A Multi-Scale Analysis of Rusty Blackbird Habitat Selection and Nest Survival in Northeastern Industrial Forests

Shannon Buckley Luepold, Thomas Hodgman, Stacy McNulty, Jonathan Cohen and Carol Foss

Background:

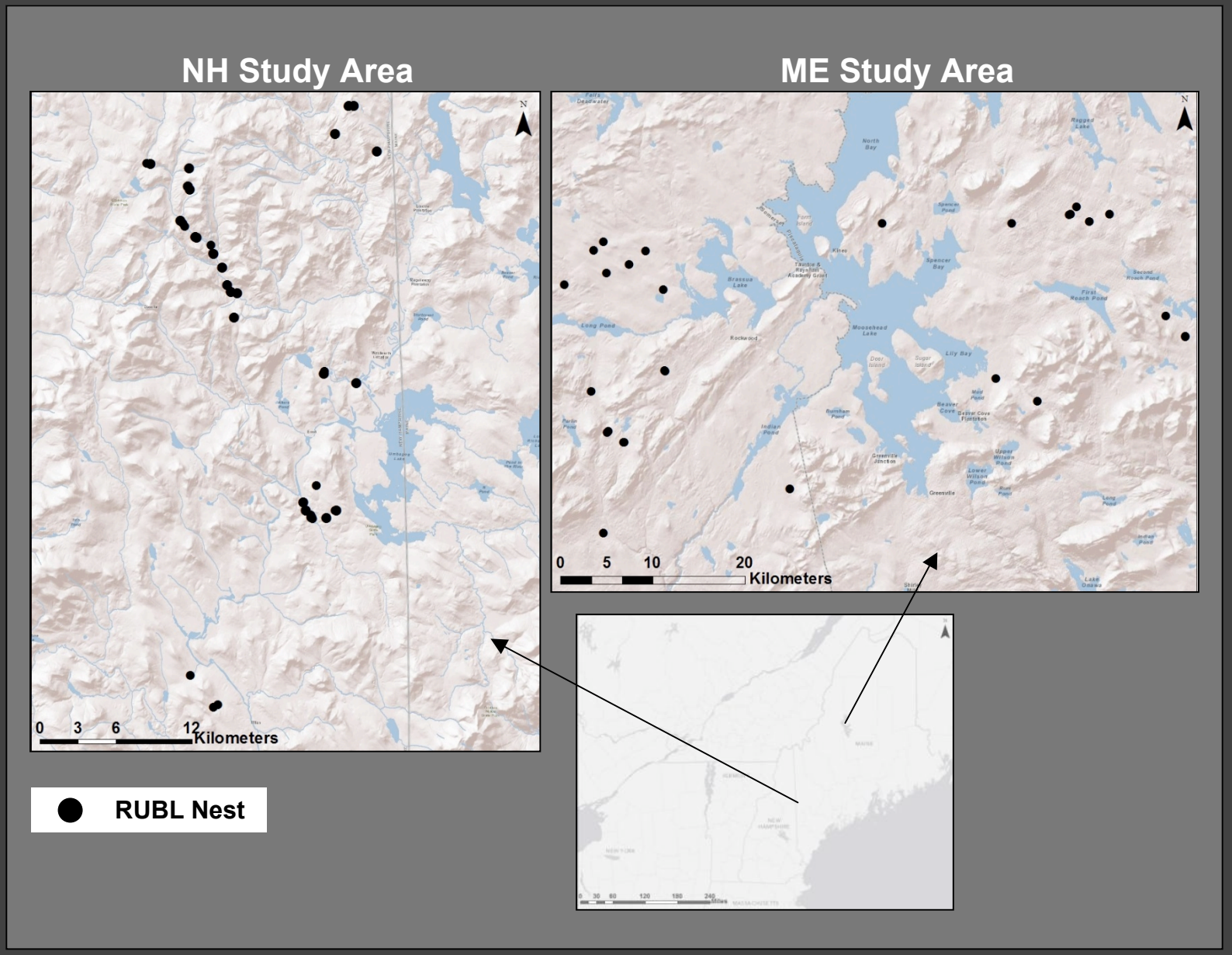
- Regenerating clearcuts as “ecological traps”
- Predators and associated habitat variables unknown
- Hypothesized to be red squirrels, but no evidence

Powell et al. 2010, Condor

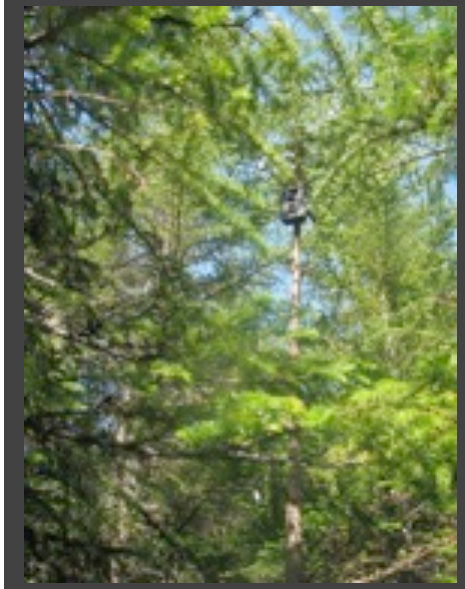
Objectives

- Examine the effect of different habitat features on habitat selection and nest survival at multiple spatial scales
- Identify predators of RUBL nests
- Explore the relationship between cone cycles, predator populations and nest predation

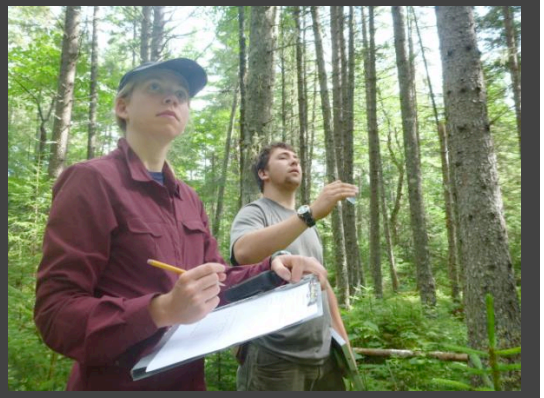
Study Areas


NH Study Area
ME Study Area
0 3 6 12 Kilometers
0 5 10 20 Kilometers
RUBL Nest

Field Methods

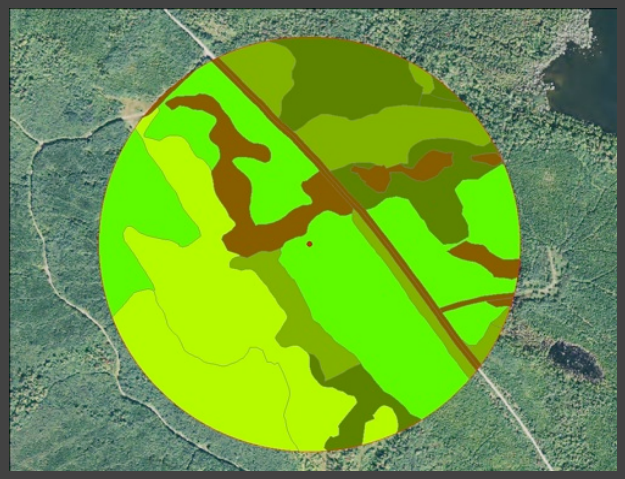


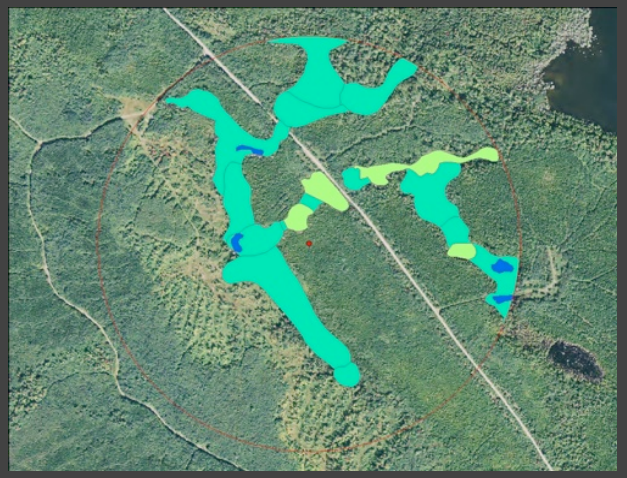
- Cameras < 1 to 3 m from nests
- Habitat measurements
- Squirrel surveys



Home Range Scale Habitat Measurements

- Data on stand area, species composition, etc. from landowners
- Wetland data from National Wetland Inventory (NWI) Database
- Used ArcGIS v10 to determine percent cover of different forest and wetland types within 500-m radius of nests, distance to nearest road





Statistical Analyses

- **Nest Habitat Selection**
  - Logistic regression in R
  - 2 Spatial scales:
    - Nest Patch Scale (5 m)
    - Home Range Scale (500 m)
- **Nest Survival:**
  - Program MARK
  - 2 Spatial scales:
    - Nest Patch Scale (5 m)
    - Home Range Scale (500 m)
- **Comparison of Cone/Squirrel Abundance:**
  - Program R
    - Mann-Whitney *U* Test
    - McNemar's Test

Results: Nest Habitat Selection

- 72 nests total: ME (29) and NH (43), 2011-2012
- 63 nests in harvested areas, 9 in unharvested wetlands

Results: Habitat Selection

Nest Patch Scale

Model*	*K*	ΔAIC_c	w_i	L
SFBAless10+Canopy+Site	3	0	0.63	1.00
SFBAless10+Canopy+Site+AlderStems	4	1.50	0.30	0.47
SFBAless10+Site	2	5.47	0.04	0.06
SFBAless10+Site+AlderStems	3	7.64	0.01	0.02
SFBAless10*Site	3	7.65	0.01	0.02

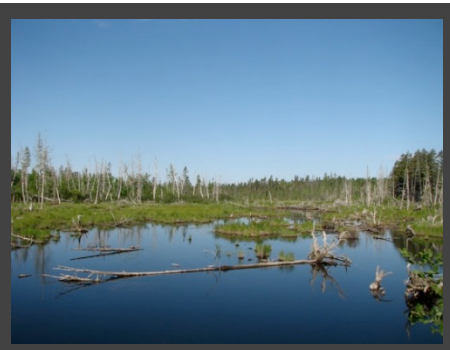
* AIC_c value of top model = 29.44, n = 72

SFBAless10: ↑ 5m²/ha → ↑ 74±32%

Canopy: ↑ 10% → ↓ 43±15%

Results: Habitat Selection

Home Range Scale



Model*	*K*	ΔAIC_c	w_i	L
YoungSoft+TotWet+Site	4	0	0.69	1.00
YoungSoft+PFO_PSS+Site	4	2.08	0.24	0.35
PoleSoft+TotWet	3	6.83	0.02	0.03
PoleSoft+TotWet+Site	4	7.70	0.01	0.02
PoleSoft+PFO_PSS	3	8.85	0.01	0.01
YoungSoft+TotWet	3	9.52	0.01	0.01

* AIC_c of top model = 136.04, n = 50

YoungSoft: ↑10% → ↑41±15%

TotWet: ↑ 10% → ↑114±43%

Results: Nest Habitat Selection

- Different factors driving selection at different spatial scales
  - Foraging requirements (wetlands) at home range scale
  - Nest safety (dense conifers) at nest patch scale

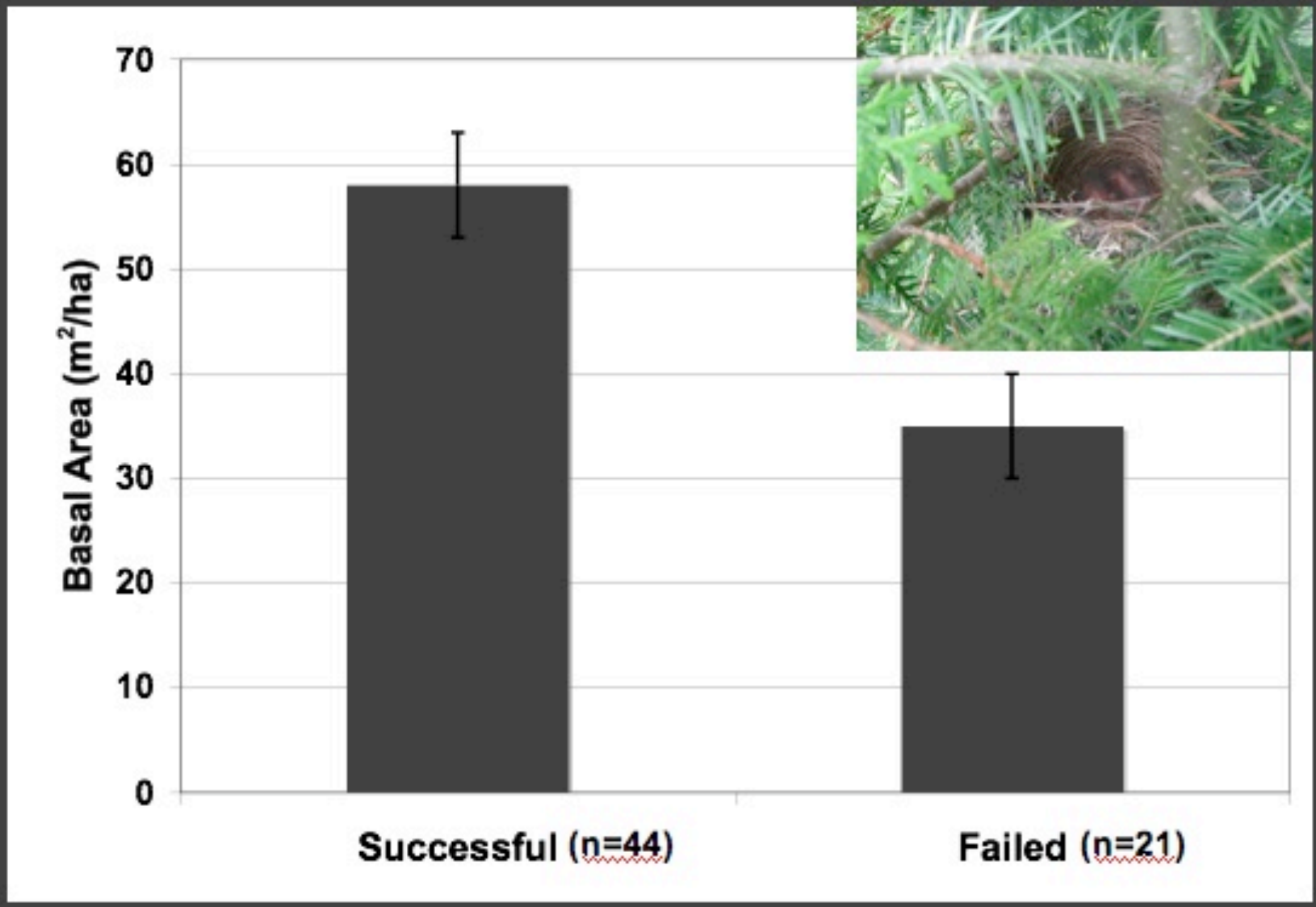
Results: Nest Survival

Nest Patch Scale:

Model*	*K*	ΔAIC_c	w_i	Dev
BATotal	2	0	0.230	131.662
BATotal+Year	3	0.424	0.186	130.070
BATotal+Cut	3	1.263	0.123	131.430
BATotal+Site	3	1.784	0.094	129.996
BATotal+RESQ	3	1.937	0.087	131.584
BATotalxCut	4	2.371	0.070	130.000
Year	2	4.175	0.029	135.837
AlderTree+Year	3	4.548	0.024	134.194
AlderTree+Site	3	4.604	0.023	134.251
AlderTree	2	5.849	0.012	137.511
Null	1	5.864	0.012	139.537

* AIC_c value of best model = 135.22, n = 65

Results: Effect of Total Basal Area



Results: Nest Survival

Home Range Scale

Model	*K*	ΔAIC_c	w_i	Dev
RdDist+Yr+RdDistxYr	4	0	0.858	95.200
WetDist+Yr+WetDistxYr	4	6.864	0.028	102.064
Year	2	8.288	0.014	107.535
TotWet+Year	3	8.853	0.010	106.080
WetDist+Year	3	9.068	0.009	106.295
TotWet	2	9.743	0.007	108.990
YoungSoft+Year	3	9.782	0.006	107.009
MatSoft+Year	3	9.917	0.006	107.144
RdDist+Year	3	10.066	0.006	107.293
TotWet+Yr+TotWetxYr	4	10.091	0.006	105.291
Null	1	10.137	0.005	111.398

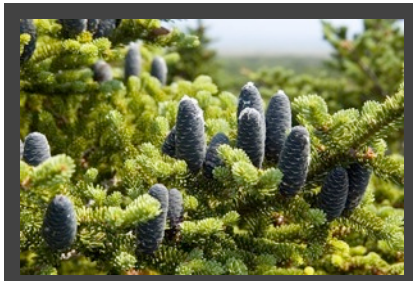
* AIC_c value of best model = 103.267, n = 50

Management Implications

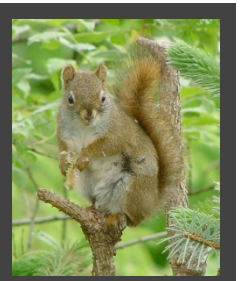
- Roads
- Pre-commercial thinning?

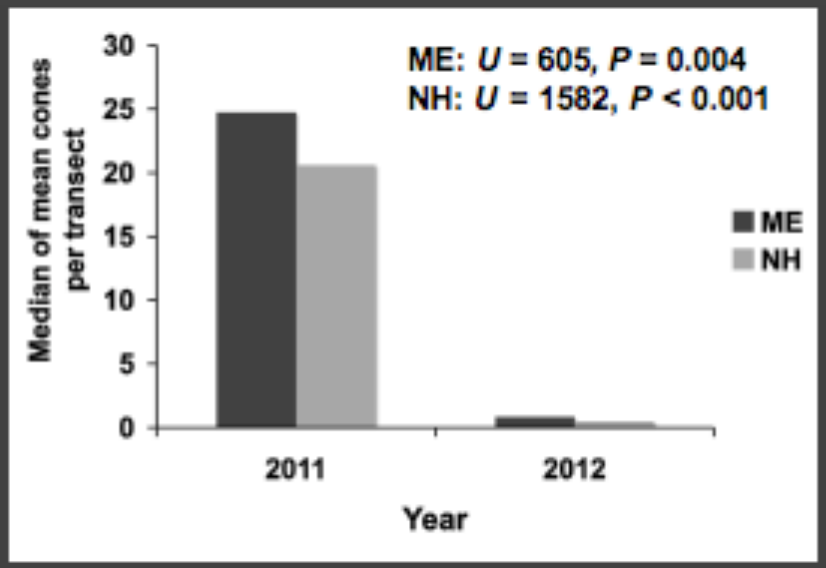
Results: Nest Survival and Predators

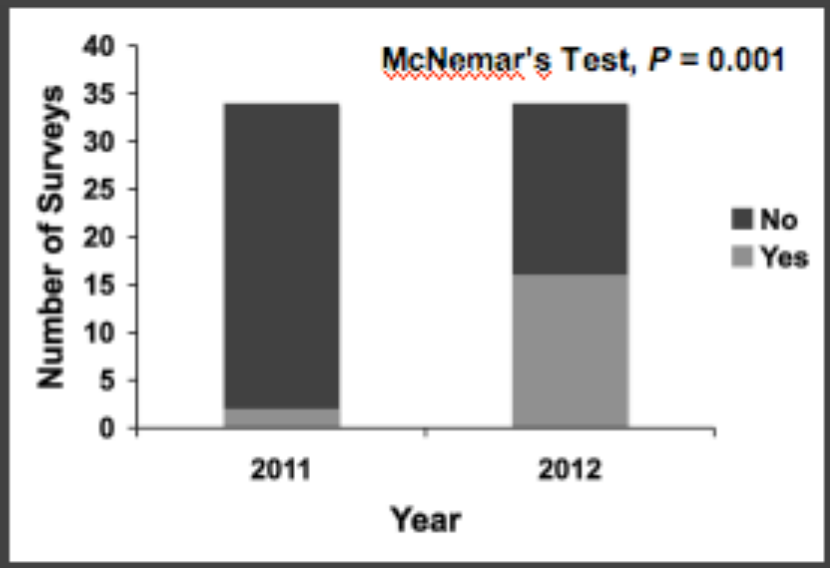
- Monitored 29 nests with cameras
- 8 predation events documented, 4 predator species identified: white-tailed deer, sharp-shinned hawk, blue jay and red squirrel
- Red squirrels most frequent predator (4 predations), but only in 2012

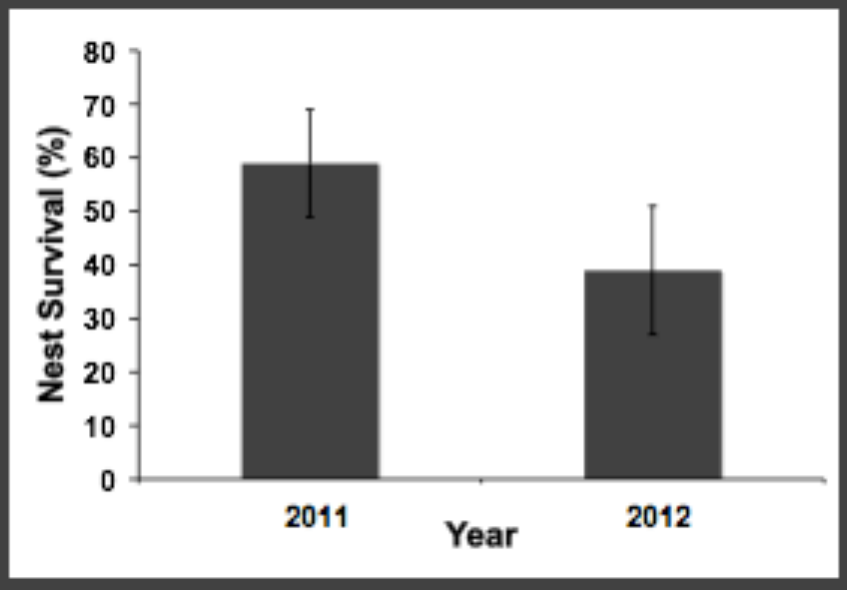


Results: Cones, Squirrels and Nest Survival

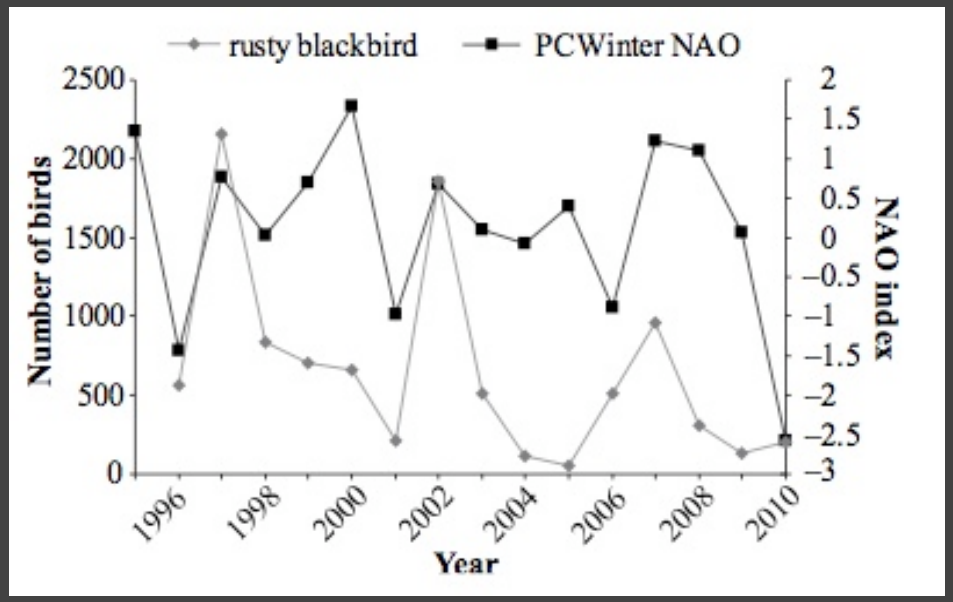


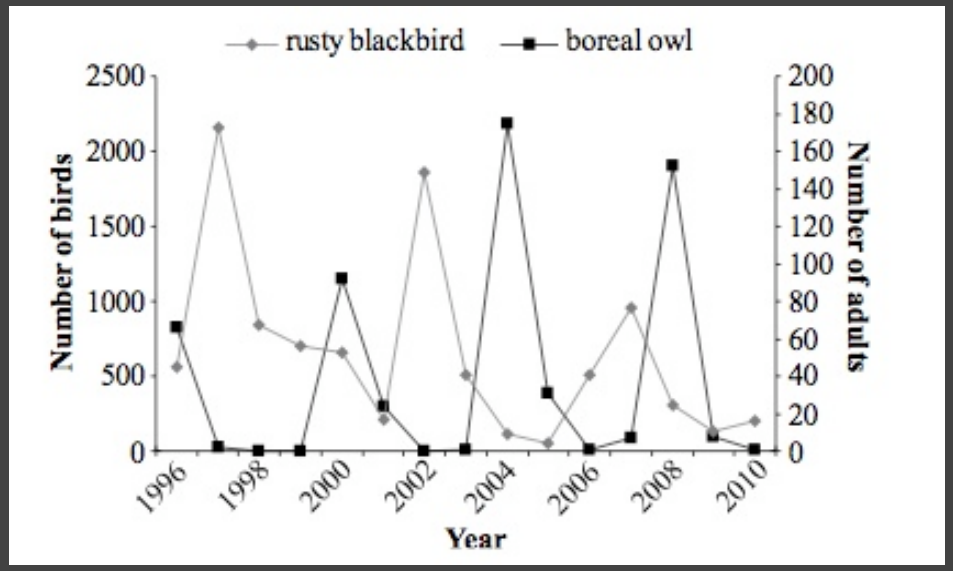






Cyclical Patterns in Rusty Blackbirds





Savard et al. 2011, Ecoscience

Conclusions:

- Different habitat features important at different spatial scales - importance of landscape mosaic
- Relationship between RUBL ecology and timber harvesting complex
- Red squirrels important nest predators, but not every year - possible influence of masting/fluctuating predator populations

References:

- Powell, L., T. P. Hodgman, W. E. Glanz, J. D. Osenton and C. M. Fisher. Nest-site selection and nest survival of the Rusty Blackbird: Does timber management adjacent to wetlands create ecological traps? Condor 112:800-809.

- Savard, J-P. L., M. Cousineau, and B. Drolet. 2011. Exploratory analysis of correlates of the abundance of rusty blackbirds (*Euphagus carolinus*) during fall migration. Ecoscience 18:402-408.

Acknowledgements:

- Academic, logistical and moral support:
  - Stacy McNulty
  - Tom Hodgman
  - Carol Foss
  - Luke Powell
  - Patti Newell
  - Jonathan Cohen
  - Stefan Lüpold
- Field Technicians:
  - Linnea D'Amico
  - Sara Prussing
  - Joe Roy
- Funding:
  - Edna Bailey Sussman Foundation
  - Maine Outdoor Heritage Fund
  - US Fish and Wildlife Service
  - Garden Club of America