Bats and Roads: Northern Long-eared bat

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Bats & Roads

Direct Mortality

- Bats fly at low speeds and close to ground

- 0.3-6.8 bat deaths/km/year

Movement Barrier

- Clutter foraging bats will not often cross gaps

Open-space

vs

Cluttered-space

Vehicle noise is a sound barrier

"Predator" Avoidance

Northern Long-eared bat

White-nose syndrome

- WNS has decimated populations
- NLEB now listed as federally endangered

- Roads may increase bat vulnerability

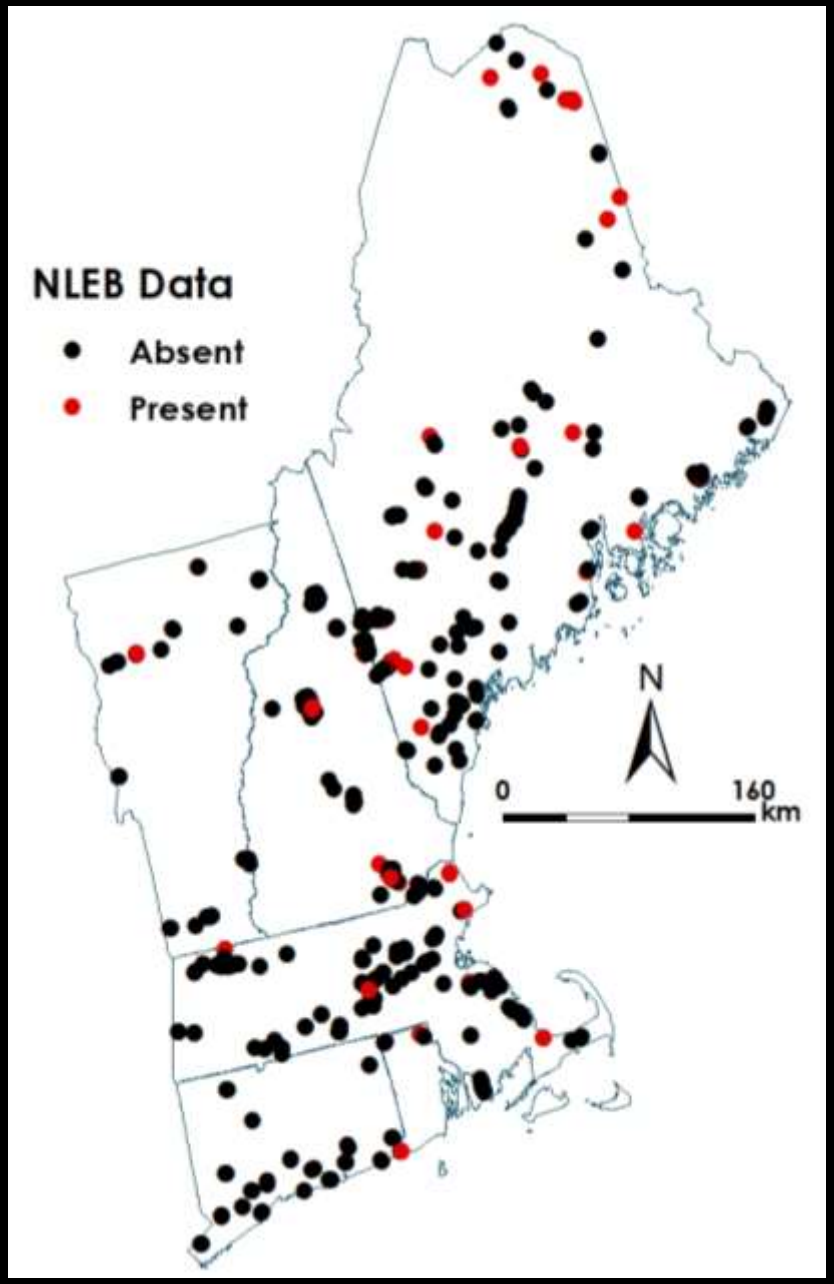
Objectives

- NLEB habitat associations
- Effects of roads on NLEB presence

Hypotheses

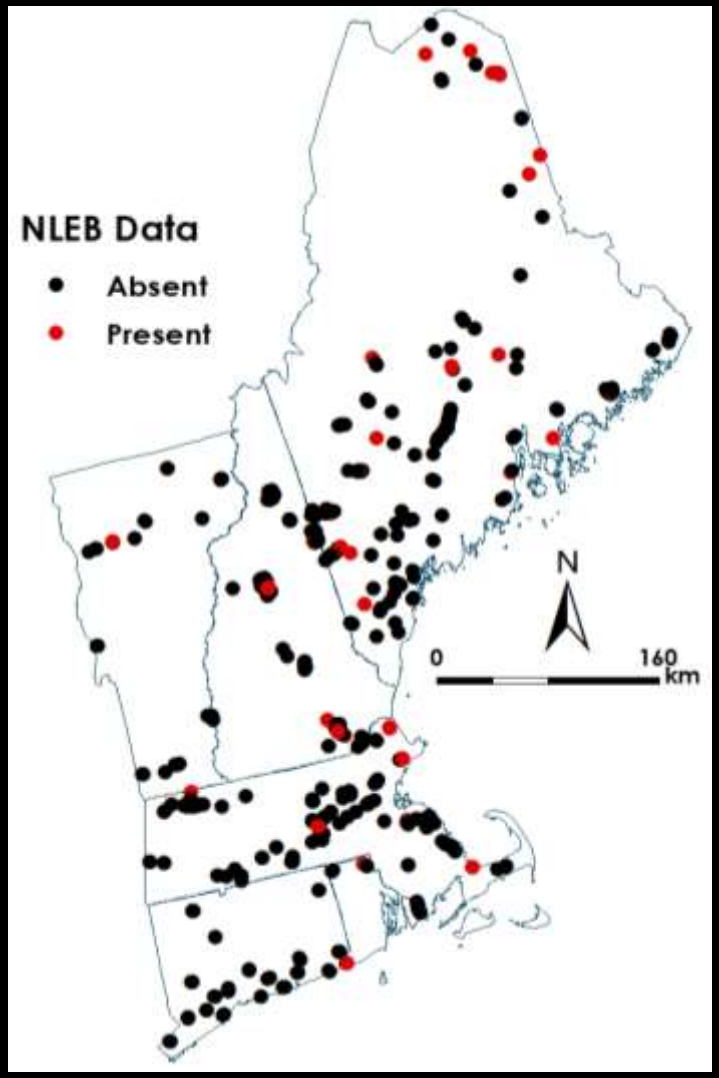
- NLEB presence will be negatively affected by roads
  - Clutter adapted species

- Collation of NLEB presence/absence data
  - 711 survey points
  - 65 detections
  - 2015, 2016, 2017



Species distribution models

- Bayesian occupancy models
  - Presence/absence models
  - Environmental covariates vary across study area with spatial knots (63)
  - Models fit in jagUI R package



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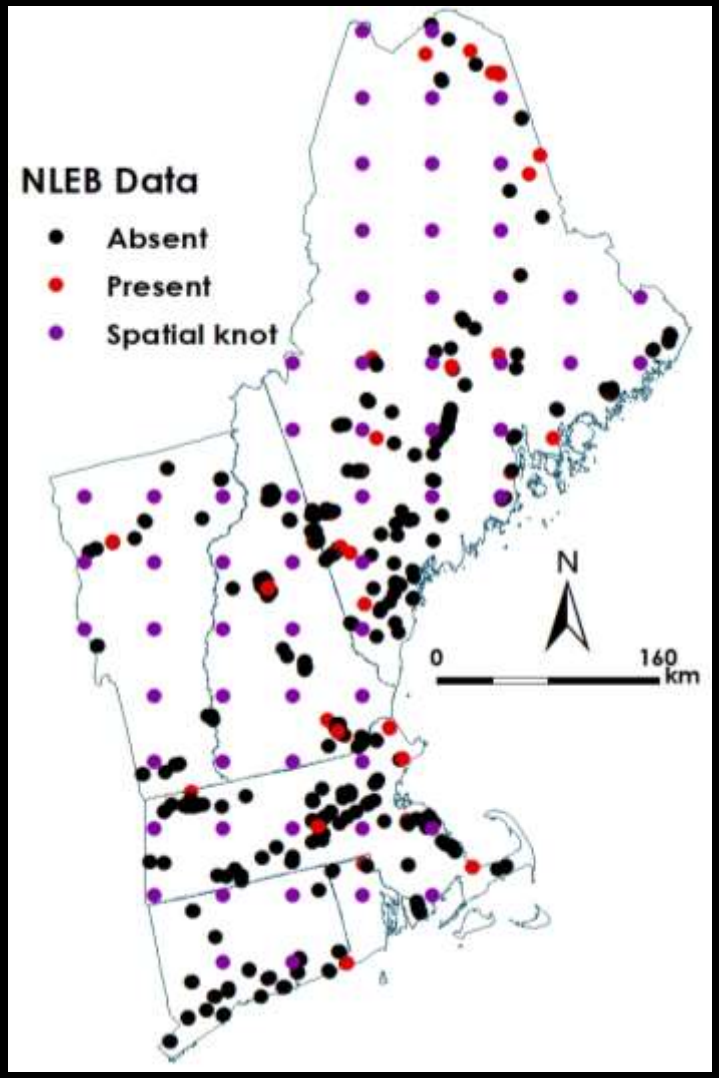
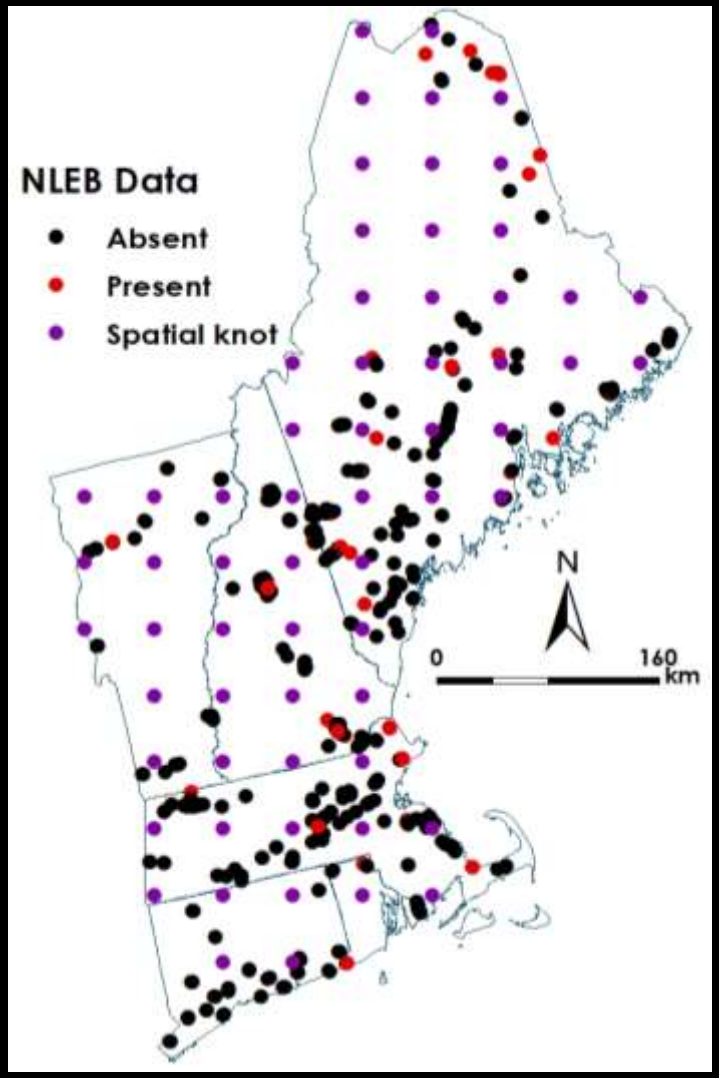


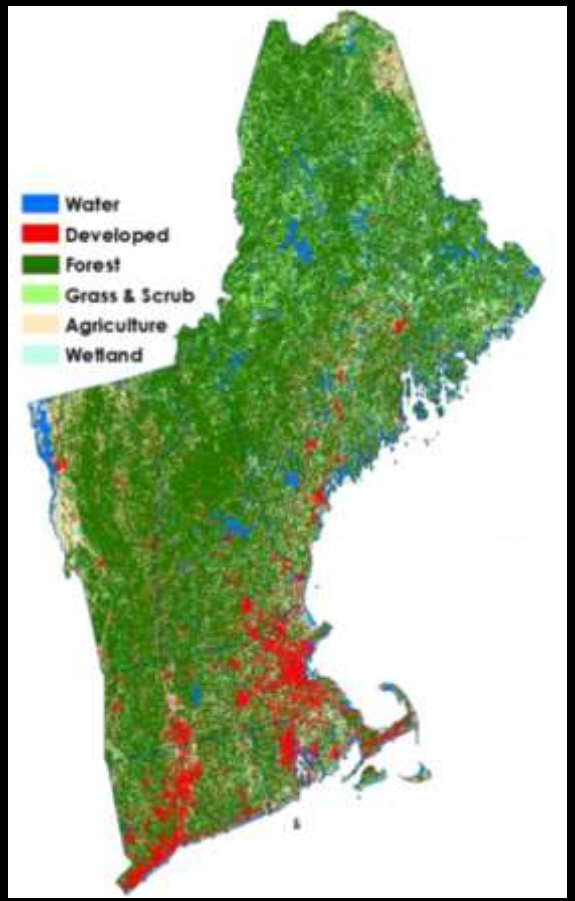
Species distribution models

- Bayesian occupancy models
  - Presence/absence models
  - Environmental covariates vary across study area with spatial knots (63)
  - Models fit in jagUI R package
- Model variables
  - Site occupancy
    - Forest proportion
    - Distance to water
    - Road density
  - Detection
    - Number of lanes
    - Survey number and date

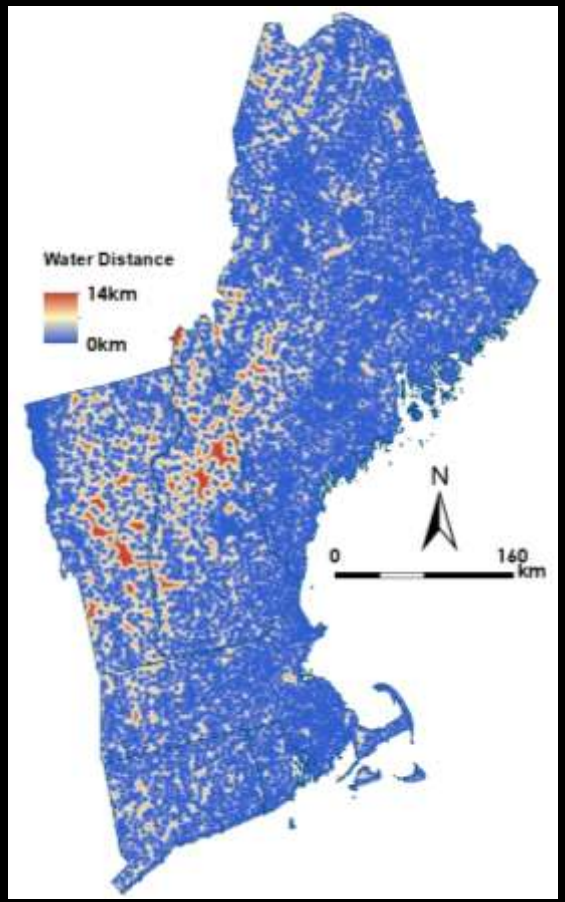


Site Occupancy covariates

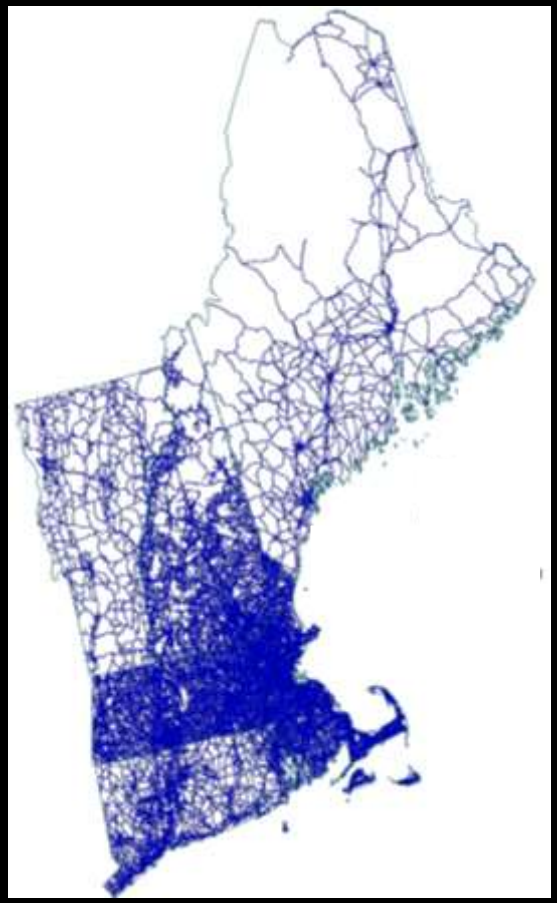
Forest proportion



Water distance



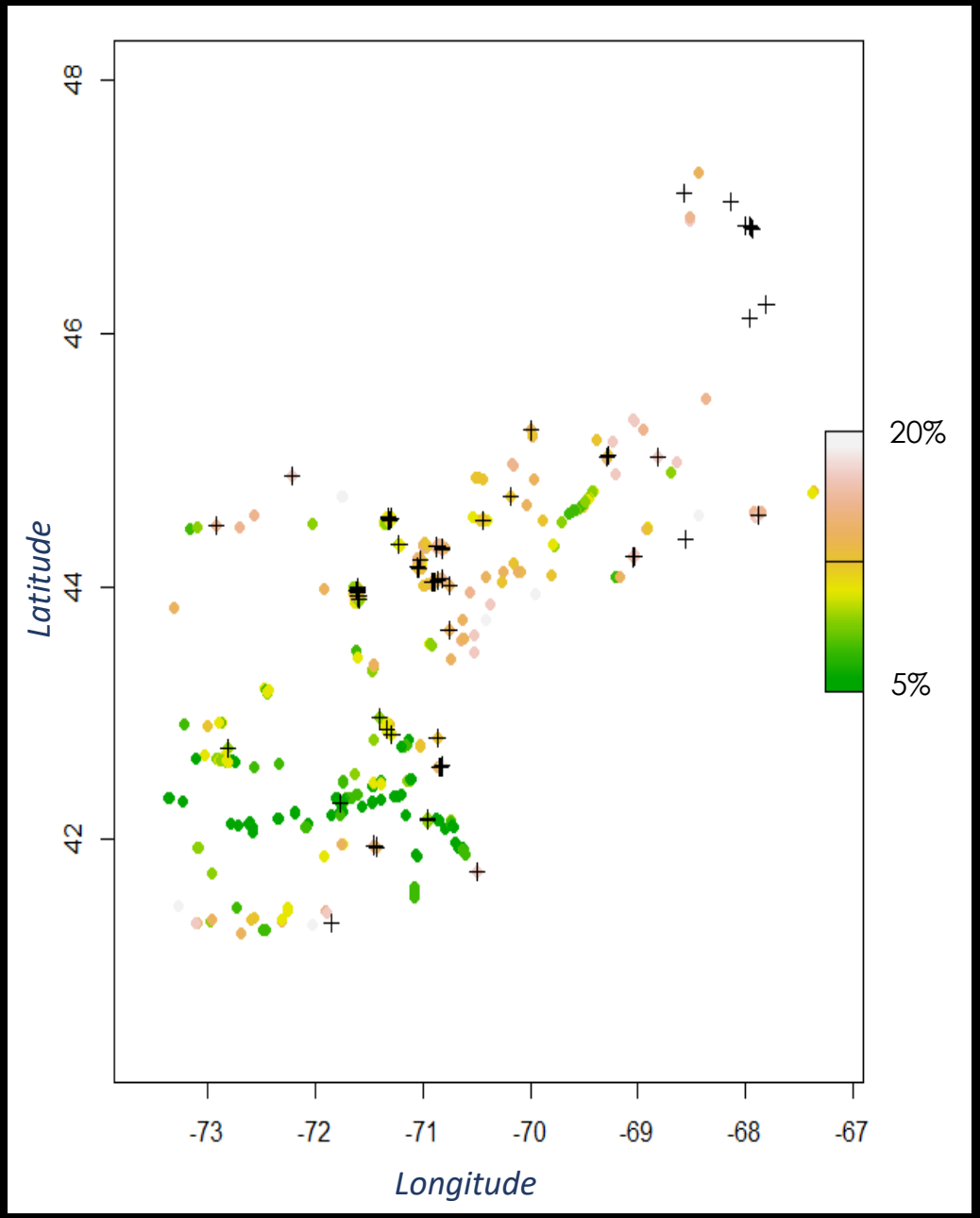
Road density



Results

- Bat occupancy varies across the region

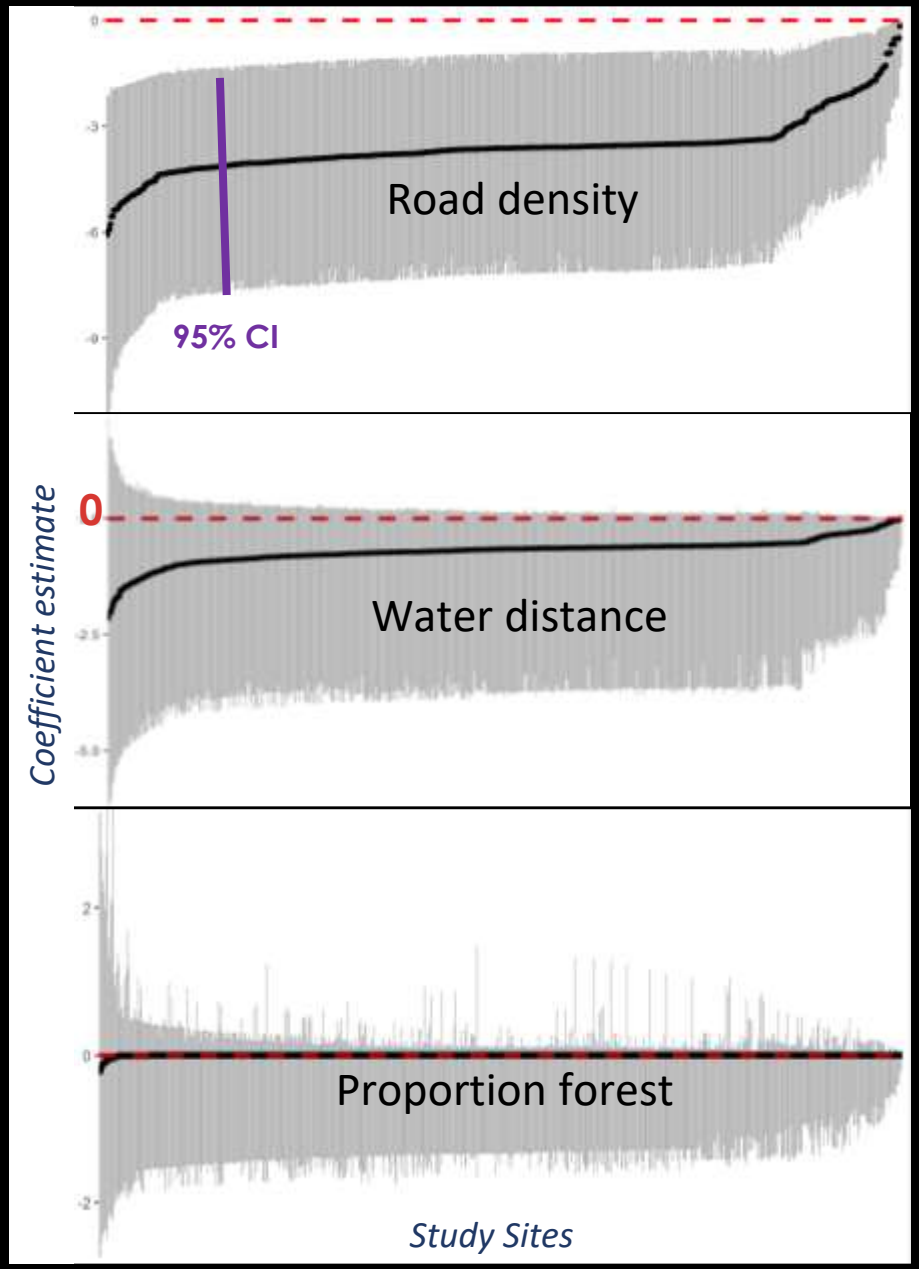
- Occupancy only ranges 5-20%



Results

- Bat occupancy is negatively affected by road density

- Neither water distance nor proportion forest significant affect bat occupancy

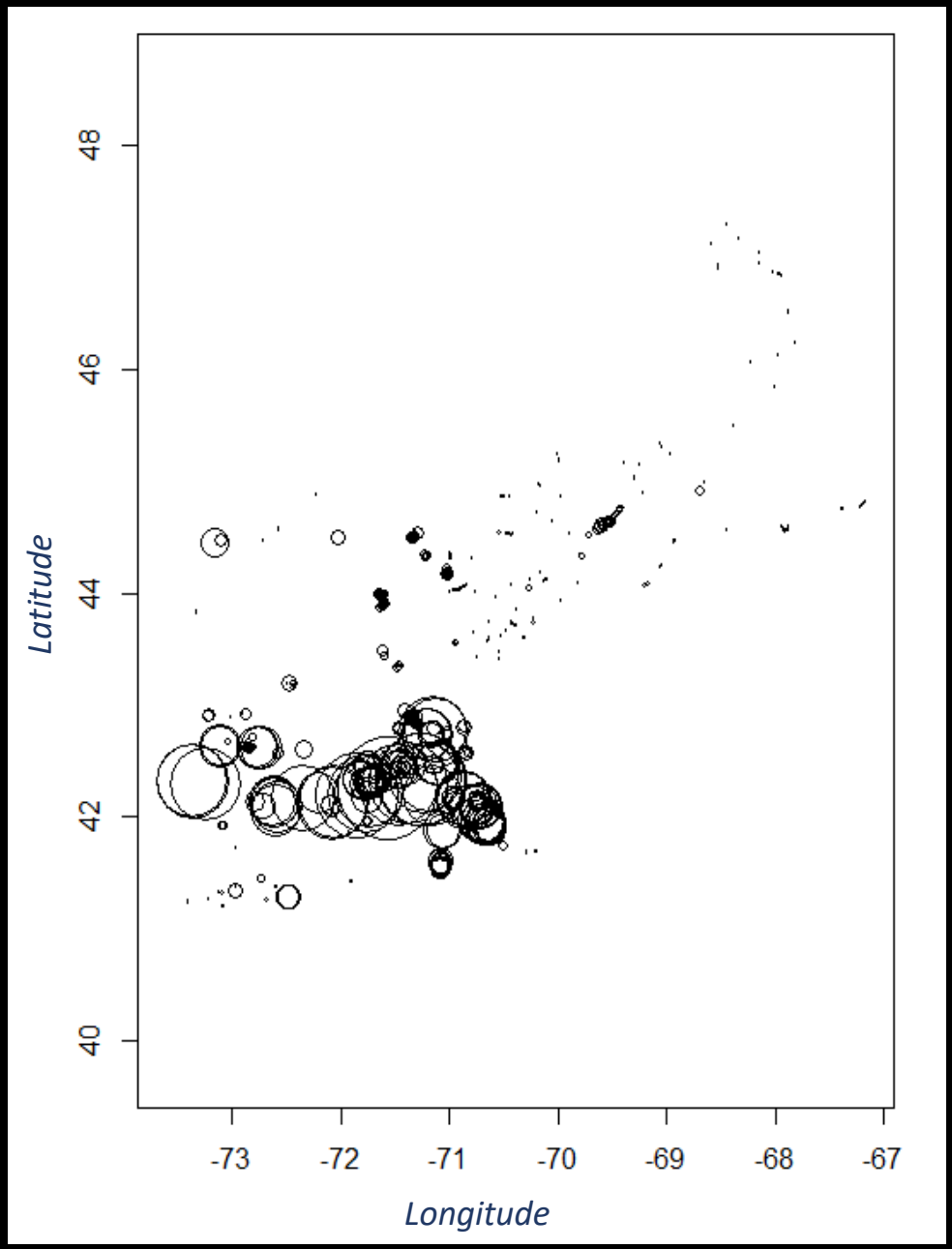


Results

- Bat occupancy is negatively affected by road density

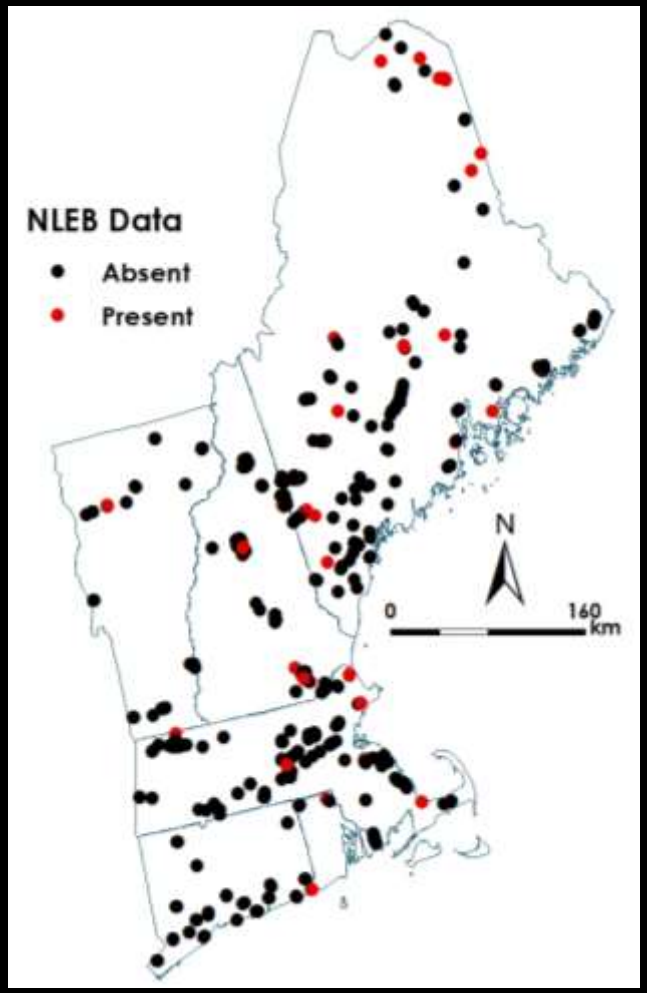
- Neither water distance nor proportion forest significant affect bat occupancy

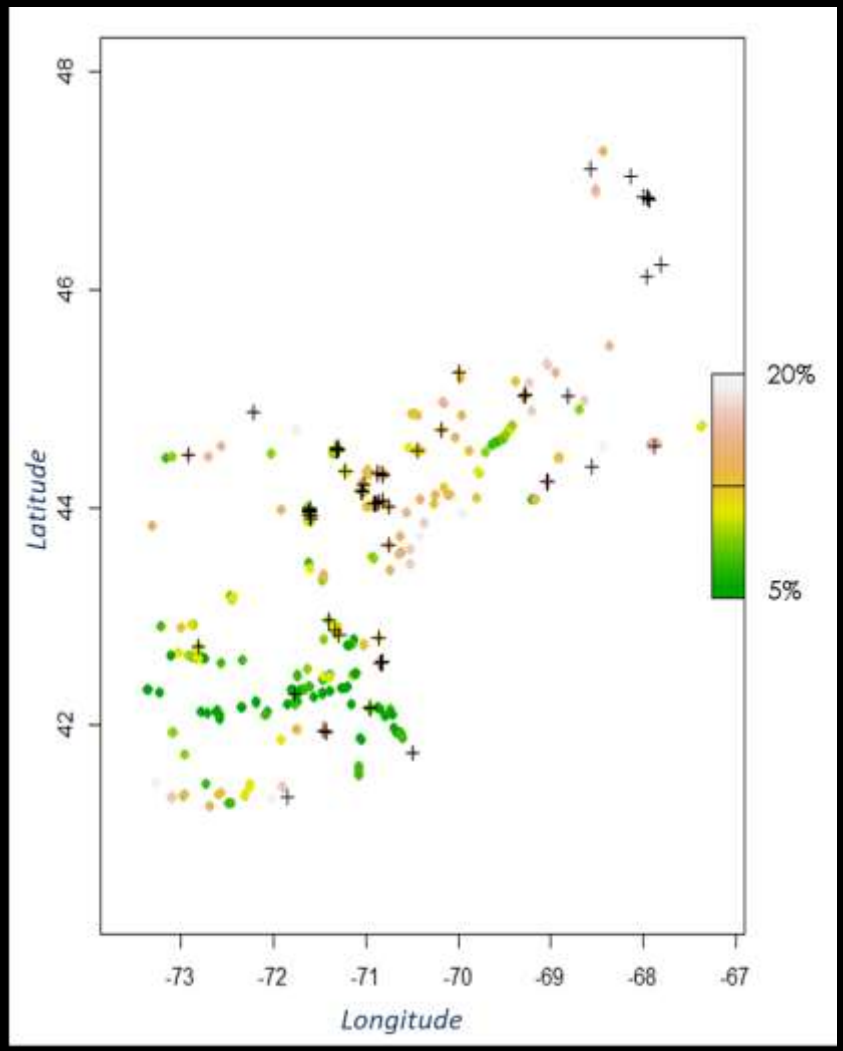
- Affect of road density varies spatially



Discussion

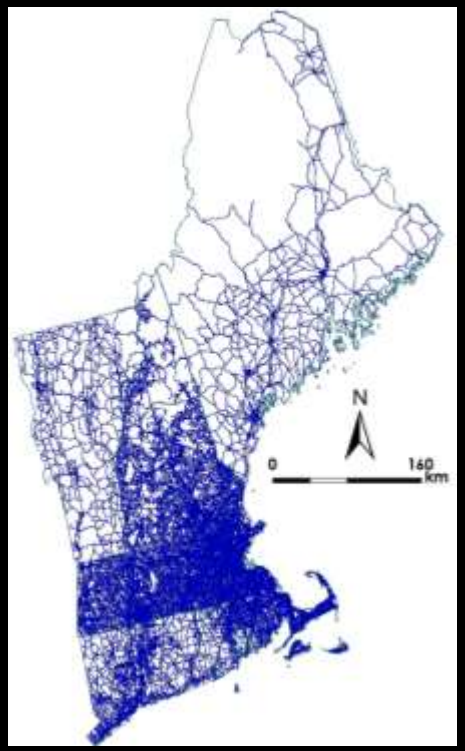
Occupancy is very low

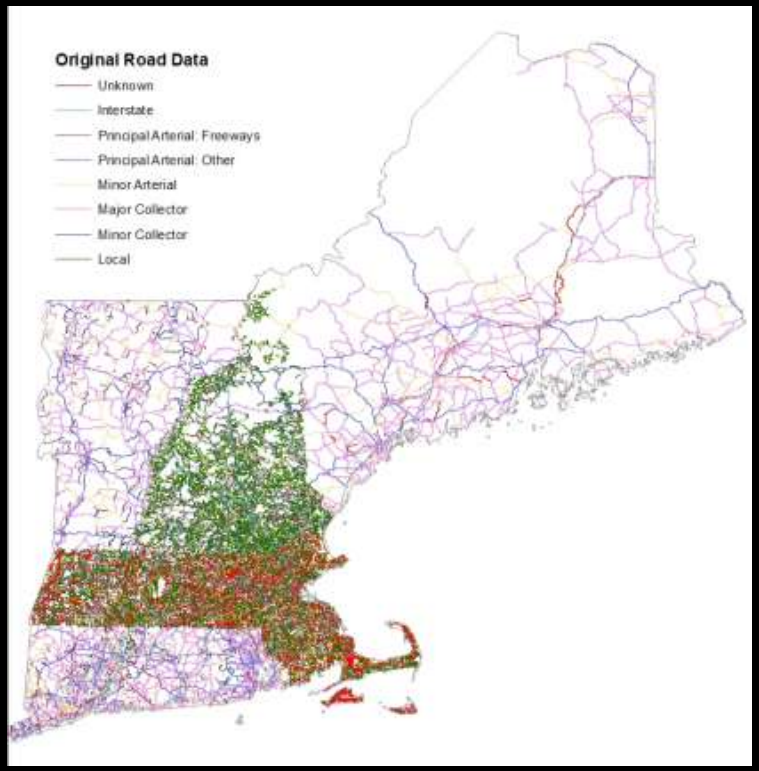


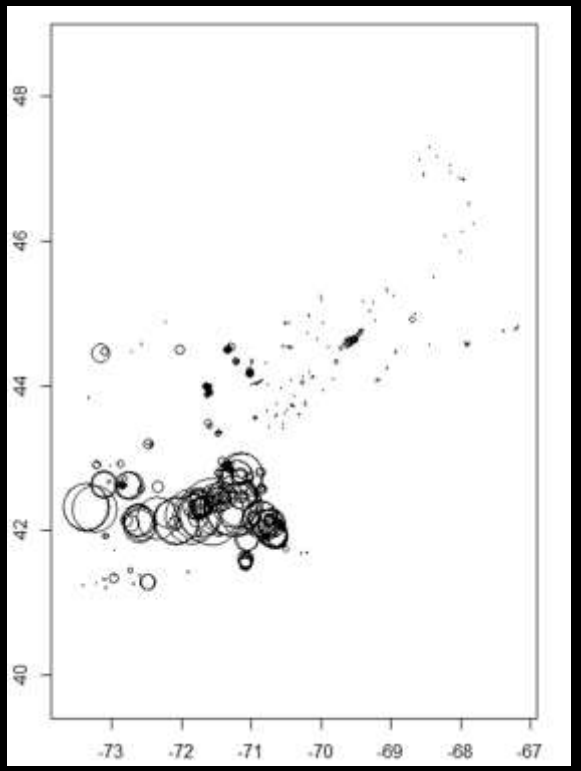


Road density is variable

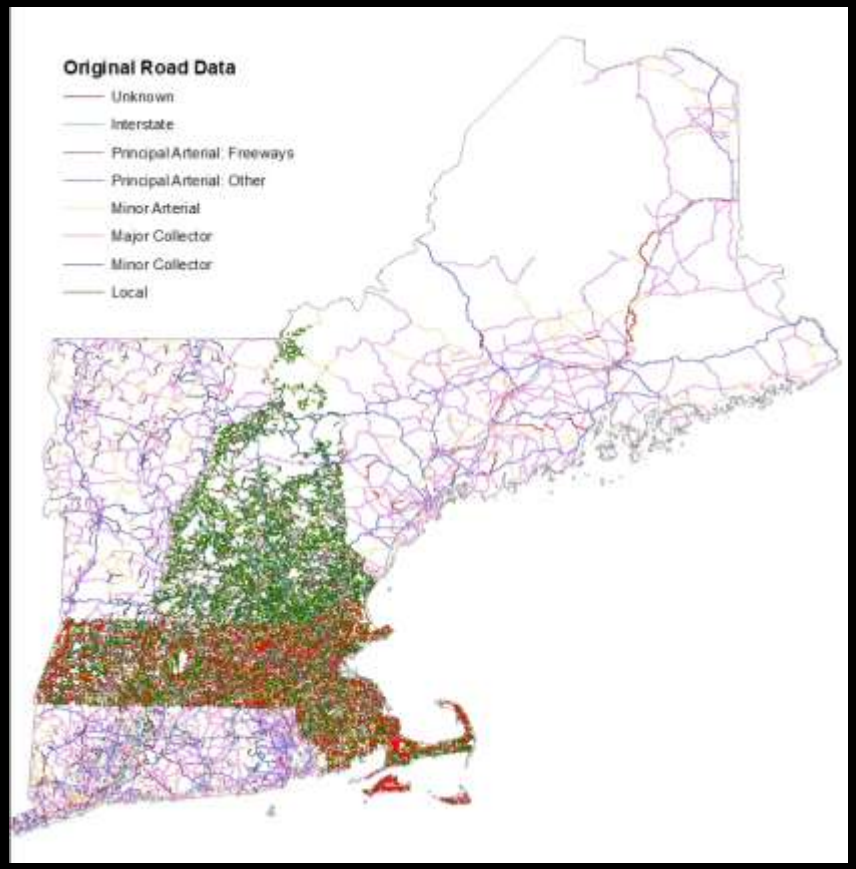
Reality vs reporting

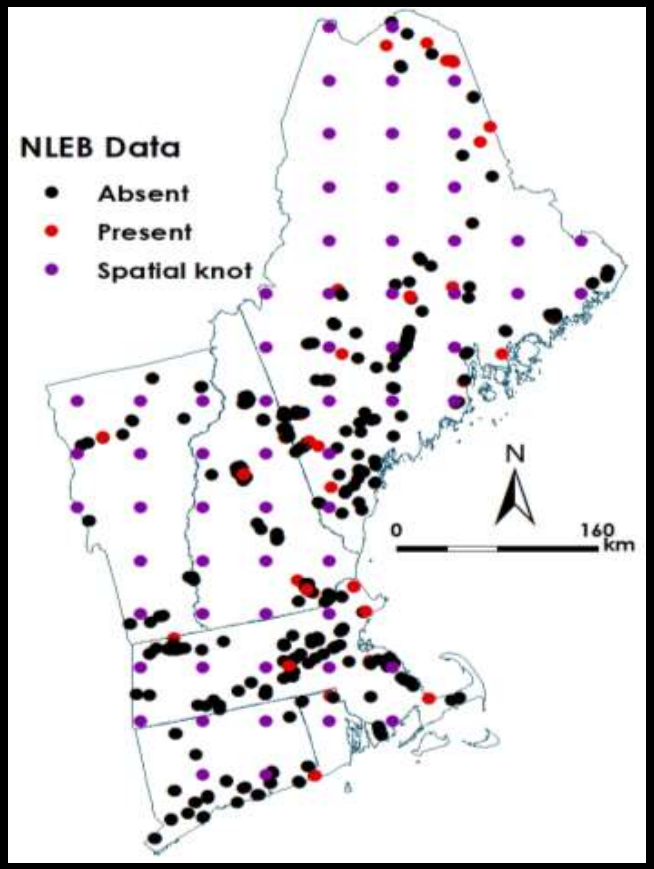






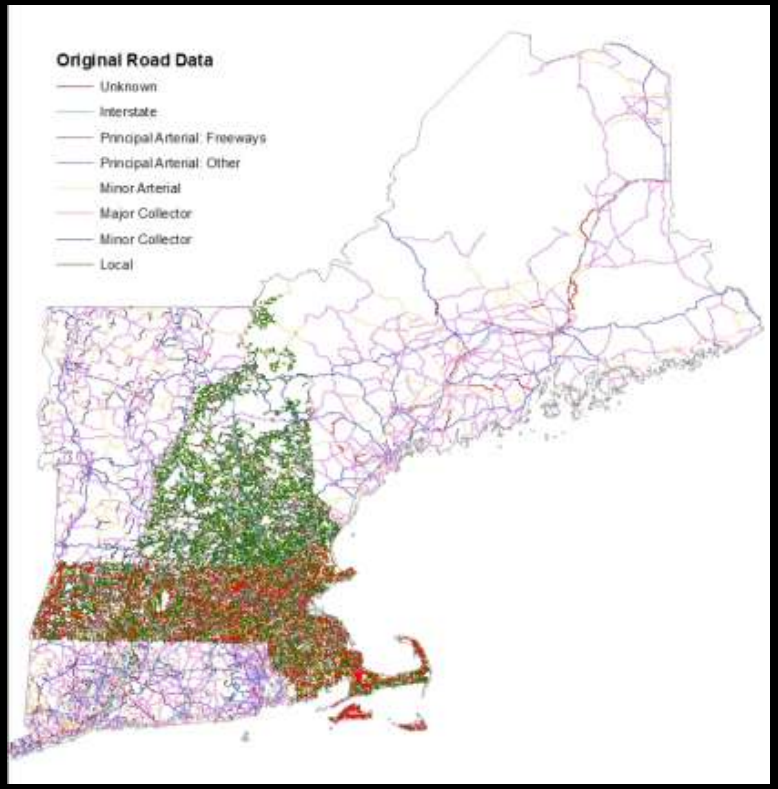
Spatial knots may fix covariate quality issues





Future work

- Assess changes in occupancy based on different road datasets



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Recommendations

- Improve consistence and quality of road data
- Experimental approaches to affects of roads on NLEB

Acknowledgements

- Data sources
  - USFWS New England Office (Susi von Oettingen)
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Any Questions?