A Summary of Bird Research Conducted on Eversource Transmission Line Rights-of-Way 2012-Present

Matthew D. Tarr, PhD
Associate Extension Professor, Wildlife Specialist
University of New Hampshire Cooperative Extension
January 2018
My research is focused on shrublands, the bird species that require shrublands, and determining how vegetation within shrublands & shrubland position on the landscape influence what bird species occur in shrublands.
What are “shrublands”?

Shrublands are habitats:

- dominated by shrubs and young trees (<15’ tall)
- often interspersed with grasses, ferns, wildflowers
- few/no tall trees that shade the shrubs & ground cover

Also referred to as:

- “thickets”
- early-successional habitat
- scrub-shrub habitat
- young forest

= “SHRUBLANDS”
Why care about shrublands?

A wide variety of birds, mammals, reptiles, amphibians, and insects use shrubland habitats to meet their daily or seasonal needs for food and cover.
36 species of birds in NH require shrublands as their primary habitat

*(Schlossberg and King. 2007)*

<table>
<thead>
<tr>
<th>Species</th>
<th>Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>American woodcock</td>
<td>Lincoln’s sparrow</td>
</tr>
<tr>
<td>Alder flycatcher</td>
<td>White-throated sparrow</td>
</tr>
<tr>
<td>Willow flycatcher</td>
<td>Northern cardinal</td>
</tr>
<tr>
<td>House wren</td>
<td>Indigo bunting</td>
</tr>
<tr>
<td>Gray catbird</td>
<td>American goldfinch</td>
</tr>
<tr>
<td>Brown thrasher</td>
<td>Wilson’s snipe</td>
</tr>
<tr>
<td>Blue-winged warbler</td>
<td>Yellow-billed cuckoo</td>
</tr>
<tr>
<td>Tennessee warbler</td>
<td>Whip-poor-will</td>
</tr>
<tr>
<td>Nashville warbler</td>
<td>Ruby-throated hummingbird</td>
</tr>
<tr>
<td>Yellow warbler</td>
<td>Cedar waxwing</td>
</tr>
<tr>
<td>Chestnut-sided warbler</td>
<td>Magnolia warbler</td>
</tr>
<tr>
<td>Prairie warbler</td>
<td>Black-and-white warbler</td>
</tr>
<tr>
<td>Palm warbler</td>
<td>Canada warbler</td>
</tr>
<tr>
<td>Mourning warbler</td>
<td>Dark-eyed junco</td>
</tr>
<tr>
<td>Common yellowthroat</td>
<td>Rusty blackbird</td>
</tr>
<tr>
<td>Eastern towhee</td>
<td>Carolina wren</td>
</tr>
<tr>
<td>Field sparrow</td>
<td>Ruffed grouse</td>
</tr>
<tr>
<td>Song sparrow</td>
<td>Northern mockingbird</td>
</tr>
</tbody>
</table>

These are the “shrubland-dependent” or “shrubland” birds
Shrubland vegetation provides unique structure and food

Nesting cover

Singing perches

Insects

Fruits
Where did shrublands occur in New England historically?

Wet shrublands

These support a slightly different suite of shrubland birds than...

Beaver wetlands

Thickets on wetland edges

Dry shrublands

Pine barrens

Coastal dunes

Forest disturbances
Today, many “natural” shrublands have been lost due to:

- Development
- Altered natural disturbance regimes
- Maturing forest

Since mid 1900’s:

- Has been a steady decline in shrublands
- Has been a steady decline in populations of many shrubland-dependent wildlife

Without regular disturbance most shrublands revert to forest within 10-15 years.
Why be concerned about shrublands & shrubland birds?

Shrublands uncommon in NH, identified in NHWAP as *Habitats at Risk*

Many shrubland-dependent wildlife identified as *Species in Greatest Conservation Need* due to declining populations
Declining shrubland-dependent birds

Populations of most shrubland dependent bird species are declining

(Schlossberg and King 2007)
Most shrubland birds are habitat **specialists** that require...

- Habitats greater than a certain minimum size
- Habitats with specific vegetation structure
A few shrubland birds use shrublands as small as 0.3 acres:

- chestnut-sided warblers
- common yellowthroats
- mourning warblers

“Gap specialists” evolved to exploit small forest disturbances

(Costello et al. 2000)
Most shrubland birds don’t occur in openings < 2 acres in size

Shrublands > 10 acres support greatest diversity of shrubland birds
(Shake et al. 2012, Tarr et al. unpublished data)
Today, shrubland-dependent birds often rely on human-created shrublands.
Since 2012, conducting bird research on Eversource rights-of-way: How do ROW and other anthropogenic shrublands function as habitat for birds?

Effects of invasive shrubs on shrubland bird reproductive success

Distribution of shrubland birds among anthropogenic shrublands

Use of transmission line rights-of-way and clearcuts by shrubland and mature forest birds
Since 2012, conducting bird research on Eversource rights-of-way:
How do ROW and other anthropogenic shrublands function as habitat for birds?

Effects of invasive shrubs on shrubland bird reproductive success

Distribution of shrubland birds among anthropogenic shrublands

Use of transmission line rights-of-way and clearcuts by shrubland and mature forest birds
Factors affecting shrubland bird occupancy of anthropogenic shrublands in southeastern New Hampshire

Randy Shoe, Matt Tarr, and John Litvaitis
UNH Department of Natural Resources and the Environment

Randy Shoe M.S. Project
2015-2016
Understanding where different bird species occur is important for understanding how each shrubland type function as habitat.

Monitoring how shrubland birds use clearcuts created specifically to benefit endangered New England cottontails.
2015 & 2016 conducted presence/absence surveys for eight focal shrubland bird species in 101 shrublands

Alder flycatcher  Brown thrasher  Blue-winged warbler  Chestnut-sided warbler

Eastern towhee  Field sparrow  Indigo bunting  Prairie warbler
Can bird occupancy be predicted by:
• shrubland type?
• vegetation within each shrubland?

Is bird occupancy related to habitat types within the landscape from 50m - 10 km surrounding a shrubland?
Factors affecting shrubland bird occupancy of anthropogenic shrublands in southeastern New Hampshire

**METHODS**

- 850 mile$^2$ study area (Belknap, Strafford, Rockingham, Hillsborough, Merrimack counties)
- Surveyed 26 clearcuts, 25 ROW, 25 old fields, 25 gravel pits
- All shrublands ≥ 2 acres, all ROW ≥ 200’ wide
- All sites surveyed 3x May-Aug

- Each focal species detected by site/sound = “present”
- Estimated density, height, species composition plants in each shrubland
- Quantified dominant habitats around each shrubland:
  - 50m, 250m, 500m, 1km, 5km, 10km buffers
Factors affecting shrubland bird occupancy of anthropogenic shrublands in southeastern New Hampshire

RESULTS

All NEC clearcuts supported a variety of shrubland bird species...

BUT

No clearcut supported all bird species

Lots of overlap in species using different shrubland types,

No shrubland type supported all shrubland bird species consistently
Likelihood of 8 focal bird species occurring in each shrubland type

- ROW & gravel pits support the greatest variety of species, greatest abundance of certain species
- Our results suggest:

  All opening types appear important for maintaining the full suite of shrubland birds in southeastern NH
Landscape composition within 500 m of a shrubland has an important influence on what shrubland birds occupy that shrubland.

Within 500 m of a shrubland, most focal species:
- Respond negatively to ↑ % urban development
- Respond positively to ↑ % shrubland

For some bird species, landscape around a shrubland may be just as useful as the vegetation within a shrubland for predicting shrubland use by birds.
• 2014-2016 color-banded > 650 prairie warblers

• Collected observations of banded birds in >100 shrublands in southeastern NH

• < ½ of males found in the same site in consecutive years

• Individuals commonly used different shrublands between breeding seasons

• Common to observe individual birds in multiple shrublands during the same breeding season:
  • Common for birds to use multiple shrublands spaced ≤ 500 km apart
  • Some individuals used shrublands >3km apart
  • Two birds found in shrublands 35 km apart (banded in Raymond, found in Dover 2 weeks later)
• Birds seem to be aware of and utilize multiple shrublands within a large local landscape within and between breeding seasons

• The population of prairie warblers in SE NH seems to function as one large population

Birds seem to readily find large openings (≥ 10 ac) - The position of large openings in relation to one another may not be especially important for adult birds

Small (< 2 acres) openings more likely to be used if they are located near (< 1/2 km probably ideal) larger openings

Tarr et al. unpublished data, Roberts & King 2017 J. Wildl. Manage 81:1298-1307
How we manage vegetation composition affects some species more than others.

Brown thrasher most specialized: scattered low shrubs in dry, sandy sites.

Prairie warbler: dense shrubs, low trees, some overstory in dry sites with minimal herb cover.

Field Sparrow: scattered low shrubs on dry sites with short, sparse grass.

Common yellowthroats, gray catbirds, song sparrows most generalist and occur in nearly all shrublands.
Shrubland bird diversity lowest where invasive shrubs grow in near monoculture and overall shrub diversity is low.

COYE, GRCA, SOSP most common shrubland birds in these habitats.

Shrubland bird diversity appears highest in habitats where invasive shrubs grow as part of a diverse community of native shrubs.

Bird diversity at mixed invasive/native habitats may be greater than in habitats composed only by native shrubs.

Tarr 2017, Holm et al. unpublished data
We have very good data indicating how human-created shrublands are used by shrubland dependent birds in SE NH

- Concerns remain regarding how creating/maintaining shrublands affects habitat for birds that nest in mature forests.

- Clearcutting mature forest to create shrublands = loss of nesting habitat for birds that nest in mature forest...

- But growing evidence that mature forest birds may use shrublands, especially after young birds fledge

Wood thrush
>20 songbird species in NH nest only in mature forest

- Eastern wood-pewee
- Great crested flycatcher
- Yellow-throated vireo
- Blue-headed vireo
- Red-breasted nuthatch
- White-breasted nuthatch
- Brown creeper
- Golden-crowned kinglet
- Ruby-crowned kinglet
- Hermit thrush
- Wood thrush
- Northern parula
- Black-throated blue warbler
- Yellow-rumped warbler
- Black-throated green warbler
- Blackburnian warbler
- Pine warbler
- Ovenbird
- Scarlet tanager
- Louisiana waterthrush
- Northern waterthrush
- Tufted titmouse
- Great crested flycatcher
- Black-throated blue warbler
- Black-throated green warbler
- Red-eyed vireo
- Ovenbird
- Blackburnian warbler

Shrublands have typically been considered negative to these “mature forest birds”, but...
Adult and fledgling “mature forest birds” do use shrubby openings

- dense ground-level cover allows birds to avoid predators
- abundant fruits and insects provide important food

Shrubland openings may enhance the productivity (i.e., number of young that survive to reproduce) of a wide variety of bird species

In 2017, we started investigating how shrublands are used by mature forest birds

(King et al. 2006, Vitz and Rodewald 2006, Askins et al. 2007, Holm et al. unpublished data)
Use of Transmission Line Rights-of-way and Clearcuts by Songbirds During the Nesting and Post-nesting Season

Erica Holm, Matt Tarr, Adrienne Kovach
UNH Department of Natural Resources and the Environment

Erica Holm M.S. Project
2017-2018
Using constant-effort mist netting to inventory the entire bird community in:
• 24 transmission line rights-of-way
• 12 regenerating clearcuts

Site Types

**RIGHTS-OF WAY:**
- Mowed/Exotic Shrub-Dominated (n=6)
- Mowed/ 1-2 growing seasons (n=6)
- Mowed/ 2-3 growing seasons (n=6)
- Selective Herbicide Treated (n=6)

**CLEARCUTS:**
- Native Shrub Dominated (n=6)
- Exotic Shrub Dominated (n=6)

Wells, ME
to
Dunbarton, NH
How mist nets are arranged on-site

18 sites total (per yr):
- 12 ROW / 4 types
- 6 CC / 2 types

Each site visited 6 times per season
One day per 2 wks
How do we do it?

Constant-effort mist netting

- Net checks $\leq 15$ min
- Birds are brought to central data collection location
- Net locations, time open, etc. all recorded

The Result:
Capture rate per net hour
(results per unit of effort)
All captured birds:
- Identified to species, sexed, aged, breeding status
- Banded with a permanent numbered band

Erica Holm with 2017 banding crew

Steph Copeland w/ blue jay

scarlet tanager

blue-winged warbler
Bird captures compared to estimates of:

- Fruit abundance at each net
- Shrub species composition & height at each net

- Vegetation – 50 point-intercept points around each net, determining exact differences at nets
- Fruit – tally all ripe, unripe, desiccated fruit in 1m x 12m transect, 2 per net
Preliminary Results from 2017

** DISCLAIMERS **

- Recent study end date
- These data are strictly preliminary
- Conjectures may or may not remain after thorough analysis
- These data do not account for all variables
Preliminary data from 2017 breeding season (Holm et al. unpublished data)

<table>
<thead>
<tr>
<th>unique birds captured:</th>
<th>3441</th>
</tr>
</thead>
<tbody>
<tr>
<td>unique species captured:</td>
<td>76</td>
</tr>
<tr>
<td>species only found in ROW:</td>
<td>15</td>
</tr>
<tr>
<td>species only found in CC:</td>
<td>17</td>
</tr>
</tbody>
</table>

ROW & Clearcuits important for birds in SE Maine & NH

Composition of shrubland birds (bold) and non-shrubland birds caught in 12 shrubby transmission line rights-of-way in southeastern ME and NH 2017

<table>
<thead>
<tr>
<th>Shrubland birds</th>
<th>Non-shrubland birds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alder flycatcher</td>
<td>Chipping sparrow</td>
</tr>
<tr>
<td>American goldfinch</td>
<td>Common yellowthroat</td>
</tr>
<tr>
<td>American redstart</td>
<td>Chestnut-sided warbler</td>
</tr>
<tr>
<td>American robin</td>
<td>Downy woodpecker</td>
</tr>
<tr>
<td>Bank swallow</td>
<td>Eastern bluebird</td>
</tr>
<tr>
<td>Baltimore oriole</td>
<td>Eastern kingbird</td>
</tr>
<tr>
<td>Black-and-white warbler</td>
<td>Eastern towhee</td>
</tr>
<tr>
<td>Black-billed cuckoo</td>
<td>Field sparrow</td>
</tr>
<tr>
<td>Black-capped chickadee</td>
<td>Gray catbird</td>
</tr>
<tr>
<td>Blue jay</td>
<td>Great-crested flycatcher</td>
</tr>
<tr>
<td>Black-throated green warbler</td>
<td>Ruby-throated hummingbird</td>
</tr>
<tr>
<td>Blue-winged warbler</td>
<td>Hairy woodpecker</td>
</tr>
<tr>
<td>Canada warbler</td>
<td>Hermit thrush</td>
</tr>
<tr>
<td>Cedar waxwing</td>
<td>House sparrow</td>
</tr>
<tr>
<td></td>
<td>Song sparrow</td>
</tr>
<tr>
<td></td>
<td>Swainson's thrush</td>
</tr>
<tr>
<td></td>
<td>Tennessee warbler</td>
</tr>
<tr>
<td></td>
<td>Tree swallow</td>
</tr>
<tr>
<td></td>
<td>Tufted titmouse</td>
</tr>
<tr>
<td></td>
<td>Flycatcher sp.</td>
</tr>
<tr>
<td></td>
<td>Sparrow sp.</td>
</tr>
<tr>
<td></td>
<td>Veery</td>
</tr>
<tr>
<td></td>
<td>Wilson's warbler</td>
</tr>
<tr>
<td></td>
<td>Wood thrush</td>
</tr>
<tr>
<td></td>
<td>White-throated sparrow</td>
</tr>
<tr>
<td></td>
<td>Yellow warbler</td>
</tr>
</tbody>
</table>

- Shrubland birds most abundant species in these shrublands
- Mature forest birds a large component of bird community in these shrublands
- Mature forest birds are in these openings regularly throughout breeding season
• Only ½ of study sites inventoried in 2017
• No glaring differences in bird species richness among types

Preliminary results from 2017 breeding season (Holm et al. *unpublished data*)
Comparing rights-of-way to clearcuts:

- Similar # shrubland bird species
- Slightly greater # forest bird species in clearcuts

**Preliminary results from 2017 breeding season (Holm et al. unpublished data)**
Comparing native vs mixed native & exotic shrub sites

- Similar, if not slightly more species in mixed ROW

Preliminary results from 2017 breeding season (Holm et al. *unpublished data*)
Comparing native vs mixed native & exotic shrub sites

- Similar, if not slightly more species in mixed ROW
- Similar # species in clearcuts

Preliminary results from 2017 breeding season (Holm et al. *unpublished data*)
### Rights-of-Way vs. Clearcuts

<table>
<thead>
<tr>
<th>Site Type</th>
<th>Forest Bird Species</th>
<th>Shrubland Birds Species</th>
</tr>
</thead>
<tbody>
<tr>
<td>Young Mowed</td>
<td>13</td>
<td>17</td>
</tr>
<tr>
<td>Old Mowed</td>
<td>15</td>
<td>18</td>
</tr>
<tr>
<td>Mixed Native &amp; Exotic</td>
<td>19</td>
<td>20</td>
</tr>
<tr>
<td>Herbicide</td>
<td>16</td>
<td>20</td>
</tr>
<tr>
<td>Native</td>
<td>25</td>
<td>19</td>
</tr>
<tr>
<td>Mixed Native &amp; Exotic</td>
<td>23</td>
<td>21</td>
</tr>
</tbody>
</table>

- Lowest bird richness in ROW the year following mowing

Preliminary results from 2017 breeding season (Holm et al. *unpublished data*)
Comparing overall bird abundance (capture rate) among Right-of-Way Types

Greatest # birds captured in mowed ROW composed of mixed native & exotic shrubs

Preliminary results from 2017 breeding season (Holm et al. unpublished data)
Comparing overall bird abundance (capture rate) among *Right-of-Way Types*

Sites with the shortest shrubs supported the fewest number of birds

Preliminary results from 2017 breeding season (Holm et al. *unpublished data*)
Will be banding daily late-May through Sept 2018
NHANRS Workshop May 18, 2018
QUESTIONS?

Matt Tarr
UNH Cooperative Extension
matt.tarr@unh.edu