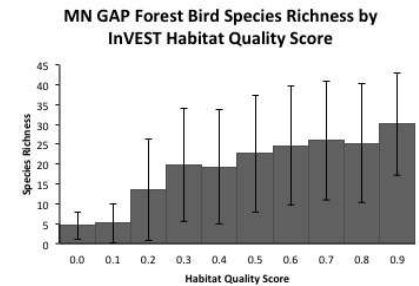
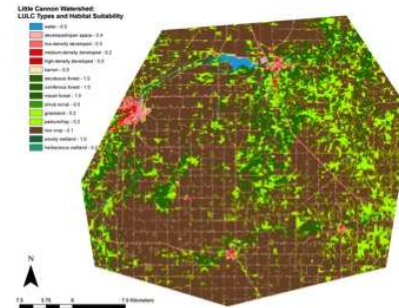
Biodiversity

This model, the simplest biodiversity model (Tier 1) combines information on land cover and threats to produce habitat quality and rarity maps. This approach, often referred to as coarse-filter for its focus on broad land categories, assumes that protecting a variety of high-quality habitats leads to protection of their component species, populations, and other small-scale ecological processes

OK Cancel Environments... << Hide Help Tool Help

Future Improvements

- Reviewing methods to incorporate species richness
- Community proximity of habitat



Questions?

