

Powerline Rights of Way and Population Declines in Early Successional Bird Species: Making Connections with Private Landowners

Christine Peterson, M.S. Candidate

University of Vermont

Christine.Peterson@uvm.edu

81 Carrigan Drive, Burlington, VT

Co-PI: Dr. Allan Strong

University of Vermont

Astrong@uvm.edu

Collaborators: Mark LaBarr, Margaret Fowle

Audubon Vermont

Completion date: December 2014

Management of early successional habitat on powerline rights of way can provide essential habitat for declining shrubland songbirds. This research provides preliminary, species-specific habitat use patterns that can be integrated into management strategies.

Funding support for this project was provided by the Northeastern States Research Cooperative (NSRC), a partnership of Northern Forest states (New Hampshire, Vermont, Maine, and New York), in coordination with the USDA Forest Service.

<http://www.nsrcforest.org>

Project Summary

- Wildlife species that rely on early successional habitat are showing long-term region-wide declines, including songbirds such as Eastern Towhee (*Pipilo erythrophthalmus*), Field Sparrow (*Spizella pusilla*), Prairie Warbler (*Setophaga discolor*), Blue-winged Warbler (*Vermivora pinus*), Golden-winged Warbler (*Vermivora chrysoptera*), and Brown Thrasher (*Toxostoma rufum*).
- In areas where vegetation structure is actively maintained in early successional stages, such as powerline rights-of-way (ROWs), there is an opportunity to provide habitat for these species over long time frames.
- This study focuses on the habitat use of these 6 early successional bird species in the Champlain Valley in Vermont along powerline ROWs
- Thirty-four sites determined to include potential suitable habitat were established along ROWs in the Champlain Valley. At each site during the breeding season, trained citizen scientist volunteers used a spot-mapping technique to document species distribution patterns along transects at all sites. Where focal species were encountered, vegetation types were recorded every 20 meters.
- Fine scale habitat use was evaluated by GPS mapping individual bird use areas during timed field observations. Detailed 1m² vegetation plot data was collected for all sites where focal species were mapped to measure used and available habitat characteristics.
- Preliminary analyses show different (species-specific) relationships between the probability of occurrence and the presence of both native and invasive shrubs.
- The findings from this study will help determine species-specific habitat use patterns to improve management practices that could benefit these declining species. It will also help to promote habitat corridors for critical songbird migration pathways in the Northeast region.

Powerline ROWs As Potential Habitat



- The Northeast has been recovering from heavy cutting and extensive agricultural land use over the past 100 years
- Wildlife species reliant on early successional habitat are showing long-term region-wide declines
- Areas where vegetation structure is maintained in early successional stages, like rights-of-way (ROWs), offer potential habitat
- The Vermont Electric Company (VELCO) manages ROWs in Vermont to maintain access to power transmission lines



Species in Decline

- This study focused on 6 early successional bird species in the Champlain Valley in Vermont that utilize early successional habitat up to 20 years post-disturbance
 - Golden-winged Warbler
 - Blue-winged Warbler
 - Eastern Towhee
 - Field Sparrow
 - Prairie Warbler
 - Brown Thrasher
- Listed as Species of Greatest Conservation Need on at least 3 of the 4 New England state's Wildlife Action Plans and the Golden-winged Warbler is currently under review for federal endangered listing.



© 2007 Lloyd Spitznagel

© JFLOWERS/ARTSNIMAGES 2013

GSCHNEIDERPHOTO.COM

© 2006 Nick Kontonicolos/1000birds.com

© Stephen Muskie

© Marie Rea

Species in Decline

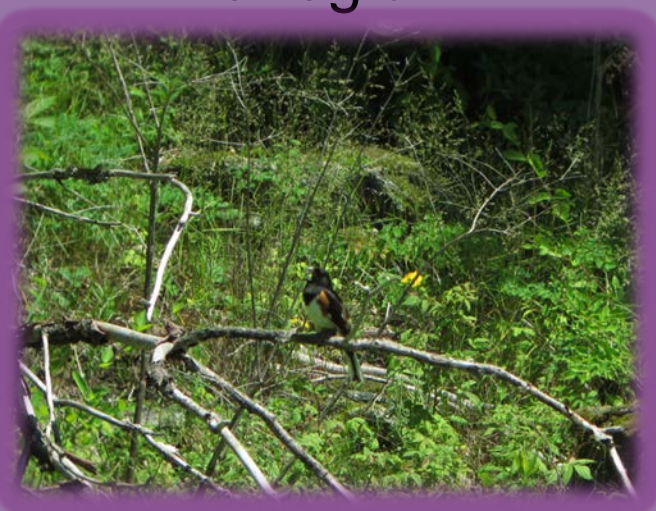
- These species are showing long-term (40 year) population declines reaching 3.3% per year in the Great Lakes-St. Lawrence Valley Bird Conservation Region, up to 2.9% per year in the Eastern Breeding Bird Survey Region, and up to 7.4% per year in Vermont¹. Over a 40-year period, even a 3% population decline per year will result in a total population decline of 70%.
- These species require frequent disturbance to maintain suitable habitat. Once habitat reaches 20 years post-disturbance, it is no longer suitable.
- Although 12% of the landscape in New England is considered to be early successional, 71% of this is in Maine, which is largely outside of the range of some high priority species such as Prairie, Blue-winged and Golden-winged warblers².

¹Sauer, J. R., J. E. Hines, J. E. Fallon, K. L. Pardieck, D. J. Ziolkowski, Jr., and W. A. Link. 2012. The North American Breeding Bird Survey, Results and Analysis 1966 - 2011. Version 12.13.2011 USGS Patuxent Wildlife Research Center, Laurel, MD.

²Schlossberg, S., and D. I. King. 2007. Ecology and management of scrub-shrub birds in New England: a comprehensive review. Report submitted to Natural Resources Conservation Service, Resource Inventory and Assessment Division, Beltsville, MD.

Research Objectives

1. Develop a better understanding of the factors that influence habitat use by the focal species.
2. Determine ROW management strategies that maximize habitat use of shrubland bird species in the region.

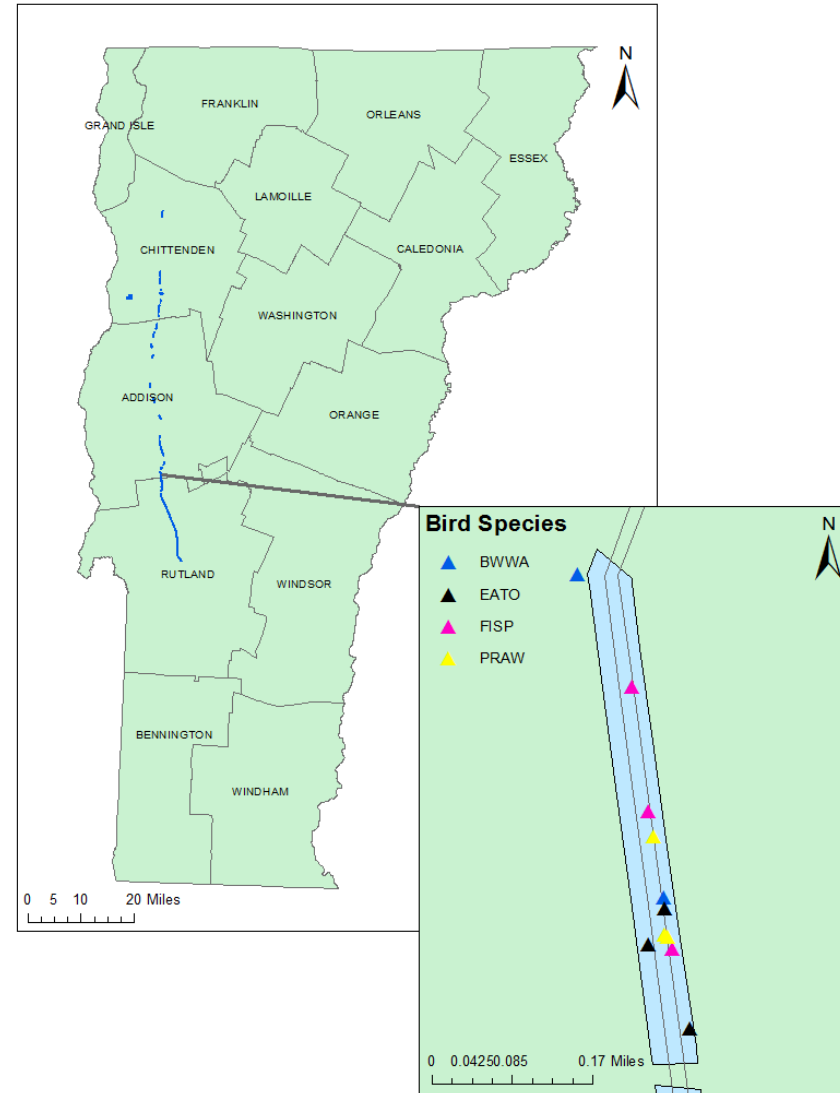


3. Explore broader applications of shrubland management to private landowner property and potential collaborative management projects.

Methods:

Spot-mapping Surveys

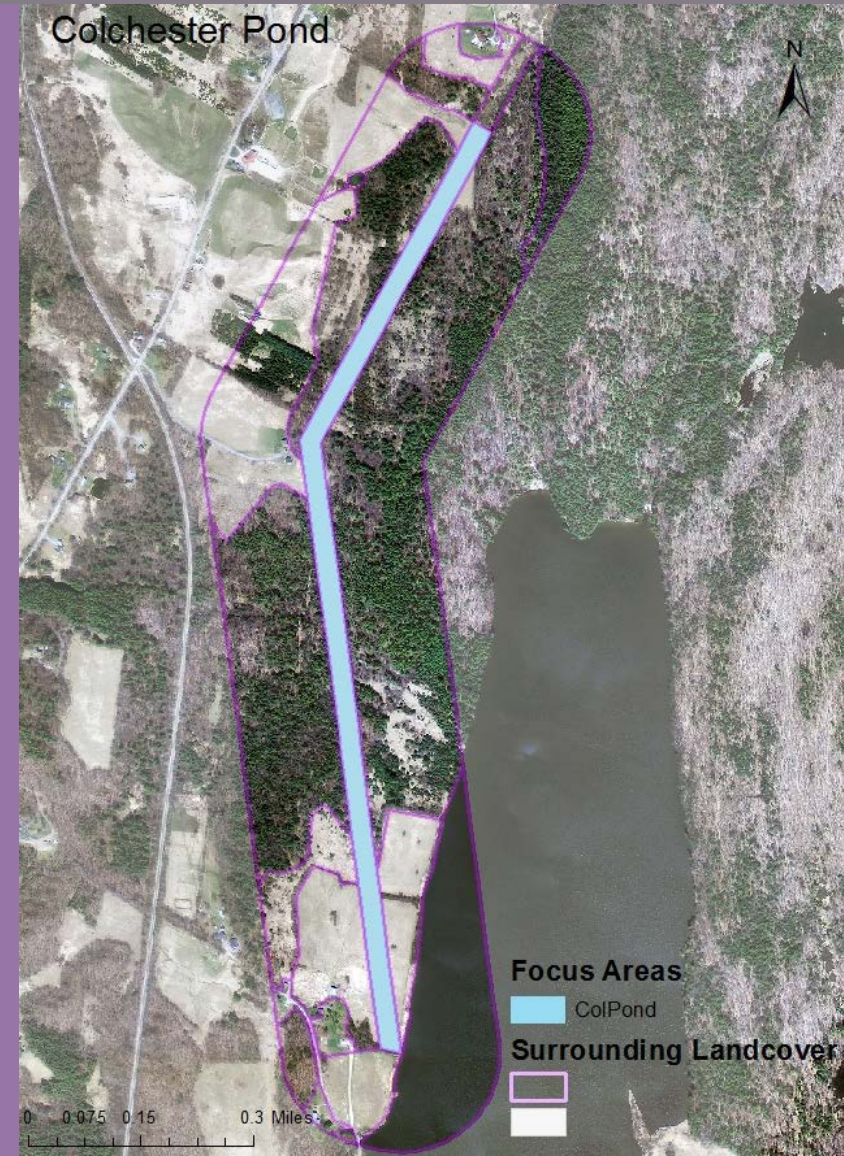
- 32 sites along powerline ROWs
 - Visited during 2012 and 2013 breeding seasons
- Spot-mapping technique
 - Citizen scientist volunteers recruited by Audubon Vermont surveyed all sites



Methods:

Surrounding Landcover Mapping

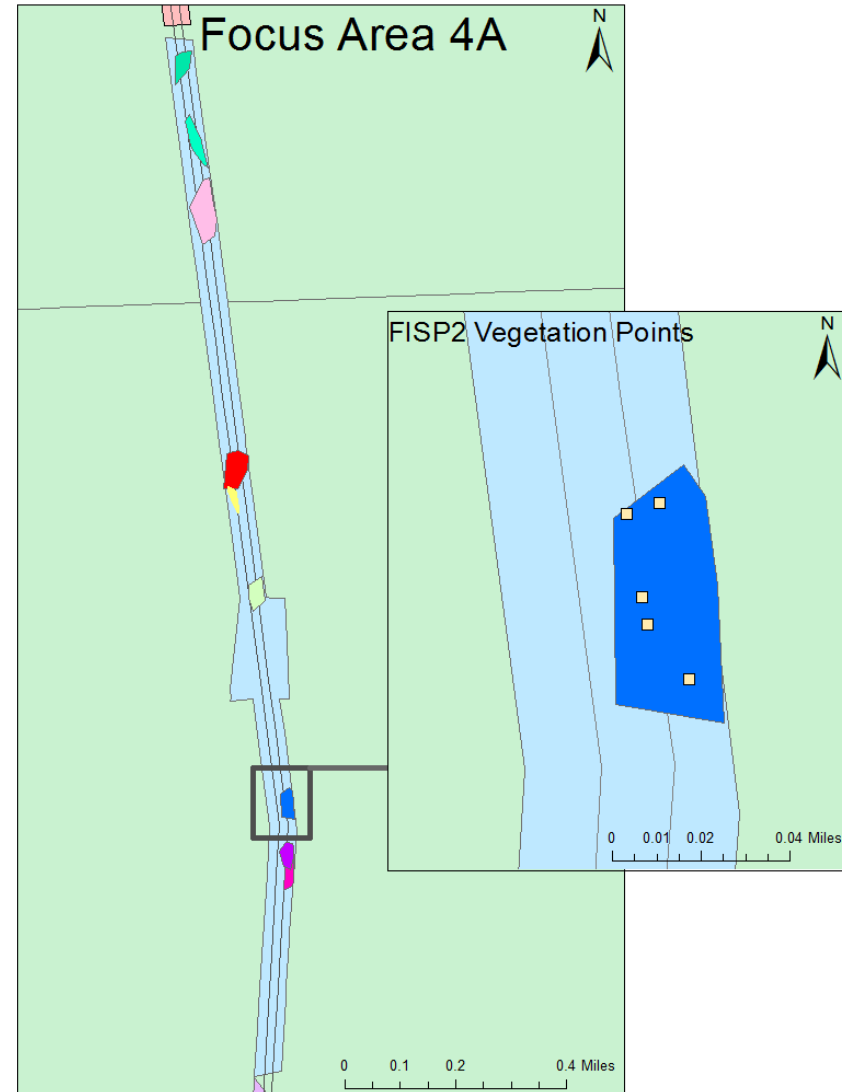
- Buffer: ~200m around all sites
 - High resolution (<1m) imagery
 - Most recent available (within 2 years)
- Landcover polygons
 - Manually digitized polygons and classified landcover types in GIS



Methods:

Bird Habitat Use Mapping

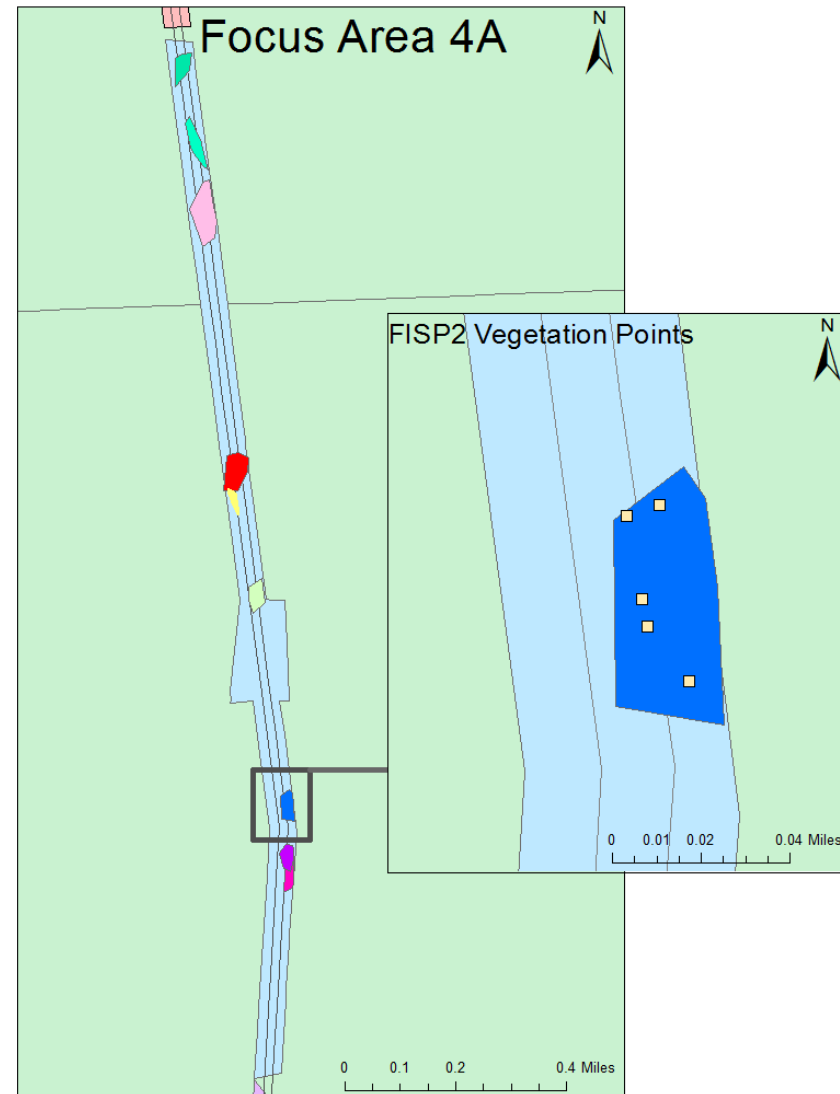
- Focused on 4 species:
 - Golden-winged Warbler
 - Blue-winged Warbler
 - Eastern Towhee
 - Field Sparrow
- At 17 of 32 sites focal species were detected
- GPS locations
 - Bird movements and behavior recorded for one hour per bird



Methods:

Bird Habitat Use Mapping

- GPS locations
 - Minimum polygons calculated from GPS points collected in the field
- Habitat use vegetation plots
 - Random points ($n = 5$) generated within each bird polygon to characterize vegetation



Methods:

Vegetation Plots

- 1m² vegetation plots
- Plant species abundance
 - 10 most prevalent plant species
 - Percent cover
- Vertical Structure
 - Pole hits for each plant species
 - Maximum height





Outcomes: Bird Habitat Use





Outcomes: Vegetation Survey

- Used habitat plots
 - 5 vegetation plots per mapped bird
 - 435 plots total for all species
- Available habitat plots
 - 2 vegetation plots every 100m at all sites where target species mapped
 - 612 plots total to measure available habitat



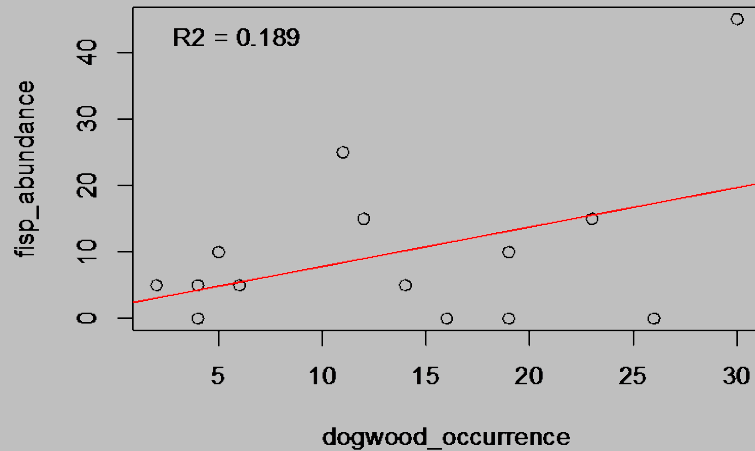
Analysis:

Use vs. Availability

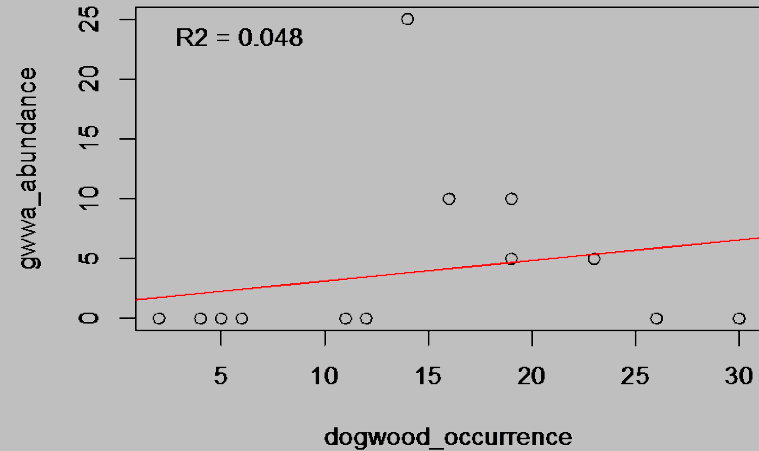
- Habitat Use
 - Model fitting and selection, linear regression
 - Compare habitat use areas with surrounding available habitat
 - Examine influence of surrounding landscape
 - Determine if vegetation preferences exist
 - Plant species composition within ROWs from plots
 - Surrounding landcover composition within buffer
- Preliminary results on plant composition of habitat for some of the focal species

Results: Dogwood Occurrence

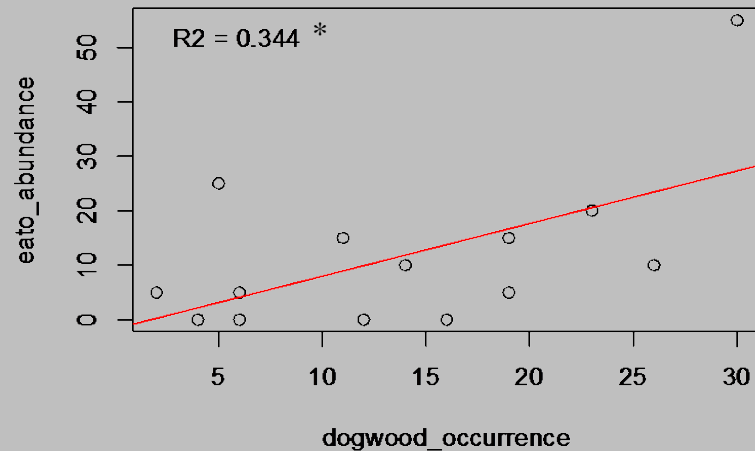
Field Sparrow



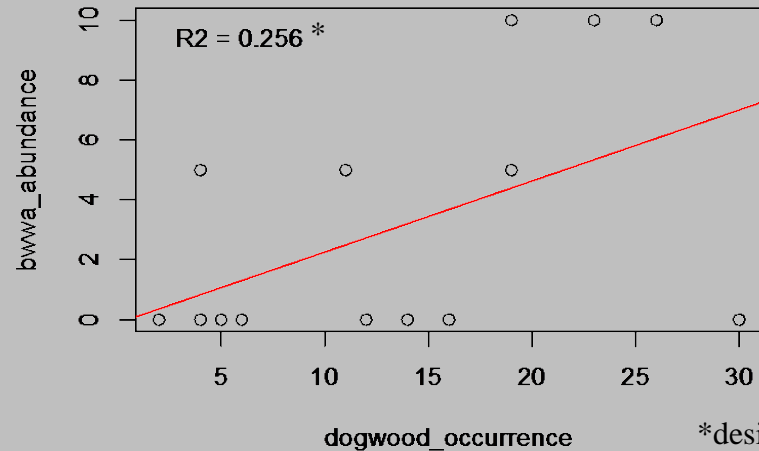
Golden-winged Warbler



Eastern Towhee



Blue-winged Warbler



*designates $p < 0.05$



Results:

Invasive Shrub Occurrence

Model: Habitat quality indicator- Invasive shrubs

- Golden-winged Warbler:

- Positive relationship with invasive shrub presence
- $\beta=0.040$, $SE= 0.0145$, $p=0.00535$

- Blue-winged Warbler:

- No significant relationship with invasive shrub presence

- ❖ Blue-winged Warblers may be outcompeting Golden-winged Warblers for higher quality habitat

Results:

Outreach and Applications

Knowledge gained:

- Expand understanding of habitat use by these declining species in the Northeast for conservation initiatives
- Dissemination of results
 - Local presentations to citizen science volunteers
 - Regional conference presentations
 - Presentation to utility company employees on management applications
- Management Applications
 - A collaborative report is being written with Audubon Vermont that will summarize the results from the study
 - Report submitted to VELCO with management recommendations that can be implemented on ROWs

Northern Forest Region: Implications and Applications

- Expand understanding of habitat use by declining songbirds
 - Direct management application with cooperation from VELCO
- Exploiting opportunities to conserve and increase biodiversity in the region on private lands
 - Raise awareness of the benefits and importance of early successional habitat and the species it can support
- Invasive species control and forest health
 - VELCO uses spot herbicide spraying to control invasive species on ROWs, which may promote the growth and regeneration of native species
 - Could have long-term effects on maintaining the ecological health of these early successional sites
- Opportunity to expand management techniques to private lands for early successional bird species
 - Broaden interest and implementation of controlling invasive species

Future Directions

- Complete data analysis for current study
 - Disseminate results via publications and presentations
 - Ecological and management implications in Vermont and Northeast region
- Further ROW surveys by citizen science volunteers recruited through Audubon Vermont during 2014 and 2015 breeding seasons
 - Determine bird species distributions and changes during management cycle
- Expand research to additional private lands other than ROWs for Golden-winged Warblers
 - National Fish and Wildlife Foundation Early Successional Forest Initiative cost-share program provides financial assistance to private landowners to manage for early successional habitat

Products

Presentations

- *Restoration of Damaged Ecosystems and Endangered Populations*, Conservation Biology Course Invited Guest Lecture, UVM, Burlington, VT, May 2014
- *Habitat Use by Six Shrubland Obligate Bird Species along Powerline Rights-of Way in the Champlain Valley*, UVM Student Research Conference, Burlington, VT, Apr. 2014
- *Powerline Rights-of-Way and Population Declines in Early Successional Bird Species*, 70th Annual Northeast Fish and Wildlife Conference, Portland, ME, Apr. 2014
- *Landcover on Powerline Rights-of-Way and Distributions of Shrubland Bird Species*, Audubon Vermont Volunteer Appreciation Night, Middlebury, VT, Mar. 2014
- *Research Methods and Design*, 30th Annual Graduate Research Symposium, Burlington, VT, Oct. 2013

Publications

- Vermont Electric Company Technical Report, collaboration with Audubon Vermont, Apr. 2014
- M.S. Wildlife Biology Thesis: expected completion Dec. 2014