Woodcock Habitat Modeling

First quarterly update, 11/5/2020

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Review of last meeting

	Migratory locations	Resident locations	Total
Public land	17	287	304
Private land	230	294	524
Total	247	581	828

	Migratory locations	Resident locations	Total
Male	125	292	417
Female	122	289	411
Total	247	581	828

Combined: 88 birds, mean 9.4 points per bird (43 individuals with < 3 points)
Locations as of July 2020

Review of last meeting

- Two models:
  - Migratory model: focused on statewide layers
  - Residential model: all statewide layers, but with additional state game land layers

- Anticipated use for the product is to determine which state lands could host woodcock stopover habitat given appropriate management

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

Current progress with migratory variables

Potential Predictive Variables for Migratory Habitat Model		
Soil Variables	*Land Cover*	*Landscape Configuration*
Soil drainage class ✓	LANDFIRE land use/land cover (point and buffered) ✗	Landcover-specific edge coefficient ✓
Topographic wetness index	LANDFIRE forest type (point and buffered) ✗	General edge coefficient ✓
Soil texture		Size of nearest forest patch ?
		Forest Aggregation Index ?
		Patch Cohesion Index ?
		Percent of landscape which is forested ?

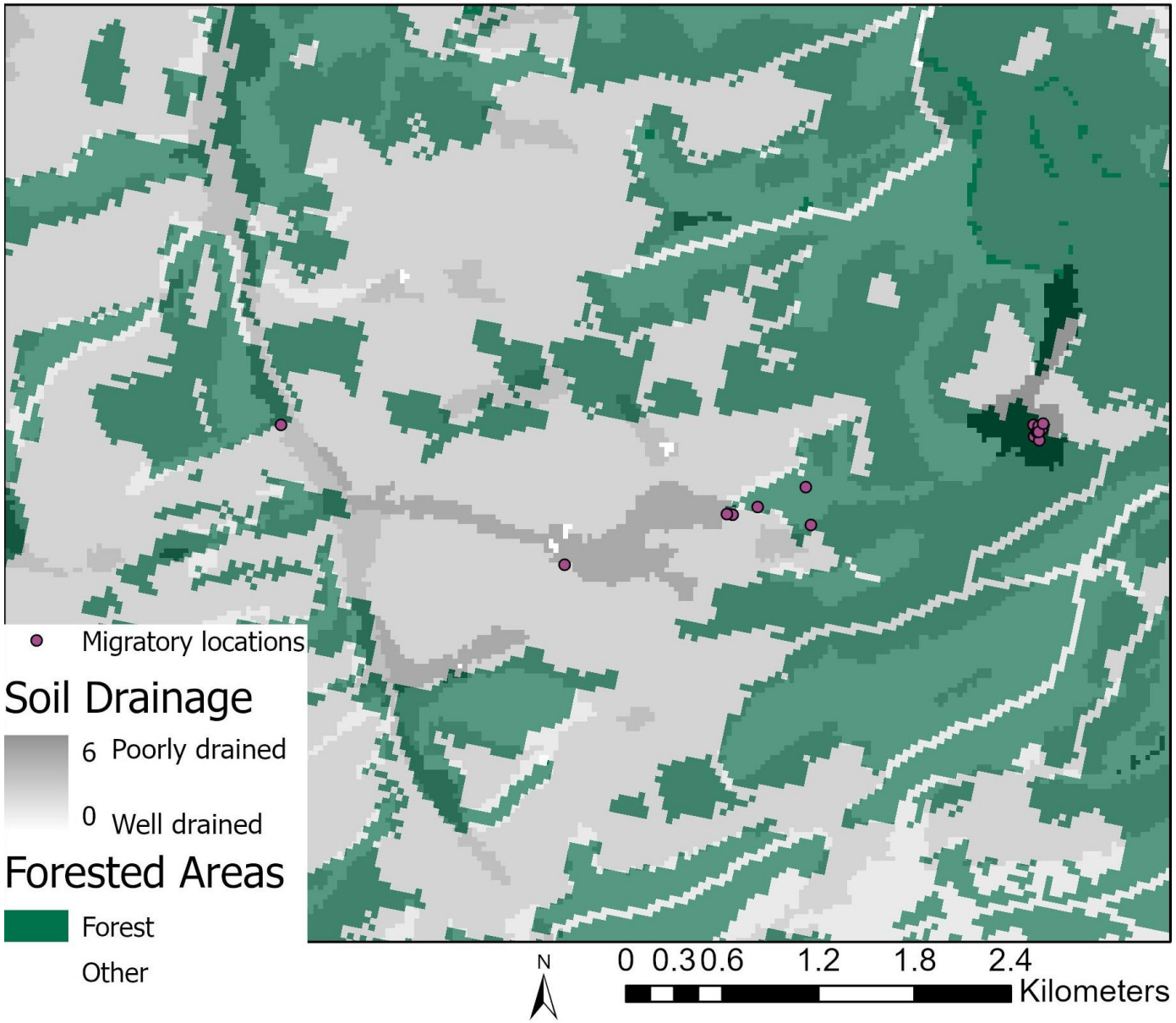
✓ Informative in exploratory analysis

✗ Uninformative in exploratory analysis

? Built, no results yet

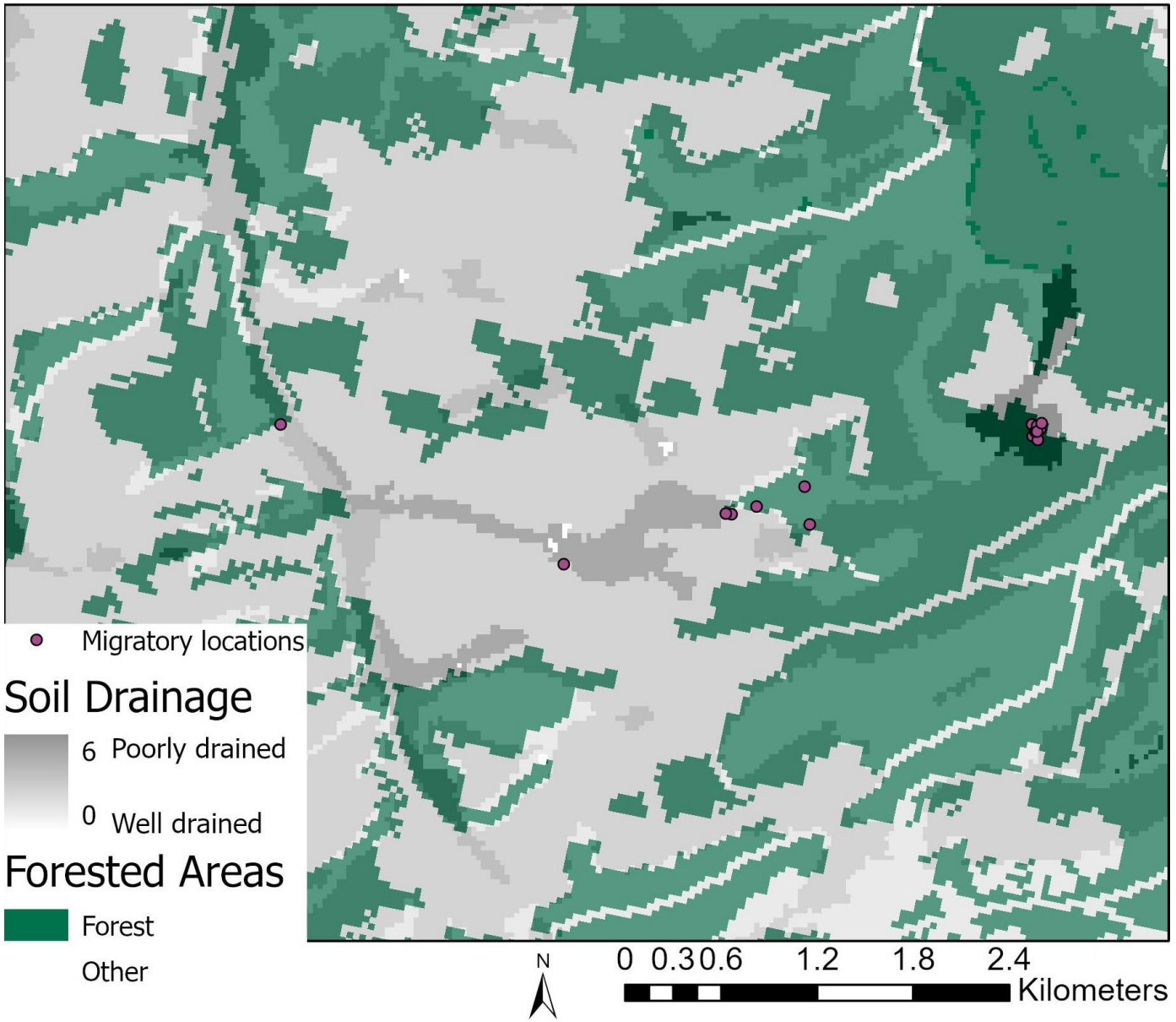
Preliminary results

- Strong selection for:
  - Forest edges (within 200m)
  - Poorly drained soils
- Little selection for:
  - Land cover



Preliminary results

- Leaning away from modeling young forest
  - Delays in LIDAR products
  - Ensure this layer doesn't expire within a few years
  - Highlight where management could occur, instead of where it already is



Integrating landscape metrics

- Landscape composition:
  - How much of the surrounding landscape needs to be forest before it’s used?
- Landscape configuration:
  - How large/connected do forest patches have to be before they’re useful to woodcock?

Integrating landscape metrics

- Woodcock are clearly selecting for larger scale landscape characteristics
- However, this selection is likely non-linear

Challenges associated with the next steps

- Multiple locations per stopover causing spatial autocorrelation
  - Solve by either aggregating to a single location or using a modeling technique (spatial regression, mixed effects modeling)

- Non-linearity in predictors
  - Quadratic variables in logistic regressions
  - Generalized Additive Models

Modeling techniques we're considering

- Maximum entropy modeling
  - Machine learning program to identify a species' niche on the landscape
- Resource Selection Functions
  - Simulate available locations and compare habitat characteristics to used locations
- Possible validation methods
  - K-fold cross validation
  - Withhold 10% for a testing dataset

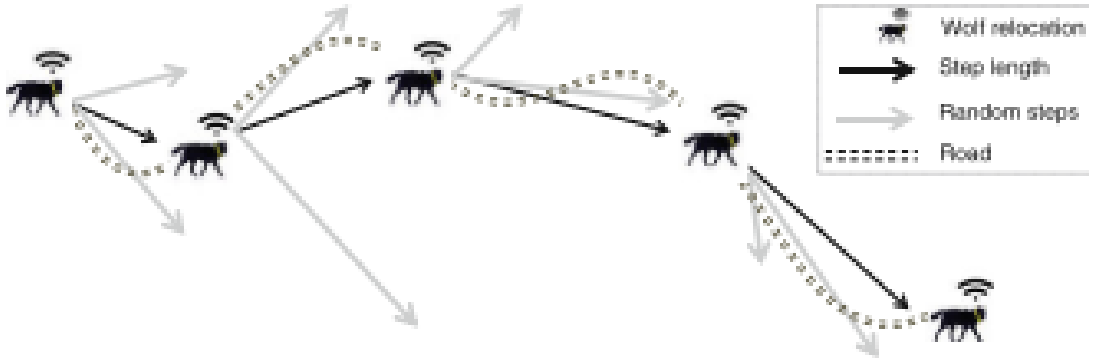


Figure from Thurfjell et al. 2014

For next meeting (tentative Jan 2021):

- Goal: Have a draft product assembled for the migratory model
- Will use these layers to create a draft predictive surface highlighting areas where woodcock are more likely to stop over on migration

- Focusing primarily on broader scale habitat factors
  - Landscape-scale approach to measuring habitat (moisture, composition, configuration)
  - Highlight which game lands are useful, but not predict where the woodcock will go within a unit

Thank you!