

# Avian Studies for South Forty Solar, LLC Parcel Burlington, Chittenden County, Vermont

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February 2013 – June 2013



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**Prepared by:**

**Meghan Lout and April Moulart**

Western EcoSystems Technology, Inc.

47 Maple Street, Suite 103.

Burlington, VT 05401

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## INTRODUCTION

Eastern Development Corporation contracted Western EcoSystems Technology, Inc. (WEST) to conduct avian surveys at the South Forty Solar, LLC site (Project Site), a 40-acre parcel of land located off Sunset Cliff Road in Burlington, Vermont. This Project Site is the proposed location of a solar panel development. The principal objectives of the study were to: 1) document seasonal use by bird species, particularly American woodcock, a species of conservation concern in Vermont, within the study area; and 2) provide information that could be used in project planning and design to minimize potential impacts to birds. Fixed-point surveys were conducted approximately weekly from February 5 through June 3, 2013 at 15 points established throughout the study area. A total of 179 3-minute (min) fixed-point surveys were completed, and 54 bird species were identified. The following report includes the results of the 2013 avian surveys; a summary of the habitat conditions relative to the species inventories; and an evaluation of the impact of the proposed development on the bird species.

## METHODS

The subject of study at the Project Site consisted of American woodcock (*Scolopax minor*) surveys, fixed-point bird surveys and incidental wildlife observations.

### American Woodcock Surveys

A WEST biologist conducted 30-minute fixed-point bird surveys to search and listen for peenting American woodcock at a single point in the project area. The survey point provided a clear viewshed of potential American woodcock display grounds. Three woodcock surveys were conducted weekly from April 21 to May 1, 2013 for approximately 30 minutes prior to sunset during clear evenings with little to no wind.

### Fixed-Point Bird Surveys

The objectives of the fixed-point bird surveys were to: 1) document all bird species within the study area during winter, spring and summer; and 2) analyze habitat conditions that support the species observed. Fifteen points, separated by approximately 100 meters (m; 164 feet [ft]), were selected to representative habitats and arrayed to achieve relatively even coverage of the Project Site (Figure 1). Each survey plot was a 50-m (328-ft) radius circle centered on the point; however, birds detected at greater distances were documented as incidental observations.

#### *Survey Methods and Observation Schedule*

Fixed-point bird surveys were conducted for 3 min at each point. Surveys were conducted approximately weekly during February (winter), and from March 28 (spring) through June 3 (summer). Surveys were carried out during the early morning hours, and points were surveyed in alternating order. To the extent practical, each point was surveyed roughly the same number of times.



Figure 1. Location of natural community types at Project Site.



## RESULTS

### American Woodcock Surveys

Three American woodcock surveys were conducted on separate visits during the evenings of April 17, April 21, and May 1. No American woodcock were observed during any of the visits.

### Fixed-Point Bird Use Surveys

A total of 179 3-min fixed-point bird surveys were conducted within the project area during 12 site visits. Fifty-four unique species were observed over the course of the fixed-point bird surveys (Table 2). Species diversity was highest during spring surveys (March 1 to May 31) when compared to the one summer survey (June 3) and three winter surveys (February 5, 7 and 12). A species' status was characterized as resident (resides in Vermont year-round) or migrant (spends the winter season in locations south of Vermont) using The Sibley Guide to Birds (2012) and The Cornell Lab of Ornithology website (<http://www.birds.cornell.edu>).

### Resident (Non-Migratory) Species

Twenty-eight resident bird species were detected at the Project Site throughout the survey period (Appendix A). Of these species, five were detected during each survey-round (black-capped chickadee [*Poecile atricapillus*]; tufted titmouse [*Baeolophus bicolor*]; northern cardinal [*Cardinalis cardinalis*]; white-breasted nuthatch [*Sitta carolinensis*]; and American crow [*Corvus brachyrhynchos*]; Appendix A). Ruffed grouse (*Bonasa umbellus*) was the only upland game bird observed, while woodpecker and corvid bird types were represented by more species than any other resident bird-type (four each). Downy woodpecker (*Picoides pubescens*); hairy woodpecker (*P. villosus*); pileated woodpecker (*P. villosus*); and northern flicker (*Colaptes auratus*) accounted for woodpecker observations, while corvid species were represented by American crow (*Corvus brachyrhynchos*); blue jay (*Cyanocitta cristata*); and one observation of both common raven (*C. corax*) and fish crow (*C. ossifragus*). One barred owl (*Strix varia*) was observed during two survey-days during winter (Appendix A). The remaining bird species observed can be seen in Appendix A.

### Migratory Species

Twenty-six migratory bird species were recorded during spring and summer surveys combined. The following sections document migrant species observations by bird type.

#### Waterfowl, Waterbirds, and Gulls

Four types of birds associated with water use were detected between April 22 and June 3, with the exception of herring gull (*Larus argentatus*; explained below). Several observations of mallard (*Anas platyrhynchos*) on multiple survey-days comprised all waterfowl observations. One species of waterbird, double-crested cormorant (*Phalacrocorax auritus*), was also observed. Herring gull was the only gull species recorded, with initial detection on February 5;

however, there was a notable peak in activity (i.e. more individuals observed; increased flight activity) on April 8<sup>th</sup>, suggesting migrant herring gulls were either passing through the area or had arrived at breeding grounds. Each of the species described in this section was recorded flying over the observer (i.e. not on the Project Area).

#### Passerines

Warblers comprised the majority of passerines detected (n=10), including: ruby-crowned kinglet (*Regulus calendula*); black-throated blue warbler (*Setophaga caerulescens*); yellow-rumped warbler (*S. coronata*); common yellowthroat (*Geothlypis trichas*); yellow warbler (*Setophaga petechial*); hooded warbler (*S. citrina*); pine warbler (*S. pinus*); American redstart (*S. ruticilla*); northern parula (*S. Americana*); and chestnut-sided warbler (*S. Pensylvanica*). Fox sparrow (*Passerella iliaca*) and chipping sparrow (*Spizella passerine*) represented migratory *Emberizids* while thrush was represented by American robin (*Turdus migratorius*) and hermit thrush (*Catharus guttatus*). Two vireo species observed included red-eyed vireo (*Vireo olivaceus*) and blue-headed vireo (*V. solitaries*; Appendix A).

Nine passerine species (i.e. songbirds) were detected during a single survey-day: ruby-crowned kinglet; pine warbler; American redstart; hooded warbler; black-throated blue warbler; fox sparrow; hermit thrush; northern parula; and ruby-throated hummingbird. Six of the nine species observed on only one survey-day were also long distance, Neotropical migrants (ruby-crowned kinglet; American redstart; hooded warbler; black-throated blue warbler; northern parula; and chestnut-sided warbler; Appendix A).

#### Mimids, Wrens, and Hummingbirds

Gray catbird (*Dumetella carolinensis*) and house wren (*Troglodytes aedon*) were the sole migrant representatives of migrant mimid and wren species, respectively. One observation of a single ruby-throated hummingbird (*Archilochus colubris*) was detected, which is also a long-distance migratory species (Sibley 2012).

#### Icterids (Blackbirds)

Red-winged blackbird (*Agelaius phoeniceus*) and common grackle (*Quiscalus quiscula*) represented all blackbird observations. Each species was detected multiple times during spring and summer surveys. Sibley (2012) identified only the red-winged blackbird as a migrant species; however, common grackle is assumed to have migrated due to an increase in the number of individuals and vocalizations observed in the study area during spring and summer.

#### Flycatchers

Three flycatcher species were observed throughout the survey period. Eastern phoebe (*Sayornis phoebe*) and great crested flycatcher (*Myiarchus crinitus*) were detected during both spring and summer seasons, while the least flycatcher (*Empidonax minimus*) was detected during the spring on one survey-day.

## **Incidental Wildlife Observations**

Every bird species observed during surveys was detected incidentally (Appendix A). One group of three to four white-tailed deer (*Odocoileus virginianus*) was observed during each survey-round during spring and summer.

## **SENSITIVE SPECIES OBSERVATIONS**

A total of four sensitive species were observed at the Project Site. Three species identified as species of greatest conservation in the Vermont Wildlife Action Plan were recorded, including: great-blue heron, chestnut-sided warbler, and black-throated blue warbler (Vermont Fish and Wildlife 2005). Fish crow, a species identified as critically imperiled with a high risk of extinction due to extreme rarity, was also observed (Vermont Department of Fish and Wildlife 2012).

## **HABITAT ASSOCIATIONS**

Habitat types of the Project Site were assigned to one of the following categories for species-habitat associations: Meadow (Wet Herbaceous and Wet Shrub Meadow combined); Upland Shrub Meadow; Sumac Stand; Mesic Maple Ash Hickory Oak Forest; Red Maple Ash Swamp; White Pine Red Oak Black Oak Forest; or flyover/ near adjacent Residential Development (Figure 1, Appendix B). Certain species were detected at one survey point (i.e. ruby-crowned kinglet), while others were observed at several (i.e. American crow). The locations of species detected on one survey-day were typically associated with one location, meaning they were observed in one habitat type, or along the edges of two to three habitat types. For example, blue-headed vireo was recorded in a tree located on the edges of three habitat types.

### **Meadow (Wet Herbaceous Meadow and Wet Shrub Meadow)**

Fourteen species, comprised of both resident and migratory birds, were primarily observed in Wet Meadow (Appendix B). Dark-eyed junco (*Junco hyemalis*) was detected during winter surveys. Species such as song sparrow (*Melospiza melodia*); American goldfinch (*Spinus tristis*); cedar waxwing (*Bombycilla cedrorum*); and chipping sparrow were recorded in the Wet Meadow and island of Upland Habitat (within the Wet Meadow) during most survey-days. Northern mockingbird (*Mimus polyglottos*) was the one resident species observed in Wet Herbaceous and Wet Shrub Meadow on one survey-day (Appendix A and B).

### **White Pine Red Oak Black Oak Forest**

Ruby-throated hummingbird, pine warbler and red-eyed vireo were the only migrants observed in White Pine Red Oak Black Oak Forest (northeast corner of the Project area). Ruby-throated hummingbird and pine warbler were each observed on a single survey-day (Appendix A and B). Hairy and pileated woodpeckers, blue jay, tufted titmouse and black-capped chickadee were frequently observed and red-breasted nuthatch (*S. Canadensis*) observations were predominantly in this habitat type (Appendix B).

### **Red Maple Ash Swamp**

The greatest number of species was detected within the Red Maple Ash Swamp (RMAS) habitat type (n=13) and along the edges of RMAS and adjacent natural communities than compared to others. The following species observations were restricted to Red Maple Ash Swamp: Barred owl; ruffed grouse; least flycatcher; hermit thrush; and eastern phoebe. Red-winged blackbird detections were auditory and comprised of individuals flying above the observer.

### **Red Maple Ash Swamp, Wet Meadow Edge and Wet Shrub Edge**

A transition zone was defined as forested habitat within 50 ft (15.24m) of a clear boundary between RMAS and its neighboring natural communities (Wet Shrub Meadow and Mesic Maple Ash Hickory Oak Forest). Five species were observed within this transition zone on one survey-day: American redstart; blue-headed vireo; ruby-crowned kinglet; hooded warbler; and chestnut-sided warbler. Red-eyed vireo and tufted titmouse were also detected, although they were recorded at various survey points and have several habitat associations.

### **Wet Herbaceous Meadow and Deciduous Trees**

A fragment of deciduous trees is located adjacent to Wet Herbaceous Meadow (WHM) in the western/northwestern portion of the Project area. Northern parula was observed in the deciduous adjacent to WHM on one survey-day. The remaining species detected within the forest fragment were also recorded at other survey points on multiple survey-days, including American robin; blue jay; American goldfinch; yellow warbler; and tufted titmouse.

### **Flyover Species and Birds Near Adjacent Residential Development**

Fish crow, double-crested cormorant, mallard, great-blue heron, Canada goose, and red-winged blackbird were solely observed flying above the observer. Carolina wren, house finch, mourning dove and house sparrow were detected exclusively in adjacent residentially developed areas.

## DISCUSSION

Four species identified as species of greatest conservation concern in the Vermont Wildlife Action Plan were recorded during the study period (fish crow, great-blue heron, chestnut-sided warbler and black-throated blue warbler; VT Fish and Wildlife 2012). Fish crow, a species identified as critically imperiled with a high risk of extinction due to extreme rarity, and great-blue heron, a species listed on the Vermont Wildlife Action Plan (VT Fish and Wildlife 2012), are not expected to be impacted by development; as each species was observed flying above the observer or outside of the Project Site. Resident and most migratory species detected have stable global populations, but Neotropical migrants, such as black-throated blue and chestnut-sided warblers, face challenges related to habitat loss and degradation throughout their geographic ranges, particularly at wintering grounds. Migration for Neotropical birds generally ranges from several hundred to two thousand miles, and some species survival is contingent upon “rest areas” (stopover habitats) along their journey. The way in which chestnut-sided warbler, black-throated blue warbler and other migrant species could be adversely affected by the project is through loss of stopover habitat (at the Project Site) along their migration routes.

Stopover habitats are important for two main reasons: 1) they provide refuge for birds when inclement weather forces migrants to seek temporary refuge during migration; and 2) they provide a safe haven where migrants may briefly rest and refuel along their migration. Stopover habitat such as that potentially provided by the Project Site could be used by the Neotropical migrant flycatchers (least flycatcher, eastern phoebe), warblers (American redstart, hooded warbler) and vireos (blue-headed vireo) that were observed during surveys.

The Project Site is also used by wintering species and resident bird species. Use of the Project Site (Meadows) by dark-eyed junco occurred in winter, while it was also used as breeding habitat for resident and migrant bird species. Despite these impacts, conversion of the Project Site to solar panels will not likely cause significant impacts to populations of wintering or resident bird species.

The Project Site consists of an array of natural communities (vegetation) in an area of residential development that is used by both resident and migrant birds. Each natural community (vegetation) provides seasonal resources that help support different avian communities throughout the year. Conversion of part (approximately 22 acres) of the Project Site area into an array of solar panels should be expected to alter species composition and potentially reduce overall species diversity. Resident and migratory songbirds breeding in the project area, and migrant songbirds stopping over would be impacted the most. Although development of the site would likely reduce the number of migrant species, and wintering and breeding birds using the Project Site through direct habitat loss, no significant impacts are expected to affect the bird species observed at the population level. Habitat modification may also cause a change in the species occupying the site due to different resource availability, resulting in no change in species richness (total number of species). It also could cause the total number of species, or total number of individuals within a species, to increase if changes in habitat structure associated with development are created. Impacts could be minimized as

more potential habitat is created by improvement and management of the undeveloped areas adjacent to the Project Site.

**Appendix A: Bird Species Observed at South Forty Solar, LLC Site  
From February to June 2013**

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**Resident Species**

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|                         |                                 |
|-------------------------|---------------------------------|
| black-capped chickadee  | <i>Poecile atricapillus</i>     |
| tufted titmouse         | <i>Baeolophus bicolor</i>       |
| white-breasted nuthatch | <i>Sitta carolinensis</i>       |
| red-breasted nuthatch   | <i>Sitta canadensis</i>         |
| northern cardinal       | <i>Cardinalis cardinalis</i>    |
| Carolina wren           | <i>Thryothorus ludovicianus</i> |
| house finch             | <i>Haemorhous mexicanus</i>     |
| blue jay                | <i>Cyanocitta cristata</i>      |
| mourning dove           | <i>Zenaida macroura</i>         |
| barred owl              | <i>Strix varia</i>              |
| Canadian goose          | <i>Branta canadensis</i>        |
| American crow           | <i>Corvus brachyrhynchos</i>    |
| common raven            | <i>Corvus corax</i>             |
| fish crow               | <i>Corvus ossifragus</i>        |
| house sparrow           | <i>Passer domesticus</i>        |
| song sparrow            | <i>Melospiza melodia</i>        |
| American goldfinch      | <i>Spinus tristis</i>           |
| ruffed grouse           | <i>Bonasa umbellus</i>          |
| downy woodpecker        | <i>Picoides pubescens</i>       |
| pileated woodpecker     | <i>Dryocopus pileatus</i>       |
| northern flicker        | <i>Colaptes auratus</i>         |
| hairy woodpecker        | <i>Picoides villosus</i>        |
| dark-eyed junco         | <i>Junco hyemalis</i>           |
| common grackle          | <i>Quiscalus quiscula</i>       |
| European starling       | <i>Sturnus vulgaris</i>         |
| cedar waxwing           | <i>Bombycilla cedrorum</i>      |
| northern mockingbird~   | <i>Mimus polyglottos</i>        |
| great-blue heron~       | <i>Ardea herodias</i>           |

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**Migratory Species**

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|                          |                               |
|--------------------------|-------------------------------|
| herring gull             | <i>Larus argentatus</i>       |
| Mallard                  | <i>Anas platyrhynchos</i>     |
| double-crested cormorant | <i>Phalacrocorax auritus</i>  |
| red-winged blackbird     | <i>Agelaius phoeniceus</i>    |
| chipping sparrow         | <i>Spizella passerina</i>     |
| fox sparrow~             | <i>Passerella iliaca</i>      |
| gray catbird             | <i>Dumetella carolinensis</i> |
| house wren               | <i>Troglodytes aedon</i>      |
| red-eyed vireo*          | <i>Vireo olivaceus</i>        |
| blue-headed vireo~       | <i>Vireo solitarius</i>       |
| least flycatcher*~       | <i>Empidonax minimus</i>      |
| eastern phoebe*          | <i>Sayornis phoebe</i>        |

|                               |                               |
|-------------------------------|-------------------------------|
| great-crested flycatcher*     | <i>Myiarchus crinitus</i>     |
| ruby-crowned kinglet~         | <i>Regulus calendula</i>      |
| pine warbler~                 | <i>Setophaga pinus</i>        |
| American redstart*~           | <i>Setophaga ruticilla</i>    |
| yellow warbler*               | <i>Setophaga petechia</i>     |
| common yellowthroat           | <i>Geothlypis trichas</i>     |
| hooded warbler*~              | <i>Setophaga citrina</i>      |
| black-throated blue warbler*~ | <i>Setophaga caerulescens</i> |
| yellow-rumped warbler         | <i>Setophaga coronata</i>     |
| northern parula*~             | <i>Setophaga americana</i>    |
| chestnut-sided warbler*       | <i>Setophaga pensylvanica</i> |
| hermit thrush~                | <i>Catharus guttatus</i>      |
| American robin*               | <i>Turdus migratorius</i>     |
| ruby-throated hummingbird*~   | <i>Turdus migratorius</i>     |

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~recorded on one survey day

\*long-distance migrant

## Appendix B: Species-Habitat Associations

| Species-Habitat Associations                               |
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| <b>Habitat Types:</b>                                      |
| <b>Meadow (Wet Herbaceous Meadow and Wet Shrub Meadow)</b> |
| song sparrow   |
| American goldfinch   |
| dark-eyed junco  |
| cedar waxwing  |
| chipping sparrow   |
| fox sparrow  |
| gray catbird   |
| great-crested flycatcher                                   |
| yellow warbler   |
| common yellowthroat  |
| yellow-rumped warbler                                      |
| northern cardinal  |
| common grackle   |
| northern mockingbird                                       |
| <b>Sumac Stand</b>   |
| American goldfinch   |
| song sparrow   |
| northern cardinal  |
| cedar waxwing  |
| yellow warbler   |
| <b>Upland Shrub Meadow</b>                                 |
| American goldfinch   |
| fox sparrow  |
| gray catbird   |
| <b>White Pine Red Oak Black Oak Forest</b>                 |
| ruby-throated hummingbird                                  |
| pine warbler   |
| pileated woodpecker  |
| hairy woodpecker   |
| blue jay   |
| red-breasted nuthatch                                      |
| white-breasted nuthatch                                    |
| black-capped chickadee                                     |
| tufted titmouse  |

American crow  
red-eyed vireo  
tufted titmouse  
northern cardinal  
European starling

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**Red Maple Ash Swamp**

northern cardinal  
Carolina wren  
barred owl  
American crow  
ruffed grouse  
northern flicker  
red-winged blackbird  
least flycatcher  
American redstart maple ash hickory forest; meadow  
hermit thrush  
red-eyed vireo  
eastern phoebe  
American robin

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**Mesic Maple Ash Hickory Oak Forest**

black-throated blue warbler

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**Red Maple Ash Swamp Forest, Mesic Maple Ash Hickory Forest and Wet Shrub Meadow Edge**

American redstart  
red-eyed vireo  
blue-headed vireo  
ruby-crowned kinglet  
hooded warbler  
tufted titmouse  
chestnut-sided warbler

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**Wet Herbaceous Meadow and Deciduous Forest Patch**

northern parula  
American robin  
blue jay  
American goldfinch  
yellow warbler  
tufted titmouse

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**Flyovers or Species near adjacent Residential Development**

Carolina wren  
house finch  
mourning dove  
fish crow  
double-crested cormorant

Mallard  
great-blue heron  
Canada goose  
red-winged blackbird  
house sparrow

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