

RUSTY BLACKBIRDS IN NEW YORK STATE: Ecology, Current Status, and Future

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INTRODUCTION

The Rusty Blackbird (*Euphagus carolinus*) suffers from a case of mistaken identity. Rusty Blackbirds, or “rusties,” are so named after their autumn plumage, when their glossy black feathers are edged with a soft brown color—something Adirondackers might only see during the birds’ fall migration through the North Country or on wintertime travels through the southeastern US. Rusties are yellow-eyed blackbirds easily confused with other Icterids such as Red-winged Blackbirds (*Agelaius phoeniceus*) or Common Grackles (*Quiscalus quiscula*).

Rusty Blackbirds seldom stand out in a crowd, as they often flock with other blackbird species. Yet the Rusty Blackbird is one of the sentinel species of the continent’s boreal ecosystems, and recent efforts to determine the bird’s status in New York State have resulted in serious cause for concern. Our objective is to share the collective knowledge gained from over a decade of studying this cryptic northern bird in the Adirondacks, to include what is known about breeding Rusty Blackbird populations in similar regions, and to explore a possible future for the species in New York.

NATURAL HISTORY AND CONSERVATION STATUS

The Rusty Blackbird's Latin name means "good eater." The moniker is an apt description for a bird that has flexible food habits, from snagging dragonflies at the edges of beaver ponds in the far northern forest to foraging for pecans in its Atlantic coastal plain wintering range (Avery 1995, Newell Wohner et al. 2015). Rusty Blackbirds summer in boreal wetlands across Canada, Alaska, and parts of New England and New York. The Adirondack region is disjunct (>200 km) from the primary breeding range for this bird of cool, wet, sphagnum-dominated bogs and moist woods, leading to potential implications for genetic flow and conservation (see Kirchman and Ralston this issue).

Rusty Blackbirds are adapted to natural disturbances (e.g., fire, wind storms, insect outbreaks, and beaver activity) that create patchy, coniferous regeneration within wetland complexes. Sites with wetlands and conifer-dominated or young conifer patches are suitable for nesting. Nests are typically located in or in close proximity to wetlands, as the birds' primary food supply during the breeding season consists of aquatic macroinvertebrates such as dragonflies, snails, caterpillars, and beetles.

Rusties usually nest in live spruce (*Picea* spp.) or balsam fir (*Abies balsamea*) trees surrounded by regenerating conifer stands or alder patches in wetlands. A recent study in Maine and New Hampshire found the mean nest tree height was 2.47 m and mean tree diameter was 4.14 cm (Luepold et al. 2015); this accords well with studies in Maine (Powell et al. 2010a) and coastal Alaska (Matsuoka et al. 2010). New England nest success was relatively high at 46.6% (n = 65 nests) and best in thick conifer cover (Luepold et al. 2015). Egg and nestling predation rose in the summer after a good conifer cone crop (Luepold et al. 2015), suggesting predator numbers and/or behavior varies through time.

The species has experienced perhaps the most significant population decline across its range ever documented among extant North American birds (>90% since 1960; Greenberg and Droege 1999, Niven et al. 2004). The New York State Breeding Bird Atlas confirmed Rusty Blackbirds breeding in 51, 5km blocks in 1980-85; the number of confirmed blocks dropped to 32 in 2000-2005 (McGowan and Corwin 2008). Larger landscape patterns are also at work: using North American Breeding Bird Survey (BBS) data, McClure et al. (2012) showed a northward retraction of >140km from the southern range limit over the past 40 years.

The factors responsible for this boreal wetland bird's drop in numbers are unknown (Greenberg and Matsuoka 2010), but climate change, mercury bioaccumulation, and habitat fragmentation and degradation on breeding and/or wintering grounds are among the factors that may play a role. Edmonds et al. (2010) found mercury concentrations in breeding Rusty Blackbirds from New England and eastern Canada exceeded published minimum levels for songbirds, and mercury bioaccumulation in this Acadian forest population is among the highest reported at sites without a nearby industrial source of

mercury. Directional climate change from the Pacific Decadal Oscillation (ocean surface temperatures) has been implicated in a northward range shift over the past forty years (McClure et al. 2012).

In New York, the Department of Environmental Conservation (NYSDEC) recognizes the Rusty Blackbird as a “High Priority Species of Greatest Conservation Need” and it is considered Rare or Threatened throughout the east. Vermont recently listed the species as state endangered; in New Hampshire and Maine the designation is species of special concern.

METHODS AND RESULTS

Several recent studies have been conducted to assess Rusty Blackbird distribution and status in the Adirondack region. We present the methods and results of each study here.

A. Boreal bird monitoring, 2003-present. The Wildlife Conservation Society (WCS), together with the New York State Department of Environmental Conservation (NYSDEC), has documented the occurrence of Rusty Blackbird and other boreal birds in the Adirondacks since 2003. They have surveyed more than 80 boreal habitats to document presence of 13 target boreal birds as well as other avian species (Glennon 2014a). Surveys are conducted via standard point count methods to assess presence/absence of target species along transects of 5 points spaced at least 250m apart within boreal wetland habitats (Ralph et al. 1995). All points are sampled with fixed radius, 10 minute point counts between the hours of 5:00 and 9:00 am and, at each sample point, birds are recorded by species, time period of detection (i.e., 0-3 minutes, 3-5 minutes, 5-10 minutes), activity (i.e., singing, calling, individual seen), and whether or not birds are within 50 m of the observer. Date, start and end time for each survey, ambient temperature, and sky and wind conditions are recorded for each count and surveys are conducted by trained observers, the majority of whom have conducted counts for three or more of the project years. Most surveys are conducted on foot; surveys in boreal river corridors are conducted by boat.

Site selection for WCS boreal bird survey locations was conducted by consulting a variety of data sources including Adirondack Park Agency wetlands inventory data, New York State Breeding Bird Atlas data (Andrle and Carroll 1988, McGowan and Corwin 2008), postings to the Northern New York Breeding Bird Listserv (a resource for many regional birders), and local expert opinion. Between 2007 and 2011, 58 sites were surveyed intensively as part of a New York State Wildlife Grant project (Glennon 2014a). These sites ranged in size from 0.04 to 6.06 km² and were widely distributed throughout the boreal zone of the Adirondacks ranging from the northern border in the Debar Mountain Wild Forest to the southwest region in the Moose River Plains Wild Forest. Approximately 40 additional sites have been surveyed at least once between 2003 and 2015. Since 2012, WCS and NYSDEC have collaborated on this work, with counts conducted by NYSDEC field technicians and analytical support provided by WCS.

Glennon (2014a) examined occupancy dynamics of Rusty Blackbird and seven other bird species in lowland boreal forest wetlands, examining the influence of wetland size and connectivity, and other variables associated with climate change and habitat fragmentation on colonization and extinction dynamics for the period 2007 – 2011. Among the 1,305 boreal bird detections analyzed for this analysis, Rusty Blackbird made up 2% of all detections. Over this five year period, the Rusty Blackbird was more likely to colonize larger, more connected wetlands and more likely to abandon those wetlands that were smaller and more isolated. This pattern conforms to metapopulation theory for species inhabiting naturally patchy habitats like boreal wetlands (Hanski 1998). However, responses to latitude and elevation were variable. Proximity of human infrastructure (e.g., roads, buildings) was the most consistent driver of short-term dynamics for Rusty Blackbird and other species, with birds two-thirds more likely to colonize low human-impact sites and go extinct from more impacted sites (Glennon 2014a).

When observations were corrected for detection probability (MacKenzie et al. 2006), Rusty Blackbird was estimated to occupy 23% of sites surveyed (Glennon 2014a). The pattern of occupancy during 2007 – 2011 was stable, with an estimated colonization rate of 10% and extinction rate of 34%. However, in recent longer-term analysis incorporating data through 2013, Rusty Blackbird declined to 16% of sites occupied in 2013 (Glennon unpub. data). Among Adirondack sampling locations, over time Rusty Blackbird appears most likely to colonize large wetlands at higher elevations and most likely to disappear from isolated wetlands in closer proximity to human infrastructure.

B. Digital Spot Mapping in Spring Pond Bog, 2009. Jablonski (2010) conducted digital mapping within the Spring Pond Bog complex in St. Lawrence County. He completely surveyed five grids of 0.09 km² during each of five visits in 2009; this technique is similar to intensive territory or spot mapping (Jablonski et al. 2012). He recorded 153 total detections of 12 lowland boreal bird species, including eight Rusty detections from four different sites. Among these four sites, there were five different vegetation communities: black spruce-tamarack (*Picea mariana-Larix laricina*) bog, shrub swamp, beaver pond, shallow emergent marsh, and spruce-northern hardwood forest. While the latter three are not specifically lowland boreal habitats, in these cases they were within the lowland boreal landscape mosaic. Of the four sites where Rusties were detected, tree canopy cover was generally sparse (< 35%), while the amount of open water was high (mean cover 11% ± 18) compared to all 22 sites (mean 2.3%). Tall (>2 m) and short (<2 m) shrub cover was always less than 38% where Rusty Blackbirds were detected. All four sites were on the edge of a flooded beaver pond or abandoned beaver-impounded meadow.

C. Wetland point counts, 2010. McCormack (2012) conducted surveys for Rusty Blackbirds in 2010 at 15 wetland complexes in the Adirondacks. A total of 75 points, spaced a minimum of 250 m apart, were surveyed twice during the early breeding season (May to

mid-June), when males are establishing breeding territories and have the highest likelihood of detection. At each point the observer listened for three minutes before playing a 30 second recording of a Rusty Blackbird vocalization (recorded in NY by Peter Kellogg and stored at the Cornell Lab of Ornithology), after which the observer listened for an additional 3.5 minutes, for a total point count time of seven minutes. All individuals that were heard or seen within 100 m during the seven minute period were recorded.

Rusty Blackbirds were detected on eight out of 148 surveys at 8% of points (McCormack 2012). Fifteen individuals were recorded, including a pair with two fledglings at Spring Pond Bog. Predicted occupancy of Rusty Blackbirds in this study was 0.13 ± 0.05 , similar to Glennon (2014a) but noticeably lower than comparable studies conducted in New England (0.37 ± 0.12 by Powell 2008) and Alaska (0.51 ± 0.21 by Matsuoka et al. 2010). For comparison, at 260 sites in Vermont and Maine in 2012, Scarl (2013) reported a < 10% raw detection rate; this was similar to historical rusty detection rates in Maine in 2006-7, despite efforts to increase detection in 2012 using playback calls and a nearly 15-minute point count.

McCormack (2012) used program PRESENCE to model Rusty Blackbird occupancy as a function of site-specific and sampling covariates using single-season analysis. Two sets of occupancy models were run to evaluate the influence of localized habitat (within 100 m) and landscape scale (500 m-10 km) features on Rusty Blackbird occupancy. Due to small sample size, only single-variable models were used. Indicators of Rusty Blackbird occupancy at the habitat scale included alder (*Alnus* sp.), northern white cedar (*Thuja occidentalis*), exposed mud, and upland pines (*Pinus* spp.), all of which have been identified in previous studies as features that provide either nesting or foraging habitat. At the landscape scale, the amount of boreal acidic peatland within 10 km was the strongest indicator of occupancy. All wetland types, with the exception of open bog, were positive indicators of occupancy at the landscape scale.

D. Targeted expert observation, 2012-13. Twelve major wetland complexes with known prior Rusty Blackbird occupancy were searched for bird presence during May-July 2012 and April-June 2013. Volunteer expert birders drove hundreds of miles and hiked numerous trails and wetlands, noting bird and predator presence, potential nesting and foraging competitors, and key habitat features. Twenty-seven separate reports of Rusty Blackbirds were received including two revisits in the same season. The data were combined with confirmed sightings from the Northern New York Breeding Bird Listserv (a resource for regional birders).

Over two years, eight sites contained adults or family groups; two in 2012 and six in 2013 (with multiple locations and years in the Shingle Shanty Preserve wetland complex). Many of the occupied sites had a history of beaver activity that created or altered the flooded conditions favored by Rusty Blackbirds for foraging and/or snags for perching. No occupied site had recent logging noted, and one site had potential competing species (Red-winged Blackbirds and Common Grackles).

DISCUSSION

Rusty Blackbirds declined range-wide several decades ago, and our recent studies suggest Adirondack-breeding birds occupy even fewer locations today than in 2003. Glennon (2014a) provides evidence that Rusty Blackbirds are nesting in higher latitude and elevation sites in the Adirondacks than a decade ago, lending credence to the similar continental-scale conclusion of McClure et al. (2012). Declines in site occupancy across a broader suite of boreal birds in the Adirondacks (Glennon 2014a, b) suggest that range contraction from climate-driven hydrological or wetland-related changes may explain the loss of Rusty Blackbird and other species.

Within the spruce-fir forest of the Adirondacks, wetlands are more important than forest composition in driving Rusty Blackbird breeding habitat selection at the landscape scale. Wetland area was the second most important factor in controlling which sites rusties are likely to colonize, and wetland isolation was the most important factor in controlling which sites they are most likely to drop out of over time (Glennon 2014a). McCormack (2012) also found that occupancy was positively correlated to the amount of boreal wetland habitat at the landscape scale. In New England, Luepold et al. (2015) support this, finding the probability of Rusty Blackbird selection of a site for nesting was three times more likely when wetland cover increased as compared to a commensurate increase in young conifer cover.

While total extent and connectivity of wetlands greatly influences site selection, it is imperative to note that fine-scale habitat features are also important to breeding Rusty Blackbird occupancy. Luepold et al. (2015) found low percent canopy cover and patches of dense, short conifers to be the most important nesting habitat variables. This accords with Jablonski's (2010) habitat assessment in the Adirondacks. Another common feature of nest sites in Maine and New Hampshire was the presence of high perches within a few meters of the nest. Perches were often snags, and paper birch (*Betula papyrifera*) was a common species used for vocalizing and defending territory (Luepold et al. 2015). McCormack (2012) and Scarl (2013) identified shallow puddles and exposed mud as features key to foraging birds. Further, many of the wetlands used are not "mappable" wetlands: the birds readily feed in roadside ditches, seeps, and isolated ephemeral pools, none of which can be reliably detected with aerial imagery and few of which are delineated on National Wetland Inventory maps.

Indeed, different factors may govern breeding habitat selection at different scales. Food availability is important at the home range/territory and larger spatial scales, while nest site selection may be based on microhabitat features related to risk of nest predation and independent of foraging habitat. This decoupling of nest and foraging habitat selection cues may be especially strong for species like Rusties with high mobility and large home ranges. Powell (2010b) determined the mean home range in Maine to be 0.38 km² (94 acres), a

larger area requirement compared to other Icterid species. This may reflect differential sex roles; males choose a territory in spring, whereas females first choose the male and then the nest site within the male's territory (Luepold et al. 2015).

There is likely sufficient suitable habitat for Rusty Blackbirds to nest in the Adirondacks in terms of forest structure and composition and openings within wetland complexes; three lines of evidence support this. First, windthrow remains an important form of local natural disturbance, and severe storms that can blow down large areas and create short, dense conifer regeneration are, if anything, becoming more frequent across the U.S. (Melillo et al. 2014). Second, the small number of places where Rusties were detected more than once in the past twelve years were not near recent timber harvest operations. Although logging is not as extensive today as in the late 1800s (McMartin 1994), harvesting of forests throughout the Northeast remains a disturbance factor of primary importance (Canham et al. 2013). In our Adirondack studies, we rarely detected nesting birds in sites that were logged since 2003. Third, the expansion of New York beaver populations starting in 1900 (NYSDEC 1992) should be favorable to creation of shallow wetlands and mudflats, yet Rusty Blackbird populations have continued to decline.

Certain forest management activities may emulate natural conditions favorable to breeding Rusty Blackbirds: of 72 nests studied in New Hampshire and Maine, 63 were in managed stands and those that were not were mostly in beaver-influenced wetlands (Luepold et al. 2015). Some 90% of nests were located near a forest edge/open border, such as a skid road, a single-tree canopy gap, or an isolated patch of young conifers surrounded by a recent clearcut (Luepold et al. 2015). However, no experimental studies have been carried out to assess the response of rusties to logging or other factors, making definitive answers difficult to discern.

In addition to worsening conditions at the Adirondack range margin, breeding habitat for Rusty Blackbird and other species is also negatively impacted by mercury deposition throughout the Northeast (Evers et al. 2012). Extensive study of mercury levels in terrestrial and aquatic food chains indicates mercury—a potent neurotoxin—should be considered a threat to Rusties and other species (Schoch et al. 2010, Sauer and Evers this issue). The Rusty Blackbird may be particularly sensitive for three reasons: 1) it feeds on aquatic invertebrates and spiders known to harbor high levels of mercury; 2) the acidic nature of some of the boreal peatlands in which it breeds results in environmental conditions whereby mercury is more readily converted to its biologically available form of methylmercury (Mitchell et al. 2008); and 3) water level fluctuations in wetlands enhance mercury methylation (Evers et al. 2007), particularly beaver-impounded systems. Mercury has been documented at high levels in eastern Rusty Blackbird populations and this environmental pollutant should not be overlooked as a potential contributor to the species' decline (Edmonds et al. 2010).

Neither predators nor competitors have much support as a cause of multi-decade decline of the Rusty Blackbird. Although we do not have nest data for the Adirondacks, New England Rusty Blackbirds had good overall nest success (at least 59% produced one or more fledglings) despite higher predator pressure in some years, particularly when red squirrel populations were high after a large conifer cone crop (Luepold et al. 2015, Foss and Wohner unpub. data). Tree seed numbers and small mammal populations tend to be synchronous and cyclical in conifers in Canada (Krebs et al. 2014) and the deciduous/coniferous woods of the Adirondacks (Jensen et al. 2012); a multi-year cycle has been operating in the boreal forest for decades if not longer. Common Grackles and Red-winged Blackbirds are often present in wetlands with Rusty Blackbirds, but our observations suggest competitive interactions do not result in significant nest abandonment by Rusties, although it is possible the stress of maintaining territories is detrimental.

No clear cause for the Rusty Blackbird decline has been found to date; this is unsurprising because migratory birds are impacted by multiple factors throughout their life cycle. Also, low detectability confounds researchers' ability to document population trends for several reasons. The Rusty Blackbird is cryptic in behavior and song, highly mobile both intra- and inter-annually (Scarl 2013), and has one of the earliest breeding seasons of any migratory species, often setting up territories when wetlands are still snowy and inaccessible to humans. The birds can be present but not detected, particularly during egg incubation. Recent research indicates longer, targeted surveys at wetlands (e.g., 30 minutes) may increase detectability over traditional 10-minute point counts (Foss and Newell Wohner unpub. data). Despite these characteristics, ample survey effort since 2003 indicates Rusty Blackbirds presently occupy few sites in the Adirondacks.

If the breeding range of Rusties is expanding northward, it may offset the southern range retraction, but survey routes for the BBS do not cover far-north territory and make monitoring this potential change difficult (McClure et al. 2012). The fact remains that range-wide Rusty Blackbird abundance dropped an estimated 5-12.5% per year since the 1970s (Greenberg et al. 2011). Whether this is due to conversion of wooded wetlands to farming and other human land use in the southeastern United States, climate-mediated shifts in breeding site food or habitat suitability, pollution, or a combination of these and other factors is not yet known.

The outlook for continued Rusty Blackbird breeding in New York is not bright. There are a few holdout locations in the Adirondacks where the birds remain (Table 1). Using several predictors of occupancy, McCormack (2012) determined that sites in Massawepie Mire, Bloomingdale Bog, and Shingle Shanty Preserve provide the most suitable habitat for rusties. These wetlands represent three of the four largest wetland complexes in the Adirondacks. Historically the species nested in all three of these wetlands, but in recent years only two of these sites have had breeding Rusty Blackbirds. A high (>80%) probability of extinction at previous Rusty Blackbird sites estimated by McClure et al. (2012) effectively erases the Adirondack region from the rusties' summer range.



CONCLUSIONS

The declining trend of Rusty Blackbird occupancy shown by Glennon (2014b) and our data combined with recent failures to detect birds in “classically rusty” wetland complexes in New York State is a call to action. Rusty Blackbird nest habitat results from a complex process of interacting disturbances that is dynamic across space and time. Wetland area and connectivity are key drivers of Rusty Blackbird dynamics in the Adirondacks. Rusties are adapted to natural disturbances that create patchy, coniferous regeneration and appear to favor large wetland complexes for breeding, which is unsurprising in that they have larger home ranges than many other boreal songbirds.

Management for landscape species like Rusty Blackbirds is particularly challenging because of the patchwork of private and public ownership and diversity of land uses permitted in the Adirondack Park. Many of the largest wetland complexes are already relatively well-protected, but it is important to note that the majority of wetlands are small. Some are vulnerable to threats such as encroaching development (e.g., Silver Lake Bog) or disturbance from recreation (e.g., Ferd’s Bog). From a conservation standpoint, small wetlands may also provide key migratory stopover or breeding habitat (Glennon 2014a). Additionally, adjacent upland habitats that Rusties may use for nesting are often not protected from fragmentation (see Glennon and Kretser this issue). This is especially true at some of the park’s largest wetlands, including Spring Pond Bog and Bloomingdale Bog, which both lie adjacent to two of the most populated towns in the Adirondacks.

Though current trends suggest that the long-term outlook for Rusty Blackbird in the Adirondacks is not good, boreal wetland complexes will remain vital to whatever suite of species may inhabit them in the future. Focusing on maintenance of ecological function in these places, rather than maintaining a specific set of species, is increasingly espoused by scientists as an important conservation strategy (Anderson and Ferree 2010). Adirondack wetlands are important not only as primary breeding sites for current and future species (e.g., Hitch and Leberg 2007) but also as stopover sites for Rusty Blackbirds and other mobile species whose breeding distribution lies primarily to the north of the Adirondacks. Wetland complexes embedded in intact forest landscapes can provide high-value stopover habitat, because they are places where all necessary resources (i.e., food, water, and shelter) are relatively abundant (Mehlman et al. 2005). Protecting them from fragmentation and disturbance will help maintain this important ecological function.

We suggest four recommendations to enhance understanding and protection of the Rusty Blackbird in New York:

1. Monitor the Adirondack population. Monitoring is critical to understanding the status of Rusty Blackbird in the Adirondacks, and WCS is working with NYSDEC to seek ways to sustain some level of continual monitoring of wetlands for a suite of boreal species. Citizen science is a powerful tool for monitoring birds; the next Breeding Bird Atlas begins

in 2020 and it is critical that volunteers survey boreal wetlands for Rusty Blackbirds and other boreal species. The Rusty Blackbird Spring Migration Blitz (<http://rustyblackbird.org/outreach/migration-blitz>) is an effort to evaluate migratory timing and “hot spots” for stopovers throughout the Rusties’ continental habitat that will also provide opportunities to contribute data and learn about breeding and non-breeding habitat use. We encourage participation in these efforts.

2. Address pollution and human disturbance. Reducing pollution is important, as is controlling invasive species that threaten the diversity and structure of boreal wetlands. Continued support of organizations such as the Biodiversity Research Institute and Adirondack Park Invasive Plant Program is essential. These organizations are working to enact regional, national, and international policy change on mercury and to increase awareness of and response to aggressive, non-native species, respectively.

3. Protect wetland quality and connectivity from fragmentation. Proximity of human infrastructure may be an important factor in moderating dynamics of Rusty Blackbird habitat occupancy in the Adirondacks and may be particularly significant in areas adjacent to small and isolated wetlands. Buffering these wetlands from road and infrastructure development will help ensure that forested wetlands maintain their vital role in the overall network of sites important to successful Rusty Blackbird breeding.

4. Address information gaps. Examination of the boreal wetland ecotype for a climate-hydrology relationship to nesting and foraging Rusty Blackbirds is a prime area for study. Also, research on habitat characteristics, land use change and management in concert with other factors is desirable; while assessment of the “footprint” of development (Glennon and Kretser this issue) can indicate impacts from roads and infrastructure, it does not take into account the current structure and composition of forests in boreal wetland complexes. Forest management may promote Rusty Blackbird habitat by leaving tall snags as perching sites for birds and creating a varied landscape with openings, but the amount of area needed of different habitat types and ages is not known and the impact of specific harvest activities on nesting needs further study.

Identifying small and ephemeral wetlands could improve habitat modeling, as would having current stand age and attribute data. Researchers can utilize new geospatial technology to identify small and ephemeral wetlands. Genetic samples would shed light on the degree of inbreeding of Adirondack-breeding birds. There is a need to better understand Rusty Blackbird populations, including connectivity and demography, population viability, and variation in survival during the life cycle of the birds, especially in central Canada. The International Rusty Blackbird Working Group aids efforts toward understanding the species’ decline (Greenberg and Matsuoka 2010) and is a prime means to share information and assess conservation strategies.

The Adirondack region is one of the most intact temperate forest landscapes worldwide and can be a model for conservation of Rusty Blackbirds into the future.



Table 1. Wetland complexes with recent breeding season occupancy by Rusty Blackbirds in Adirondack Park. Only confirmed detections are included. Sites are listed in order of decreasing size after Glennon 2014a.

SITE NAME	TOWN	COUNTY	LAND PARCEL	YEAR	WETLAND AREA (KM ²)	OTHER ICTERID SPECIES	BEAVER SIGN PRESENT
Massawepie Mire	Piercefield	St. Lawrence	Private	2012	6.06	N/a ¹	Yes, abandoned lodge
Single Shanty Preserve & Research Station	Long Lake	Hamilton	Private	2013	3.52	None	Beaver flooded
Dead Creek Flow	Wanakena	St. Lawrence	Five Ponds Wilderness	2013	2.50	None	N/a
Powley Road	Arietta	Hamilton	Ferris Lake Wild Forest	2013	1.30	None	N/a
Ferd's Bog	Inlet	Hamilton	Pigeon Lake Wilderness	2013	0.59	N/a	Yes, inactive pond
Sabbatis Circle Road	Long Lake	Hamilton	Whitney Wilderness; private	2013	0.32	Red-winged blackbirds common grackles	N/a

1. N/a means no information available

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