

# Woodcock Habitat Modeling

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Third quarterly update, 4/20/2021

Liam Berigan



# Review of overall goals

- Two models:
  - Migratory model
  - Residential model
- Anticipated use for the product is to determine which state lands could host woodcock stopover habitat given appropriate management

# Review of proposed timeline

- November 2020
  - Assemble habitat layers for the migratory model
- January 2021
  - Have a draft product assembled for the migratory model
- April 2021
  - Have a draft product assembled for the residential model
- July 2021
  - All final products prepared

# New modeling products

- Migratory model
  - Incorporated high resolution landscape data
- Residential model
  - Formatting Singing Ground Survey data
  - Modeling with random effects
  - Predictive layer
  - Variable importance

# Predictive Variables

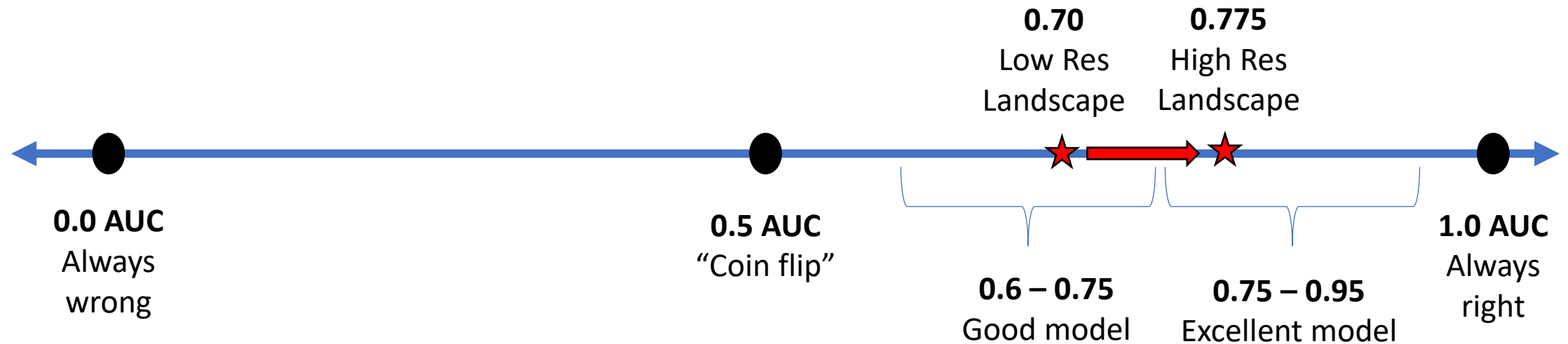
Landscape (1k and 5k)	Moisture	Land cover	Topography
Aggregation index	Soil drainage class	Forest	Elevation
Edge index	Topographic wetness index		Slope
Cohesion			
Percent of landcover as forest			

# Evaluating stopover models

- AUC is:
  1. A method for evaluating the accuracy of a predictive model
  2. The probability of correctly ranking a used/available pair



# Improvements in the migratory model



# Comparison of new and old migratory layers

- See attached migratory predictive layer
- The overall pattern (local, with some regional hotspots) is similar

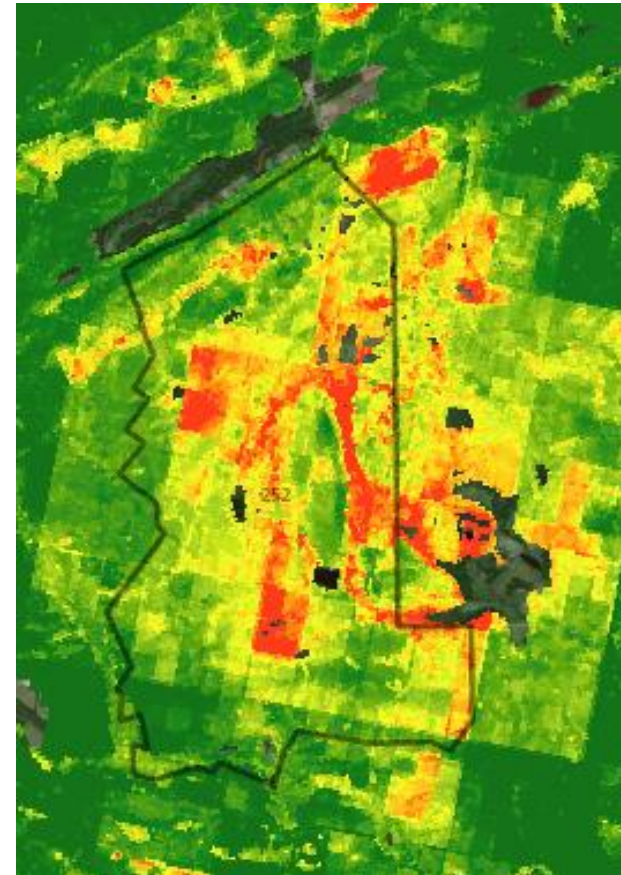


# Predictions on State Game Land 252

Before:

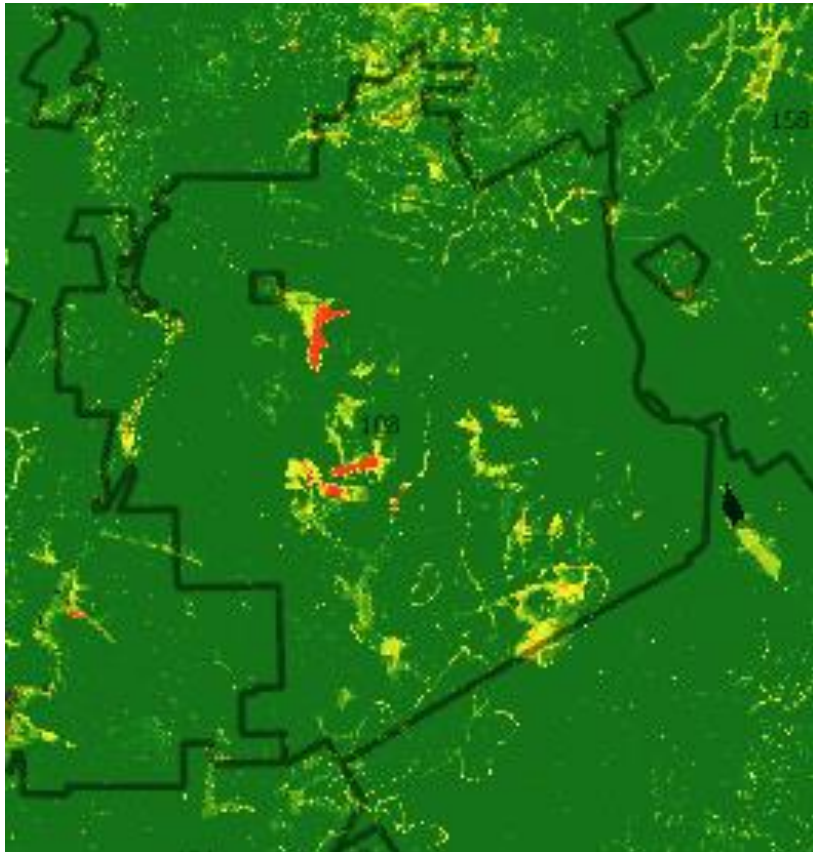


After:

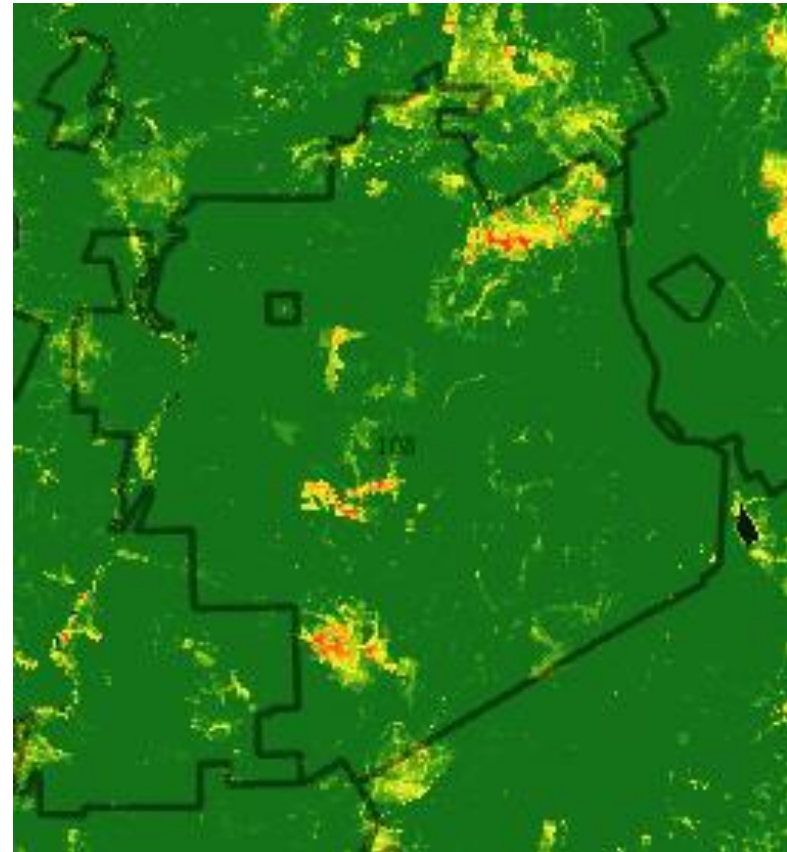


# Predictions on State Game Land 108

Before:



After:



# Residential model planning

- Two sources of potential data
  - Pre-migratory data from tagged birds
  - Survey data (federal, state)
- We elected to use survey data for both prediction and evaluation
  - Pros:
    - Statewide, most directly comparable to the migratory layer
    - Allows comparison between state game lands in different regions
  - Cons:
    - No state game land layers

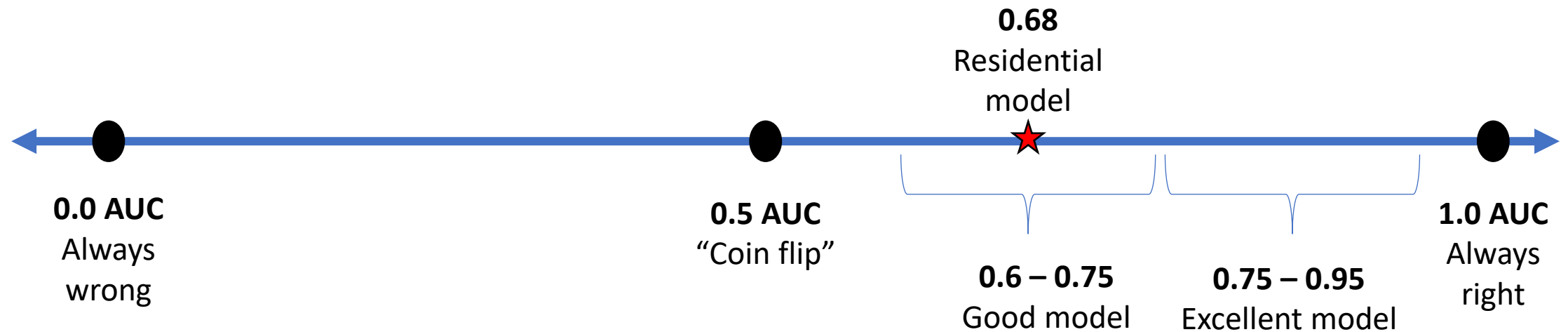
# Formatting Singing Ground Survey Data

- If a point included a location at least once in the last 5 years, marked present
- Otherwise, absent
- 95 present points, 635 absent

# Modeling with random effects

- Transect survey data has more spatial autocorrelation than migratory stopover points
- Account for autocorrelation using route number as a random effect
- Random Forest with Random Effects
  - Iterates through random forest models with linear random effects removed until log likelihoods converge

# Evaluating the residential model



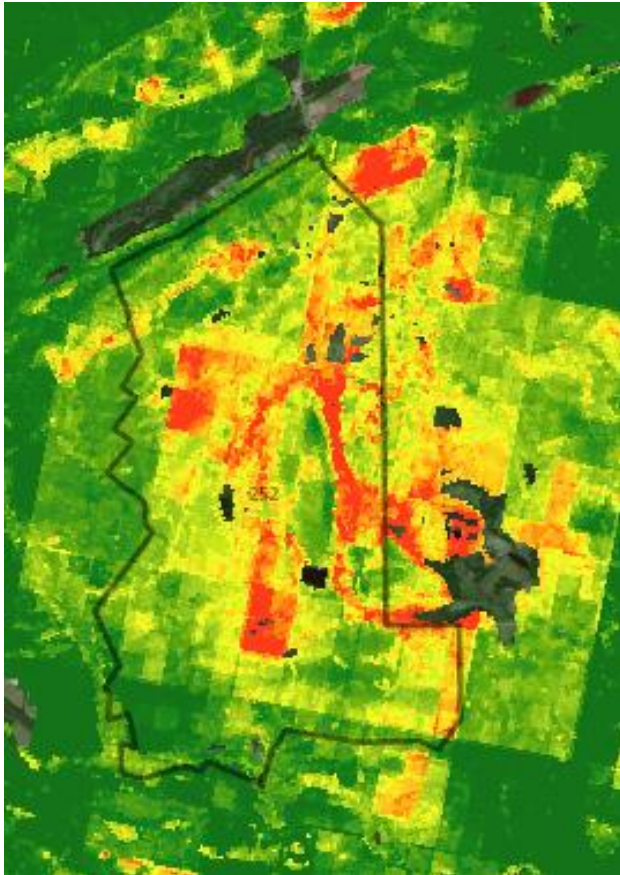
# Comparative predictive layers

- Migratory:
  - Local scale
  - Flat areas of fragmented forest
- Residential:
  - Regional scale
  - Highly forested regions in west and northeast



# Predictions on State Game Land 252

Migratory:



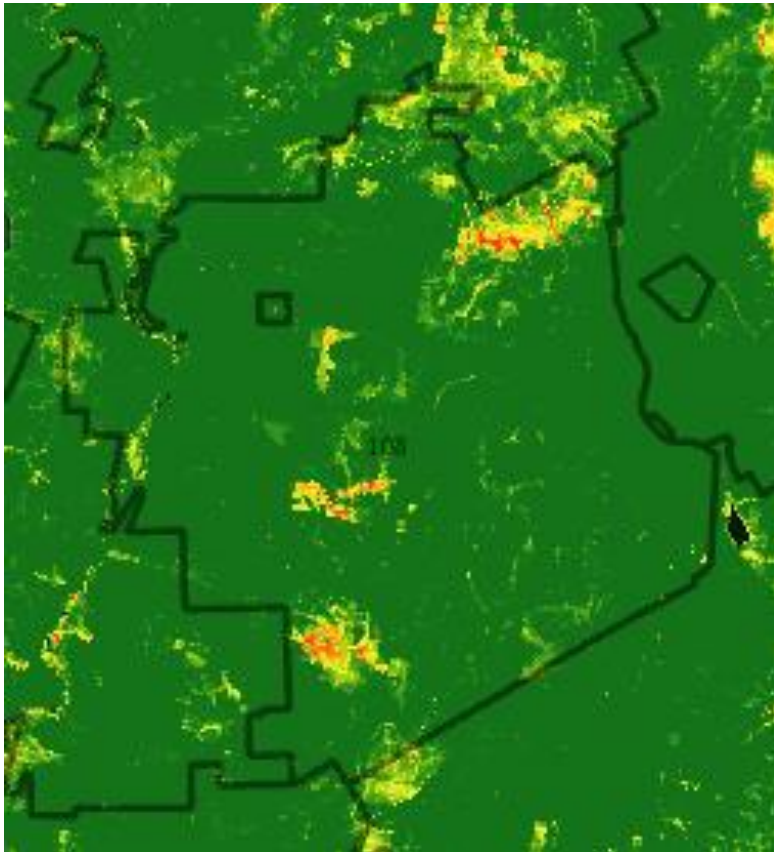
Residential:



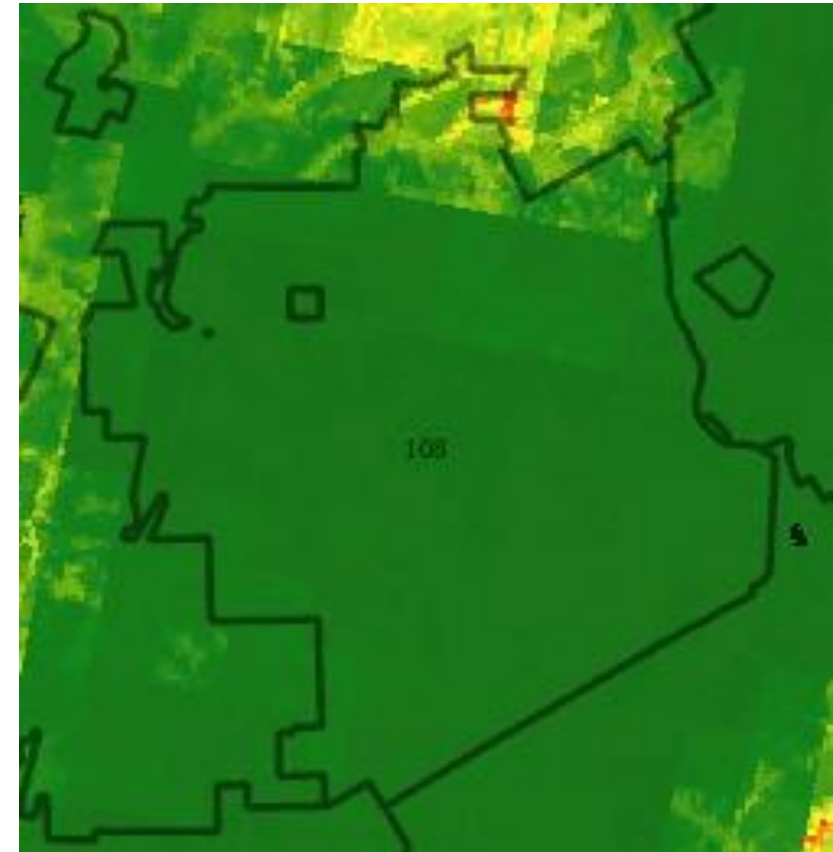


# Predictions on State Game Land 108

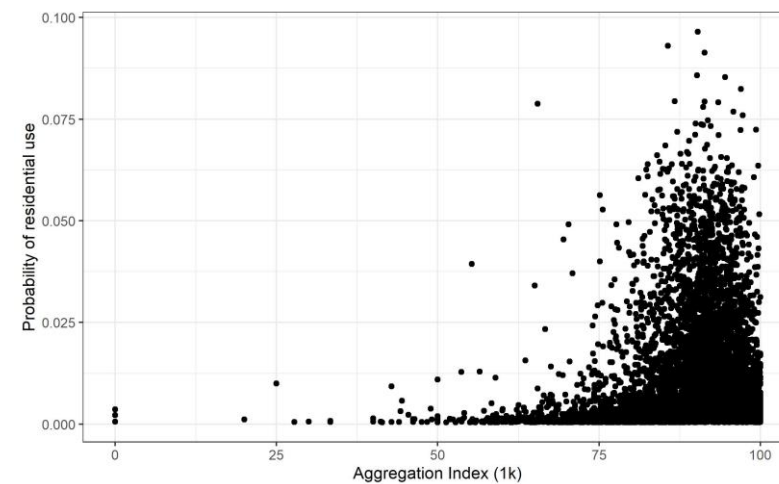
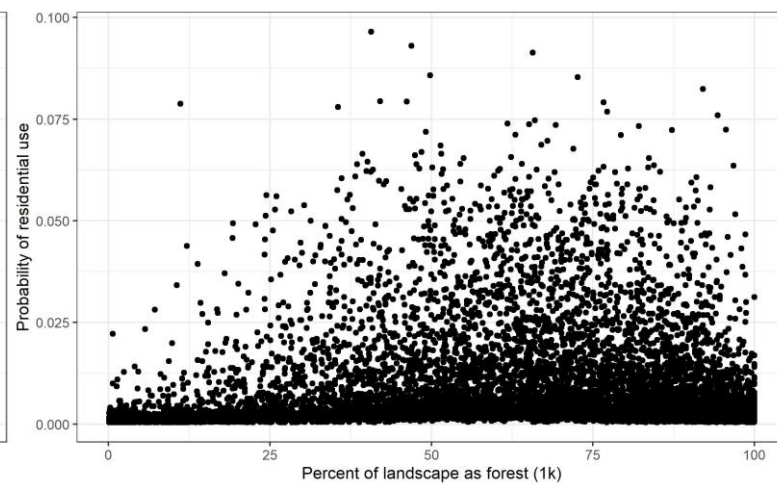
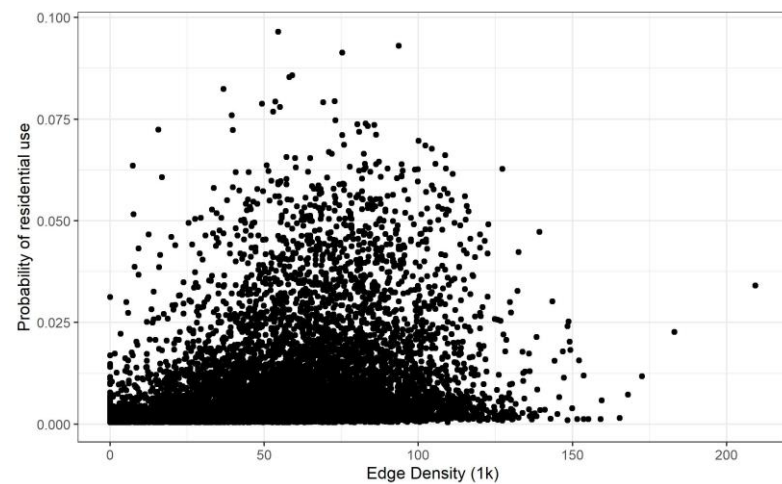
Migratory:



Residential:



1k

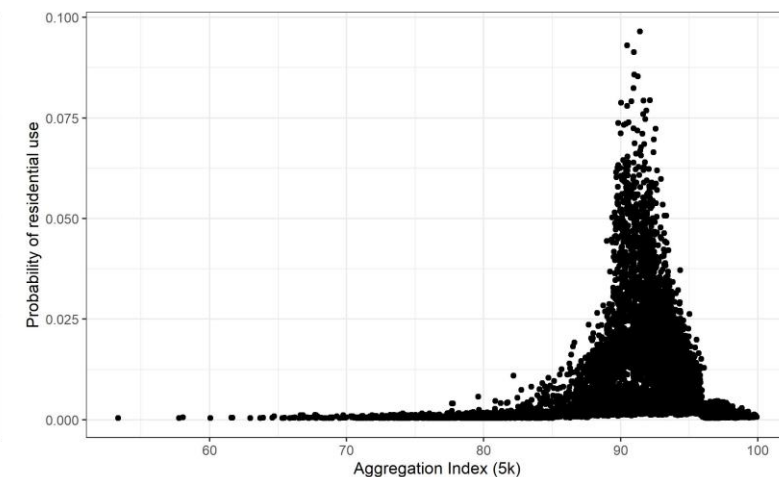
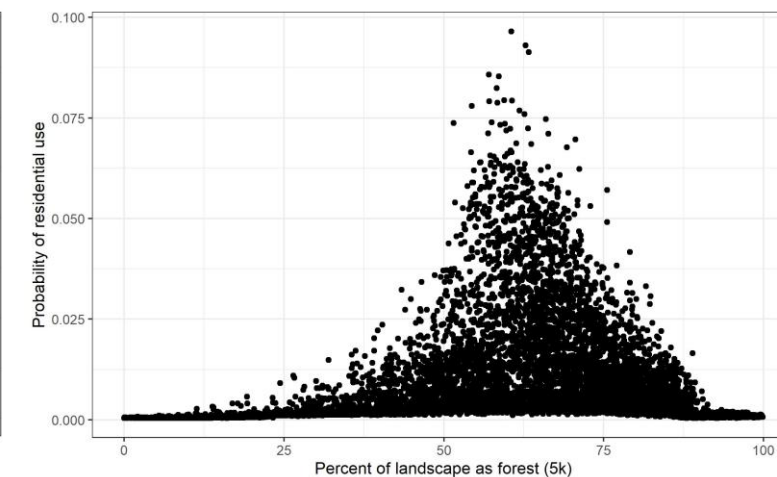
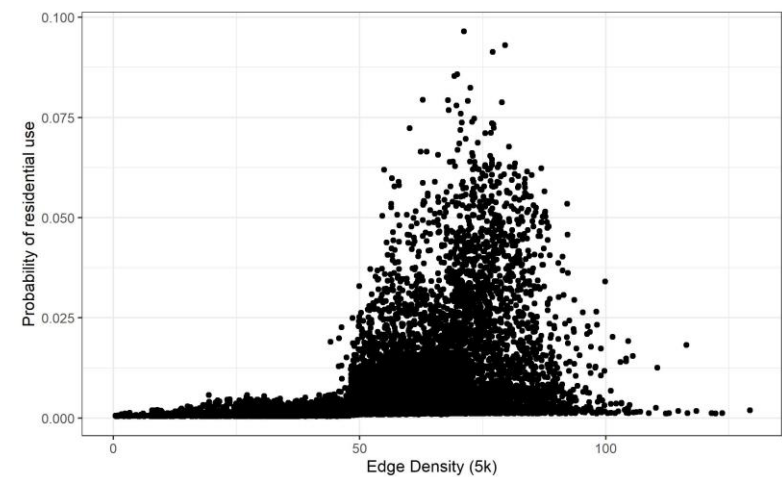


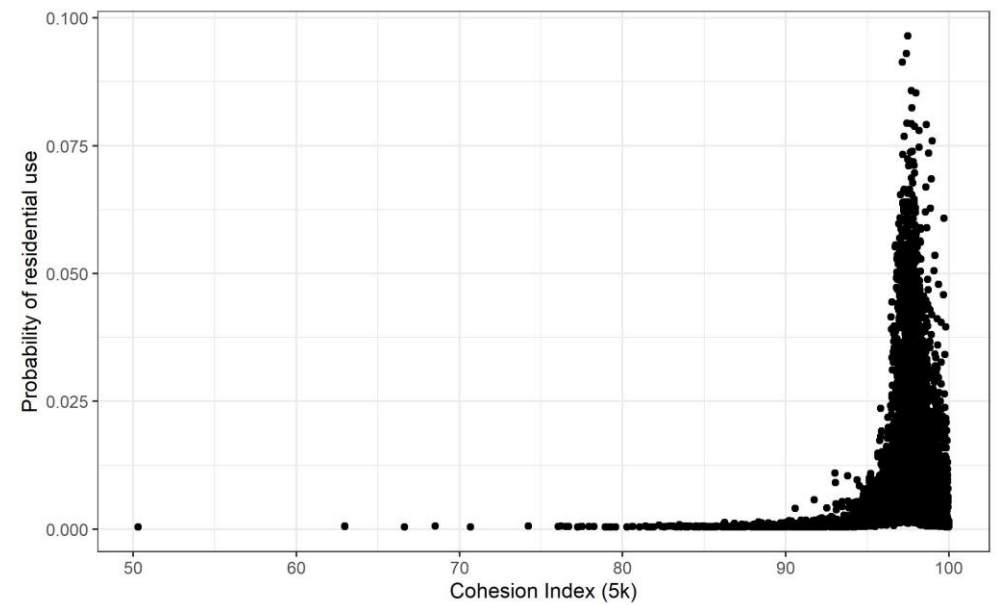
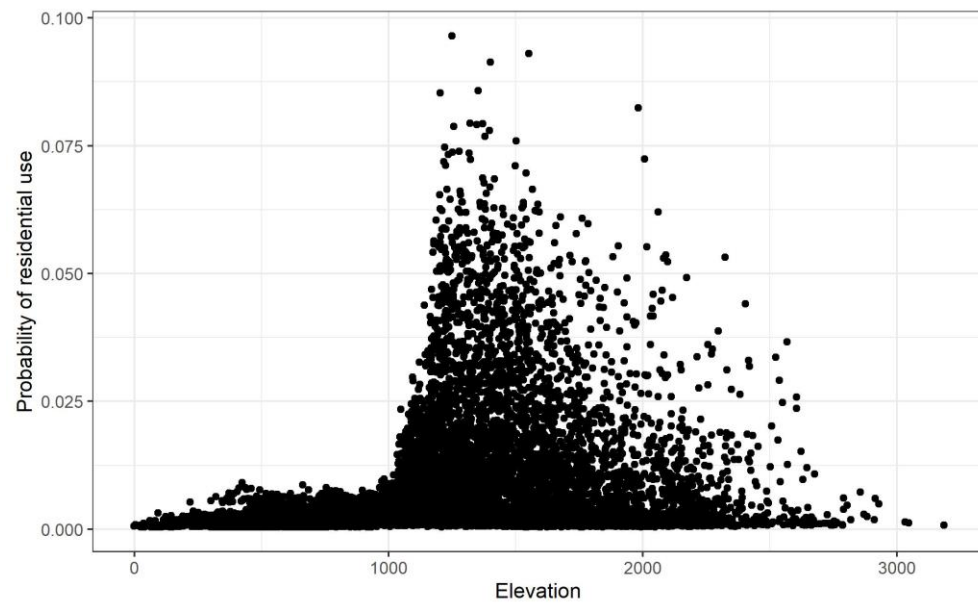
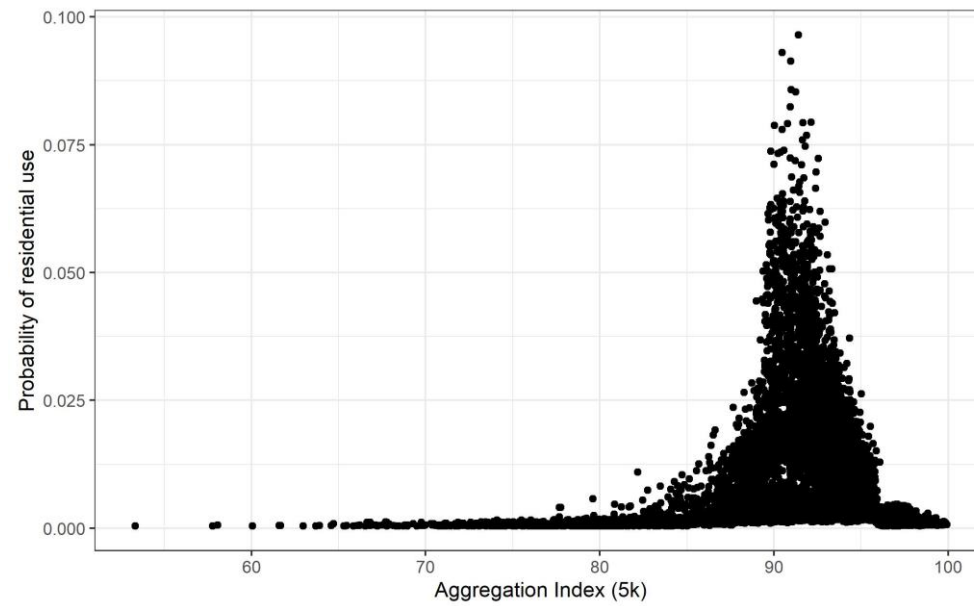
Edge

% Forest

Aggregation

5k





# Finishing up the residential model

- Finding alternative predictors to elevation that better explain regional patterns
  - Agriculture
  - Developed
- Adding any new state data

# Next steps

- Strategies for combining inferences from these layers
  - Allow weighting layers at a user level
  - Shiny app
- Integrating these layers into the report
  - Ranking state game lands?
  - Other public lands, private lands
  - Identify regional hotspots?
  - Potential areas for acquisition/protection?

# Wrapping up

- Finalize habitat models and Shiny app for review by June 30th
- Progress meeting in late June
- Report submitted no later than September 30<sup>th</sup>
- Begin preparing manuscript for journal submission once report is complete



# Thank you!

