Factors Limiting New England Cottontail (Sylvilagus transitionalis) Populations in New York: Implications for Habitat Restoration

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Emily Gavard, M.S.
DEC Collaborators: Dan Rosenblatt, Paul Novak

Goals
- Effects of invasive vegetation and eastern cottontail on New England cottontail restoration
Project Objectives

- Population and Site Monitoring
- Resource Selection
- Survival / recruitment
- Hunting
- Invasive vegetation
- Eastern cottontails
- Management strategies
- Home Range (adult and juvenile)
- Dispersal (adult and juvenile)
- Radio-tracking
- Genetic (microsatellites)
- Parasites and Nutrition

Emily Reuber

Trapping Success

| NEC/ Total Unique Adults and Juveniles: | 110/196 |
| NEC/Total Unique Collared and Transmittered | 110/183 |
| NEC/Total Adults Collared: | 83/143 |
| NEC/Total Young Transmittered: | 32/55 |
| NEC/ Total On Air Adults | 21/47 |
| NEC/ Total On Air Juveniles | 0/1 |
Cranberry Mountain

Trapping very successful this year
Captured NEC in back larger management area (20 months post cut)

<table>
<thead>
<tr>
<th>08- Cranberry</th>
<th>NEC 2014</th>
<th>EC 2014</th>
<th>NEC 2015</th>
<th>EC 2015</th>
<th>Total NEC</th>
<th>Total EC</th>
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Patch Extinctions of NEC at
- Glynnwood
- Taconic-301 (recolonized)
- Wiccopee (recolonized?)

Red sites → shift from NEC to EC dominated in 2015

Single Site (Appalachian Trail) has more NEC than EC in 2015

Trapping Notes:
- Same areas trapped
- Similar Effort - Effort increased when NEC not trapped
- NEC Trapped at Wiccopee and Route 9 were in January 2015

<table>
<thead>
<tr>
<th>Annual Trapping Trends</th>
<th>NEC 2014</th>
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<th>EC 2015</th>
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<td>34</td>
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<td>6</td>
<td>5</td>
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<tr>
<td>Total Adults</td>
<td>43</td>
<td>19</td>
<td>30</td>
<td>44</td>
<td>73</td>
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</table>
**Habitat Use**

**Movements**

NEC
- Median \( \text{Summer} \) = 58 meters, \( N = 840 \)
- Median \( \text{Winter} \) = 37 meters, \( N = 626 \)

EC
- Median \( \text{Summer} \) = 54 meters, \( N = 283 \)
- Median \( \text{Winter} \) = 43 meters, \( N = 294 \)

Lit suggests NEC more reluctant to move outside cover → less cover in winter

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**Resource Selection**

**Part 1: Structure**

- Logistic regression w/ random effect
- Examined selection for structure and vegetation composition

<table>
<thead>
<tr>
<th></th>
<th>Stems</th>
<th>Vegetative Canopy</th>
<th>Herbaceous Height</th>
<th>Woody Canopy</th>
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<td>Both</td>
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<td>EC</td>
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<td>+</td>
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<td></td>
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<tr>
<td>Leaf off</td>
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Resource selection
Part 2: Shrub Species

- Logistic regression w/ random effect
- Examined selection for structure and vegetation composition

<table>
<thead>
<tr>
<th></th>
<th>Rose</th>
<th>Native</th>
<th>Barberry</th>
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</tr>
<tr>
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</table>

Habitat Use
Home Range Size

New England cottontail
- 95% Isopleth: 1.60 ± 1.75 hectares, n = 23
- 50% Isopleth: 0.45 ±0.41 hectares, n = 23
Habitat Use
Home Range Size

New England cottontail
- 95% Isopleth: 1.60 ± 1.75 hectares, n = 23
- 50% Isopleth: 0.45 ± 0.41 hectares, n = 23

Eastern cottontail
- 95% Isopleth: 1.27 ± 0.88 hectares, n = 11
- 50% Isopleth: 0.33 ± 0.16 hectares, n = 11

No interspecific differences:
- 95%: t = -0.75, df = 31.83, p-value = 0.46, n = 34
- 50%: t = -1.09, df = 31.51, p-value = 0.29, n = 34
Implications of demographic study so far

- Species turnover
  - EC push out NEC after poor winters, need to manage existing sites not just newly created sites
- Seasonal habitat changes
  - NEC using different summer habitat → suggests need to manage for patches of young shrubland/grassland within larger shrubland management patches
  - Interspecific differences in habitat selection → manage in favor of NEC
- Newly identified habitat types
  - NEC using residential areas bordering shrubland
  - NEC are using grassland/young shrubland
  - NEC using human structures and outbuilding as daytime/winter refugia
- Contributions of road and hunting mortality
  - Implications for population persistence at certain sites
- Predator communities
  - Naturalized coyote potentially increasing predation on NEC → Creating predator pits? Increasing site extinctions
- Use of non-native vegetation
  - NEC using invasive rose and barberry, may benefit species

Genetic Analysis of NEC

- Identify unique individuals from ear clips (trapped/collared rabbits), and from fecal pellets.
- Initial plan to only look at ear clips (currently 75+ NEC)
- Now all pellets included (489 NEC)

**EAR DATA**

<table>
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<tr>
<th>DNA Sample Site</th>
<th>Lsa1 (Blue)</th>
<th>Lsa8 (Yellow)</th>
<th>Sat12 (Green)</th>
<th>INRA016 (Blue)</th>
<th>Genetic Sex ID</th>
<th>SIR1</th>
<th>StrQ2</th>
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Genetic Analysis of NEC

- Pellet data suggest multiple resampling of individuals
- Some pellets match trapped rabbit DNA

PELLET DATA

<table>
<thead>
<tr>
<th>DNA Sample</th>
<th>Site</th>
<th>Ls21 (Blue)</th>
<th>Ls28 (Yellow)</th>
<th>Sat12 (Green)</th>
<th>INRA016 (Blue)</th>
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</tbody>
</table>

Genetic population structure (between/within patches)

Dispersal

Resampling individuals for parasite work
Parasites and Nutrition

Gastrointestinal Parasites
- Species present include nematode (13 species), trematode (1 species) and protozoa (6 species?)
- 91% of all fecal pellets showed parasitism
Eimeria spp.
- 86% of NEC
- 89% of EC

Obeliscoides cuniculi
- 9% of NEC
- 17% of EC
**Trichostrongylus spp.**

- 22% of NEC
- 55% of EC

**Parasite: Species Differences**

![Graph showing parasite prevalence](image)
Future Directions -

- Long term population monitoring trends
- Monitor new management areas: adaptive management
- EC abundance
  - Impacts on NEC abundance and recruitment
- Impacts of deer browse on young forest regeneration and suitability for NEC
  - Current use vs. availability study leads into this well
- Diet analysis with use/availability analysis
- Impacts of naturalized and introduced predators (coyotes, feral cats) on NEC populations
  - Seasonal shifts in predation
- Hormones
  - Monitor reproduction
- Cooperative studies with Roger Williams and Queen’s zoo
  - Nesting sites, interspecific breeding, maternal care (better application to field studies)

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