

## POLICY OPTIONS FOR FOREST DISTURBANCE-ADAPTED SPECIES MANAGEMENT: ASSESSING THE RUSTY BLACKBIRD IN NEW YORK'S ADIRONDACK PARK

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### ABSTRACT

Rusty Blackbird populations in the United States have been declining for decades due to a multitude of stressors. Populations have declined by greater than 95% from 1966-2005 according to the North American Breeding Bird Survey (Greenburg et al. 2011). A critical challenge for determining effective land management approaches that can help a species such as the Rusty Blackbird is determining appropriate land management protocols. Even in places such as the Adirondack Park where the Wilderness and Wild Forest land use designations are intended to preserve forests and limit anthropogenic impact on the landscape, these protections do not appear to be enough. Species facing rapid decline in the Park include Rusty Blackbirds, *Euphagus carolinus* (RUBL), and Spruce Grouse, *Falci pennis canadensis* (SPGR).

While resources are available to protect the Spruce Grouse because it is classified as an endangered species in New York, other species are more vulnerable. For instance, state protections and funding required to implement management plans and conduct research on Rusty Blackbirds are extremely limited. We examine a variety of policy options to address this concern in a variety of contexts within the Adirondack Park. This analysis demonstrates the need for the development of experimental approaches with effective monitoring and oversight to support species conservation across a range of contexts. In the case of the RUBL, potential solutions include experimental management on private lands, incentives for private land owners to manage for RUBL habitat, and increased education and partnership-based forest management for RUBL habitat.

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## INTRODUCTION

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Conservation efforts in the United States often focus on preserving ecosystems to reduce anthropogenic impacts to the greatest degree possible. However, some wildlife species benefit from moderate forest disturbance, including anthropogenic disruption, and are known as forest-disturbance-adapted species. These species can benefit from periodic disturbance events in their environments that reset the forest development cycle from mature trees to seedlings. These events often increase the extent of available breeding and foraging habitat. Conservation policies that focus on specific forms of protection may help some species more than others, particularly because the underlying dynamics of disturbance are complicated. Natural forest-disturbance events include occurrences such as forest fires, ice storms, wind events, floods, and beaver activity that significantly alter the environment. Disturbances can also include anthropogenic activities such as forest management, road construction, or changes in land use.

Early wildlife management theory recommended the creation of edge habitat, as discussed in Aldo Leopold's *Game Management*, benefiting some game species. Due to this finding, many wildlife managers focused intensely on the creation of edges, because they were viewed to be beneficial and increase species diversity (Temple and Flaspohler 1998; Yahner 1988). These alterations were designed to increase the diversity of habitat present, therefore benefiting species diversity and game populations.

However, such alterations failed to simultaneously account for the many species that could not tolerate anthropogenic management. In addition to habitat loss, fragmented landscapes may be responsible for declines in certain bird species that persist on an un-fragmented landscape, as these species can be exposed to increased nest predation, brood parasitism, or human activities all of which may drive a decline in populations (Flaspohler, Temple, and Rosenfield 2001; Kroodmsa 1984). Additional negative impacts caused by edges includes changes in microclimate, negative impacts on seed germination/survival, and increased wind-shear (Laurance and Yensen 1991). The fear of repeating these mistakes still remains in the scientific community. Policies to address both issues are possible. For instance, small scale management projects for forest-disturbance-adapted species can create viable breeding habitat, while still avoiding large scale disturbances in broader areas that may negatively impact non-forest-disturbance adapted species. Variation and experimentation is likely critical to develop differing management practices that account for different species habitats and contexts.

The focus of ecosystem conservation in the Adirondack Park is on protecting natural resources and open space character to maintain species and ecosystem functions. The Adirondack Park Agency (APA) land-use designation system creates a complex patchwork of parcels that benefit some species and may be less beneficial for others. The Unit Management Plan (UMP) system implemented by the APA assesses

resources and ecosystems present on the land parcel, along with potential public use activities. Prior to classification, the resilience of the ecosystem is assessed to ensure minimal disturbance (New York State Department of Environmental Conservation n.d.).

For instance, minimal human disturbance or visible alterations are allowed in Wilderness and Wild Forest lands which encompass 43% of the Park (Adirondack Park Agency and New York State Department of Environmental Conservation n.d.). These regulations may reduce options for management activities that could be used to benefit disturbance adapted species. Some structures and actions are allowed on Wilderness and Wild Forest parcels. They include scattered lean-tos or primitive tent sites, pit privies, non-motorized trails, or natural fish barriers, and other minor interferences provided they do not impede the goal of maintaining a landscape appearing to be affected by the forces of nature (New York Department of Environmental Conservation 2019).

This paper outlines policy options for Rusty Blackbird (or RUBL in short form) habitat management in the Adirondack Park in partnership with private land management, and in other ways that are synergistic with managed Wilderness protected areas, as an example of increasing policy flexibility and options. The choice to focus on habitat management is one aspect of a “full annual cycle stewardship” program (discussed below) that should be explored to slow the decline of RUBL. Modifying habitat through forest management, natural disturbance, and the presence of the American Beaver (*Castor canadensis*) can create or improve RUBL breeding habitat (Pachomski et al. 2021). Recommended policy options for increased RUBL habitat management include experimental management on private lands and incentives for private land owners to manage for RUBL habitat.

The Rusty Blackbird is a forest-disturbance adapted species at the southern periphery of its range in the Adirondack Park. It is concentrated in the Northwestern region of the Adirondack Park (McCormack 2012), and breeds in stunted spruce-fir forests adjacent to wetlands (See Appendix 1 for map). While our analysis primarily focuses on RUBL, additional species may benefit from these proposals if management actions are tailored for their habitat requirements and applied within their range. Early successional species that could benefit from these proposals include Brown Thrashers, Chestnut-sided Warblers, golden winged warblers, eastern towhee, and smooth green snake as examples (New York State Department of Environmental Conservation n.d.; Adirondacks Forever Wild n.d.). Additionally, the Spruce Grouse, a species of great conservation concern in New York State could also benefit from habitat management within the Adirondack Park. These and other forest-disturbance-adapted, and early successional species could potentially benefit from our policy recommendations that allow for species-specific management regimes similar to the Rusty Blackbird guidelines included in this report.

Rusty Blackbird populations are rapidly declining, likely by a combination of drivers that include habitat loss and blackbird abatement programs.<sup>1</sup> The exact importance of various factors in these declines is

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1 Blackbird abatement programs are present in the Southern United States where migratory blackbird flocks gather during the winter months. Large flocks of blackbirds (Red-winged Blackbirds, Rusty Blackbirds, Common Grackles) tend to congregate near farms and devastate grain crops. Abatement programs allow farm owners to shoot nuisance animals to protect the crop being harmed. These programs are dangerous to Rusty Blackbird populations, which don't exist in nearly as high numbers as the other species.

not yet clear, and there is not a single cause. Despite the lack of full clarity on reasons for decline, Foss & Lambert have developed habitat management guidelines that have proven effective for Rusty Blackbirds (Lambert and Foss 2017). Additional research is still needed to understand the population dynamics of Rusty Blackbirds and other forest-disturbance adapted species in the Adirondacks. Implementing trial management strategies and other policy options discussed in this paper have the potential to slow rapid declines and add to our understanding of these species.

This paper discusses several policy options to improve populations of RUBL and other forest-disturbance-adapted species in the Park. These approaches can be implemented on their own, or more optimally in combination with each other. They include: (1) Increased education and outreach to stakeholders and land-users on RUBL declines, and actions to reduce their decline, (2) voluntary management partnerships with private landowners (including education programs and managerial oversight by an NGO or government partner), (3) incentives for private land owners to manage for RUBL habitat (again, in a partner model), and (4) the implementation of experimental approaches in RUBL habitat management. These policy options could be applied to provide habitat for a variety of forest-disturbance-adapted species as long as the proper management regime was implemented. All options could be implemented on an experimental or trial basis as appropriate.

Our analysis is tailored to public attitudes and land use regulations in the Adirondacks, focusing on education and incentives for private landowners. The use of education/outreach, tax incentives, direct compensation, and forest management are effective tools to achieve conservation efforts, particularly in the context of forest-disturbance species in protected contexts. These proposals for declining RUBL populations in the Adirondack Park can be successfully applied to global conservation efforts with minor alterations taking into account for local policy restrictions, public opinion, and relevant management/conservation plans for the focal species.

## **THE ECOLOGY OF THE RUSTY BLACKBIRD**

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Rusty Blackbird (*Euphageous carolinus*) are migratory songbirds that breed throughout Alaska, Canada, New York, and New England (Wohner, Foss, and Cooper 2020). This species winters in floodplains in the southeastern United States, where they spend the winter foraging in or near shallow water (Evans et al. 2021). The species has experienced significant population decline over the last forty years, from 13 million individuals to 2 million individuals from 1965-66 to 2000-2003 (Pachomski et al. 2021). There are a variety of stressors impacting the decline of RUBL which are discussed below (Buckley 2013; McCormack 2012; Powell et al. 2010).

RUBL forage aerially, or walking along the edge of shallow water for a variety of food sources (Pachomski et al. 2021; Wohner, Foss, and Cooper 2020). Food sources during the breeding season include “aquatic macroinvertebrates, such as beetle adults and larvae, odonate larvae (dragonfly and damselfly), Trichoptera (caddisfly) larvae and emergent adults, and Tipulid (crane fly) larvae, but they also hunt aerial prey such as mosquitoes... snails, grasshoppers, caterpillars, adult dragonflies, adult mayflies, ants, centipedes, and crustaceans.” (Pachomski et al. 2021, 2) RUBL diets become more broad during the autumn and winter when they consume a wide variety of seeds, fruits, grains, and insects.

Rusty Blackbirds breed in dynamic environments such as bogs, beaver ponds, and other wetlands. The tree/shrub species for their nests vary regionally. In New England, RUBLs often nest in low spruce and fir trees near beaver ponds (Greenburg et al. 2011; Pachomski et al. 2021). Densely packed spruce-fir stands adjacent to wetland areas are commonly used for nesting even though RUBL are primarily a wetland species. Wohner et al found that wetlands on the 5-500m scale were not selected for nesting sites (2020). Though proximity to wetlands is required post fledging to supply ample food sources to fledglings with increasing energy demands, for this reason Wohner et al recommend fledgling habitat be taken into account when managing for RUBL. They build cup nests in young conifers such as “red spruce (*Picea rubens*), black spruce (*Picea mariana*), or balsam fir (*Abies balsamea*), surrounded by other young conifers, and occasionally in speckled alder (*Alnus incana*) swamps, in snags, or in isolated conifers in open areas” (Pachomski et al. 2021, 2). Post fledging foraging grounds can shift to any region with shallow standing water.

## UNDERSTANDING THE DECLINE OF RUSTY BLACKBIRDS

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A variety of reasons drive our interest in Rusty Blackbirds. They are subject to rapid decline, and have a variety of unknown drivers potentially contributing to their decline. There is also a large body of existing research to inform management plans, combined with their status as a species of greatest conservation need in New York State’s Wildlife Action Plan (New York Department of Environmental Conservation 2015). Additionally, the small remaining population in the Adirondack Park is at risk of extirpation without further research and potential management efforts.

In addition to the pressures listed, RUBL are further at risk of decline because they are a boreal species at the southern periphery of their range. Under worst case scenario models for climate change, the boreal forest is predicted to experience the greatest change in temperature of any habitat type (Ralston and DeLuca 2020). With drastic temperature changes the suitable boreal habitat is predicted to shift approximately 934 km latitudinally North by 2080, and has shifted an average of 82.8m up in elevation as reported by Kirchman & Van Keuren in a New York study (Ralston and DeLuca 2020). The shift latitudinally North and up in elevation poses particular issues for boreal lowland species such as the RUBL because their habitat is inherently linked to low lying wetlands that do not occur at higher altitudes. However, with greater habitat connectivity, species threatened by a changing climate can move to northern latitudes where habitat is more suitable. The southern boreal forest has a variety of stressors leading to its decline in addition to climate change. These include recreation, changing land use, and increased development and disturbance by humans.

According to the International Union for Conservation of Nature (IUCN) Redlist, Rusty Blackbird populations are declining and vulnerable to threats which might lead to extinction (BirdLife International 2020). The species has declined more than 95% from 1966 - 2005 according to the North American Breeding Bird Survey (BBS) (Greenburg et al. 2011). Such steep population declines are alarming because they decrease the population’s genetic variability, reducing its resilience and increasing the risk of extinction. For instance, a range retraction of 65-160 km in the past century was observed in Maine by Greenburg. This indicates a decline in population size, suitable breeding habitat, or changing food sources within the region.

There are many hypotheses for this rapid decline, but there is no known definitive cause. Some of the proposed causes for decline include: loss/degradation of the boreal forest due to logging and agriculture, mercury bioaccumulation in their food sources, wetland desiccation, hematozoa contamination, climate change, loss of winter habitat, and blackbird abatement in the Southern US (Greenburg et al. 2011; Pachomski et al. 2021). Increasing parasitism by bird blowflies is another potential driver for RUBL decline (Foss 2018) though this is still a speculative hypothesis. Mercury accumulation within food sources occurs primarily in rainfall near the western Adirondacks, from power production and industry more to the west. Combating mercury is currently being done under the Clean Air Act amendments that were passed in 1990. Wetland desiccation (drying) will continue to be an issue as climate change progresses. Loss of wetlands restricts RUBL breeding territory due to a lack of food. Blackbird abatement programs are an issue in wintering habitats such as Kentucky, Tennessee, and other Southern states. These programs allow for the killing of nuisance blackbirds. RUBL are likely killed because they congregate with Red-Winged Blackbirds and the Common Grackle in winter flocks to forage. Ensuring only non-threatened species remain affected during abatement plans is impossible.

The impacts of logging activity on RUBL population decline are contested. One study looking at daily nest survival rates found that nests located in sites that had not been logged in the past twenty years to be 2.3 times more likely to fledge. Reduced fitness observed within sites that had been logged in the past indicates that logging should not be used for management (Powell et al. 2010). However, a study in New Hampshire and Maine found that logging had no impact on nest success (Buckley 2013). When studying nest success in Northern New Hampshire, it was found that even-aged conifer stands from regenerating clear-cuts supported successful RUBL nesting. In that study, 92% of sites had previously been clear-cut (Wohner, Foss, and Cooper 2020). Anecdotally, other researchers (including author Hallstrom) have seen larger populations of RUBL in disturbed areas due to forest management operations during research fieldwork in New Hampshire. However, these observations are preliminary and have not yet been scientifically supported.

## HABITAT MANAGEMENT GUIDELINES

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The habitat management guidelines provided for RUBL by Foss and Lambert (2017) provide a clear set of actions that can be used to create RUBL habitat. We use these to inform our policy options for the Adirondack Park. The guidelines discuss site selection for habitat management, ideal RUBL habitat composition, and additional species that may benefit from the prescribed management. Site selection for habitat management is critical. Sites are characterized by regenerating spruce-fir forests or mixed hardwood/softwood stands within 800ft of a wetland or low gradient stream (Foss and Lambert, 2017). RUBL home range sizes can vary greatly, from 10-430 acres (Foss and Lambert, 2017), though the guidelines recommend managed habitat of 2.5-100 acres, site dependent. Managed stands could take 5-15 years before RUBL occupy the area and build a nest (Foss and Lambert, 2017).

RUBL habitat management strives for an even aged stand with some older and dead trees left standing to be used as perches. Under the Foss/Lambert guidelines, managed habitat should be composed of white/red spruce, tamarack, balsam fir, white pine, yellow/white birch, and maple greater than 13ft tall (Foss and Lambert, 2017). To achieve the desired even age stand Foss and Lambert recommend “overstory harvesting with residual tree retention”(Foss, Lambert, 2017, pg 5), however clearcuts and shelterwood

cuts may also be used. Regenerating spruce-fir stands should be within 800ft of a wetland or low grade stream, tree height should range from 8-12ft, and maintain a DBH (diameter at breast height) of 1.5-2in (Foss and Lambert, 2017). With this management we will be creating habitat for a wide variety of species in addition to RUBL, such as spruce grouse, canada warbler, olive-sided flycatcher, bobcat, and moose (Foss and Lambert, 2017). Spruce grouse and moose remain species of concern in New York State, with targeted habitat management following these guidelines we will create viable habitat for multiple species of concern including RUBL.

The Rusty Blackbird population decline in New York State and the Adirondack Park has been similarly steep in comparison to the total population decline observed in other areas. A study conducted over a five-year period using a point count system found 1305 total boreal bird sightings, and only 2% of those were Rusty Blackbirds (Glennon 2014). Low detection indicates a very small population present within the Adirondack Park. That same study found RUBL populations were remaining “stable” over the five-year period, however this analysis could be confounded by the small sample size. Rusty Blackbird occupancy declined in the Adirondacks from 2007-2011 from 28%-22% at each site surveyed as reported in an unpublished dataset from The Wildlife Conservation Society in the Adirondacks (Glennon et al. 2019a; McCormack 2012).

Others have hypothesized that one aspect contributing to the observed decline of boreal wetland species such as RUBL is related to the increasing presence of cosmopolitan species which are able to out-compete boreal specialists for resources (Glennon 2014). In addition to outcompeting for resources, southern cosmopolitan species can increase predation and introduce diseases to previously isolated populations. This invasion of cosmopolitan species can be attributed to climate change, declining populations of specialist species, rural sprawl, and human encroachment on otherwise secluded areas (Glennon et al. 2019a; 2019b; Ralston and DeLuca 2020).

At this time, it is unclear the relationship between drivers and their effects on RUBL population dynamics. Some identified drivers may act synergistically, or antagonistically to influence the decline; however, these effects have not been identified. Policy experimentation, habitat management, and continued studies of RUBL populations in the Adirondack Park provide the opportunity to understand the strength and importance of different factors in the RUBL decline.

## **INCORPORATING “FULL ANNUAL CYCLE STEWARDSHIP” FOR RUBL MANAGEMENT**

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Evans et al describe full annual cycle stewardship as a conservation plan that incorporates all aspects affecting the species through an annual cycle (2021). For the RUBL, this form of stewardship is crucial to address the variety of factors leading to the species’ steep decline in both winter and breeding habitat. The availability of breeding habitat is only one aspect that needs to be addressed. For instance, their paper describes an unpublished full annual cycle population model by Rushing et al which found that juvenile survival in wintering habitat is the parameter most closely linked to the rate of population change (Evans et al. 2021). As a result, the need for research and conservation programs that are directed at winter habitat in addition to breeding habitat is likely a critical component to most effectively reduce decline.

By using a full annual cycle approach to stewardship, a variety of stressors can be addressed across the species geographic range. For RUBL this means addressing loss/degradation of the boreal forest in

the north due to logging and agriculture, mercury bioaccumulation in their food sources, and wetland desiccation. A full program would also need to address blackbird abatement in the Southern US (Greenburg et al. 2011), and habitat alterations in winter territory per Evans. Our paper focuses solely on the breeding range in the Adirondack Park to address one aspect of the larger program needed to protect RUBL: increasing the amount of viable breeding habitat at the southern extent of the species' breeding range.

## PROPOSED MANAGEMENT PLAN

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We use the Rusty Blackbird management guidelines developed by Foss & Lambert as a suggested mechanism for managing habitat in the Adirondack Park (2017). They are referred to hereafter as the Foss/Lambert Guidelines. The management approach is linked on the International Rusty Blackbird Working Group's website. The guidelines recommend 2.5 - 100 acre plots of even age stands of spruce-fir trees to be grown in clumps, with some mature live and dead trees to be left for optimal perching locations. Management should occur within 800 feet of a shallow wetland or stream to provide sufficient food sources for breeding populations and avoid areas adjacent to mature softwood stands and roads.

These standards likely also provide benefits for species such as Spruce Grouse, Canada Warblers, Olive-sided flycatchers, bobcat, and lynx which is extirpated in the Adirondack Park. Similar habitat management guidelines have been created for Spruce Grouse. These guidelines were developed and implemented for SPGR recovery efforts in Vermont (Alexander and Chipman, 1993 – cited in Ross and Johnson), but have been cited in New York's Spruce Grouse recovery plan as well (Ross and Johnson 2012). Management plans such as this can be supplemented with the same policy recommendations to benefit other forest-disturbance-adapted species present in the Adirondack Park.

While Wohner et al do not recommend breeding habitat management in many areas due to the species use of regenerating softwood stands generated by an array of harvesting practices, they do recommend that harvest plans create a "softwood stand 5-15 years post-harvest within 300m of a stream or shallow wetland over time" (2020, 12). Given the land use distribution within the Adirondack Park, targeted habitat management and experimental research on private lands could benefit the species by increasing the number of viable breeding sites. The current habitat management guidelines by Foss/Lambert use logging and timber harvest as their method to create even aged conifer stands to enhance/create RUBL breeding habitat. Logging as a method to create or enhance RUBL breeding habitat in addition to natural drivers is supported by Pachomski et al (2021). In this paper we use the Foss/Lambert guidelines for habitat management. As such, logging is seen as a tool to generate quality breeding habitat. That said, more research must be conducted to clarify the impacts of logging on RUBL populations.

Selective forest management may increase prevalence of cosmopolitan species immediately after timber harvesting, however as a spruce-fir stand regenerates, those species will likely move on to areas with more open space. Lack of habitat connectivity strongly influences models predicting RUBL extinction (Glennon 2014). Additionally the RUBL decline may be linked to the Allee effect, which makes finding mates difficult due to migration patterns and their patchy distribution (Greenburg et al. 2011). Through forest management, available breeding habitat can be expanded and improved to reduce the current patchy distribution of habitat in the Adirondack Park. If implemented appropriately, forest management could increase habitat availability for RUBL and other forest-disturbance adapted species by providing more



breeding habitat near wetlands. Though breeding habitat has not been identified as the sole factor leading to RUBL decline, it is an aspect that can be addressed through policy incentives in RUBL breeding range to create a “full annual cycle stewardship” plan (Evans et al. 2021).

In the context of private land ownership or commercial timber operations, there are several considerations for this approach. First, the guidelines are relatively benign and easy to implement. There is minimal complexity in the approach, and costs are likely to be nominal beyond the commitment of the land. Second, there is flexibility in plot size, which could increase ease of implementation for land owners. Third, because the guidelines require adjacency to wetlands, it is likely that the value of the land for other activity such as timber or human access is lessened.

## **POLICY OPTIONS**

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In the following discussion, we provide several policy options. The primary goals for these proposals are to provide more suitable nesting habitat for RUBL within the Adirondack Park to aid in the stabilization of the population. These policy options constitute only one part of what a complete full stewardship model would require. All of them would be expected to result in increased implementation of the Foss/Lambert Management model, or experimental variants designed to improve research on RUBL success.

### *Option 1. Educational and Outreach Programs*

A basic step is the use of education programs to increase awareness of RUBL decline within the Park and to inform stakeholders of management practices available to improve habitat. The value of basic collaborative outreach programs are well-established – though success can vary (Cheng and Sturtevant 2012; Toman, Shindler, and Brunson 2006). Education programs can be run through organizations such as the Audubon Society, Adirondack Wildlife Refuge, The Nature Conservancy or other conservation minded organizations within the Park’s boundaries, or via the appropriate government entity, the Dept. of Environmental Conservation. Increasing the salience of an issue will allow the public to understand the issue and help reduce the decline of native species such as the RUBL.

The predominant goals of education programs are to demonstrate the value in habitat management, allow for public feedback, and promote conservation minded activities (Jacobson 1991). Successful completion of an education program may combine fliers, informational panels, question and answer sessions, social media campaigns, and partnerships with land trusts and environmental activist groups to help the public implement conservation plans. Presumably the communication plan would include details on the specifics of implementation (and the relative ease in doing so) along with links to more detailed resources for enactment.

### *Option 2. Voluntary Partnerships*

The next step in implementing increased management would be the use of private landowner partnerships put in place through a land trust, non-profit group, trusted silviculture operation, or a partnership to explore the benefits of habitat management in the Park. For instance, New York’s Department of Environmental Conservation has worked with NY Audubon, a trusted non-profit group, to develop an incentive program to protect grassland birds in New York State (Ross and Johnson 2012). This option allows

for habitat management experimentation (discussed below) on less protected lands in the Adirondack Park. These programs could allow managing organizations to have direct oversight of the management practices and ensure they are implemented properly according to the Foss/Lambert guidelines.

Private conservation initiatives have a strong track record. For instance, one study ranked five common motivations for conserving private lands, noting that “natural resource protection domain was assigned the highest importance by participating landowners followed by community- mindedness, family commitments, financial incentives, and sustaining agricultural production.” (Ernst and Wallace 2008).

Understanding common motivators for private landowners to conduct conservation work allows for a targeted approach to best address RUBL and forest-disturbance adapted species management in the Adirondack Park. Management programs can focus on natural resource/species protection and financial incentives (see option 3). Additionally, education programs and outreach events would ensure the issue remains salient, and aid in fostering voluntary management efforts on private lands.

### *Option 3. Incentive Programs for Private Land Management*

Tax policies and direct financial incentives could be used to achieve conservation goals by appealing to the economic interests of Park landowners. Private landowner programs for conservation have successfully been implemented through both market-based and volunteer-based solutions. Both are viable options to achieve RUBL management within the Adirondack Park. Compensation options can increase the degree of program participation and uptake. They can include conservation easements, tax incentives, and/or direct compensation for associated costs. Financial incentives would likely not need to be extensive to encourage enough initial participation for experimental implementation.

Conservation easements protect the selected parcel of land in perpetuity and allow for landowners to specify the use/management regimes used on the parcel. Conservation easement programs will mimic the National Resource Conservation Service Working Lands program for Sage Grouse and New England Cottontail to encourage voluntary conservation efforts on private land. In a study of 119 conservation easements held by The Nature Conservancy, it was found that 46% were on working landscapes such as ranches, farms, and forestry operations (Rissman et al. 2007). Easements used for RUBL management would often fall under forestry operations due to the implementation of the Foss/Lambert guidelines. The land used in a conservation easement qualifies as a “tax-deductible charitable gift” in New York through the Conservation Easement Tax Credit (CETC). To collect the tax benefit, the easement must be held by an accredited land trust, municipality, or public conservation organization.

Organizations such as the Adirondack Land Trust or the Nature Conservancy could act as beneficiaries and facilitators for an easement-based program with careful planning and coordination. After the easement is filed with an accredited land trust, conservation organization, or municipality, the landowner must register the easement with the Department of Environmental Conservation. All registered easements are monitored periodically by DEC officials to ensure terms of the easement are properly implemented. The maximum credit attainable under the CETC is \$5,000 paid annually. Second home owners in the Park are allowed to partake in the CETC program as long as the easement is held in New York State, and they file a non-resident or part-time resident income tax return (“NYS Conservation Easement Tax Credit,” n.d.). The ability for second homeowners to receive benefits through the CETC may sway individuals to establish easements to manage for RUBL and other forest disturbance-adapted species in the Park.

Incentives based on a per acre of land used for management provide an additional tax break for the landowner and encourage more land to be managed in a RUBL friendly manner. The 480a Forest Tax Law provides landowners who participate in sustainable land management with savings on their property taxes (NYS Dept. of Environmental Conservation 2020). Using the 480a Forest Tax Law is prudent because it is an established program within New York State and works similarly to conservation easements in so far as binding the commitment to the deed of the land. This means that all commitments made to sustainably manage the land will be legally binding even if the land is sold, ensuring proper habitat management in perpetuity. Conversely, incentives could be based on a yearly incentive check directly paying landowners for their cooperation. This kind of incentive-based program requires funds from an outside managerial organization to be used. Possible organizations that could provide funding include NYSDEC, NY Audubon Society, and The Nature Conservancy.

Similar incentive programs are used to reduce the number of breeding grassland birds that are killed annually due to agriculture. In Charlotte Vermont, the Vermont Audubon Society has provided a \$100/acre grant for intensely managed land to protect grassland birds when all guidelines are met and submitted to headquarters (Perlut, Hamilton, and Hanley 2008). Additional programs such as Agricultural Land Easements have been used for conservation in New Hampshire. Programs such as the Environmental Quality Incentive Program through the Natural Resource Conservation Service (NRCS) provide incentives for managing grasslands (Vermont Center for Ecostudies 2016).

#### *Option 4. Experimental Forest Management*

Research on the declines in RUBL, and strategies to help the species thrive are ongoing. As discussed earlier, a variety of questions exist as to which factors are the strongest drivers in RUBL decline. As such, using increased opportunities for access to RUBL habitats through the previous approaches could include the development of slight differentiation in management approaches to determine if varying management techniques are more or less successful.

For instance, experimental implementation could likely employ winter logging harvests in small patches “around the edges” of Resource Management lands. Resource Management lands are a combination of privately owned land that could be ideal for experimental forest management. This land use classification comprises 24.98% of the Adirondack Park’s total area. These experimental stands would be ideally situated near Wilderness areas (but still on private land), and could also be near, but not directly adjacent, to roadways, to reduce human impacts. A variety of questions could be answered in such situations, to determine the degree of tolerance for various human related activities, whether winter timber harvests are an appropriate strategy to reduce timber disturbances to the species. In general, a variety of experimental approaches could be used. Critically, participation in land management programs would need to be high enough such that a small portion of the plots could be allocated to experimental approaches.

## **STEPS TO IMPLEMENT MANAGEMENT ON PRIVATE LANDS**

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A variety of actions would be needed to implement our proposals. The first step is to identify suitable potential management parcels via a variety of means. The use of hydrological, tax, and landcover maps, eBird sightings of RUBL on or near private lands, and forest resource inventories (as illustrated in Manson et al (2020)) can be used. These resources, except for forest resource inventories, are open-source

documents that any conservation organization or private citizen can access, simplifying the process for any supervisory agency. Forest resource inventories are used by timber operations. They detail a parcel's forest composition, such as the number of trees per acre, basal area, and value of the timber present. Knowing the tree species present, density of trees, and value will allow the supervisory organization to select high-quality parcels for management. This resource could also provide information to the landowner on the value they can expect in return from the timber that is harvested during management.

Landowner communication would incorporate a variety of outreach information. It would include information on the identification of the management parcel/plot. It would include information to educate the landowner of RUBL (habitat requirements, their decline, life history summary, and photos of healthy individuals), and their role in the forest ecosystem. Outreach would include an explanation as to why their land would be ideal for management of RUBL. It would list incentives available in exchange for management. Finally, it would include initial connections to the partnership organization. The partnership organization would maintain a list of foresters who are able to implement the management program. Prior to an agreement, a pre-management site visit to ensure the habitat will be viable would be required. In particular, this would help to ensure the full viability of a food source ecosystem present for RUBL (wetland or shallow slow-moving streams).

Presuming requirements are complete, a habitat management plan would be enacted per the Foss/Lambert guidelines with a forestry company. In years following, annual site visits would occur to ensure the management plan is adhered to. Presumably, surveys would be done for RUBL to identify if the site is being occupied. These surveys can be done as point counts throughout the site, or as transect surveys. The current methodology put forward by Wohner, Foss, and Cooper (2020) suggests moving to a transect based survey system that is less focused on wetland proximity. Monitoring could also be done or augmented via citizen science, presuming some training. Certainly, requesting landowners to report any sightings of RUBL on the managed property will provide data from a given site throughout the breeding season and give the landowner a chance to take ownership of the management initiated on their land. Lastly, the partnership organization would help facilitate incentive payouts depending on the circumstances of the agreement.

## DISCUSSION AND ANALYSIS

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The management approach of working “around the edges” on private land would avoid harm to protected Wilderness lands, while still allowing for an increase in RUBL breeding habitat further from the most intense timber operations. Forest management teams could hike into wetlands that are a reasonable distance from roads, cut the stand, and leave some detritus to replenish the soils before the regenerating forest grows. Minimally invasive logging techniques, or hand logging could be used in these areas. Hand logging would be more labor intensive and increase liability for the forest management company but would create a result that is overall less intrusive. Alternatively, traditional forest management methods can be used to clear regions near wetlands, but negative environmental impacts may be higher. Examining differentials in timber techniques is one of the experimental protocols that could be tested.

*Policy Experimentation.* To ensure that these programs are successful, adaptive policy making techniques and sunset clauses can be used. Adaptive policy making techniques emphasize evaluation and revisions. Policies can be revised to address areas of weakness and ensure the goals of the policy are being

met. There are several mechanisms that can be used for evaluation. These include point count surveys, habitat surveys to identify quantity and quality of habitat created, and impact analysis of management practices on species composition. Point count surveys can allow researchers to identify the overall effectiveness of the management plan. Quantitative surveys of the managed habitat illustrate the success of creating new habitat. Studies of RUBL populations present in the managed regions should be conducted to ensure the region is not a population sink, and that the management is in fact benefitting RUBL populations in the Park. These surveys can be conducted through the use of citizen science projects such as BioBlitz's, RUBL specific Blitz surveys, eBird RUBL sightings, and landowner reported sightings. Citizen science as a means to collect data over a large area and length of time is a cost effective and supported method of data collection by a variety of researchers such as (Pachomski et al. 2021; Evans et al. 2021).

The use of sunset clauses requires that the policy be re-evaluated and revised after an initial trial period, thus allowing policy efficacy to be addressed. If the policy is not ratified or re-voted upon, then the legislation dissolves and is no longer binding. Sunset clauses may also help to reduce the cost of enacting legislation, by ensuring that inefficient policies are assessed, and improved or stopped (Viswanathan 2007). Because these management actions require time for forests to regenerate, the suggested time should be appropriately selected based on the average growth rates of spruce and fir species that are native to the Adirondacks.

Certainly, scientists agree upon the potential benefits of experimental management programs, but with some reservations. For instance, Dr. Michale Glennon (Director of Science at the Adirondack Watershed Institute) is not opposed to habitat management on private lands, but would not endorse similar activities on Adirondack Forest Preserve lands (Glennon 2018). Glennon also questions the potential of habitat management for reversing Rusty Blackbird decline in the Park, but supports trial research on private and easement lands to explore the possibility.

Others argue that a strategic approach could bring benefits, if carefully implemented. Dr. Angelena Ross (Wildlife Biologist with New York Department of Environmental Conservation) agrees that habitat management has the potential to benefit these species of concern, especially the Spruce Grouse. She has conducted experimental habitat management for SPGR in the Adirondack Park at a large site by mechanically thinning small areas and comparing changes in grouse use at the site before and after management. These measures were also compared, at undisturbed sites across the same time frame. In these experiments, Spruce Grouse use tripled on sites that were thinned, a change not observed in the undisturbed sites. However, Ross cautions that an increase in only grouse use is not adequate evidence enough evidence for range-wide policy changes for the species. Other factors such as productivity and annual survivorship were not measured. While Ross questions the consistency of future land managers' goals after opening up the forest preserve to management, she maintains that the option should be at least considered (Ross 2018).

These suggested policy actions are based on the easiest factor to address RUBL decline: habitat availability. In theory, creating more habitat (acres) would provide a greater overall network of breeding habitat and increase the carrying capacity within the Park and allow for population growth. Further, increased connectivity might result from increased numbers of stepping stone breeding habitat locations, though this outcome is certainly a question. This assumes no other drivers in RUBL decline outweigh the effects of limited breeding habitat (e.g. mercury bioaccumulation, wetland desiccation, blackbird

abatement, etc.). Critically, any policy solutions must occur with continued research to identify the mechanisms causing RUBL decline, specifically in the Adirondack Park.

We suggest a combination of the first three options as a first step: private land management with incentives and education, as a way to minimize negative environmental effects, and increase public support. A private land owner incentive based program to test the efficacy of the Foss/Lambert habitat management guidelines in the Adirondack Park functions is an effective start. After the program is implemented and habitat has been allowed to regenerate, studies should be conducted to assess the impact on RUBL populations. These studies can be simple present/absence surveys, nest success studies to understand the success of each nest and the likelihood an individual pair successfully rears a clutch, and monitoring overall site productivity. Fledging analysis studies are more involved; however, they provide insight about the effects of habitat management on a specific population.

Finally, this case demonstrates the broader need for three characteristics in policy design in the Anthropocene: complexity, nuance, and experimentation (Nelson et al. 2017). Modern environmental protections require more complexity to address the nuances of different species, different human behaviors, and different eco-systems. In order to develop such policy effectively, we need to adopt policies on an experimental basis to test different approaches and determine their effectiveness.

## CONCLUSION

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Natural ecosystems are dynamic and change regularly. Natural disturbances such as forest fires, flooding, wind events, beaver activity, and damage by snow and ice events maintain adequate disturbance for forest-disturbance adapted species. In human dominated systems, natural disturbances are reduced or suppressed for human safety, aesthetics, recreation, and resource extraction which modify habitat change for forest-disturbance adapted species. Human actions, even within the land regulations of the Adirondack Park, can limit potential habitat maintenance for forest-disturbance adapted species. Overall, habitat availability can be addressed within the boundary of the Park through the policy options outlined above. Adoption of some combination of these policy options could provide the beginnings of improvements in forest-disturbance adapted species management in the Adirondacks.

The most feasible solution is introducing management, incentive-based, and educational programs directed towards private land owners. Using the Foss/Lambert guidelines, this would allow for initial experimentation to determine if these management regimes could successfully increase the success of forest disturbance adapted species in the Adirondack Park.

Transparency throughout the entire process is the best mechanism to encourage public support. Using incremental implementation to assess efficacy, and if successful, demonstrating benefits can allow the public to understand this approach. Benefits may be seen in the economy if birders and nature enthusiasts come to see RUBL and other threatened species that will benefit from management.

To increase habitat availability and ultimately slow the decline of RUBL within the Park, we recommend that the Foss/Lambert management guidelines be used on private lands in combination with incentives and education. Our work demonstrates the ongoing need to increase the degree of thoughtful, nuanced policy design that can be tested in various ways, and in various contexts. While rigorous protections invoked

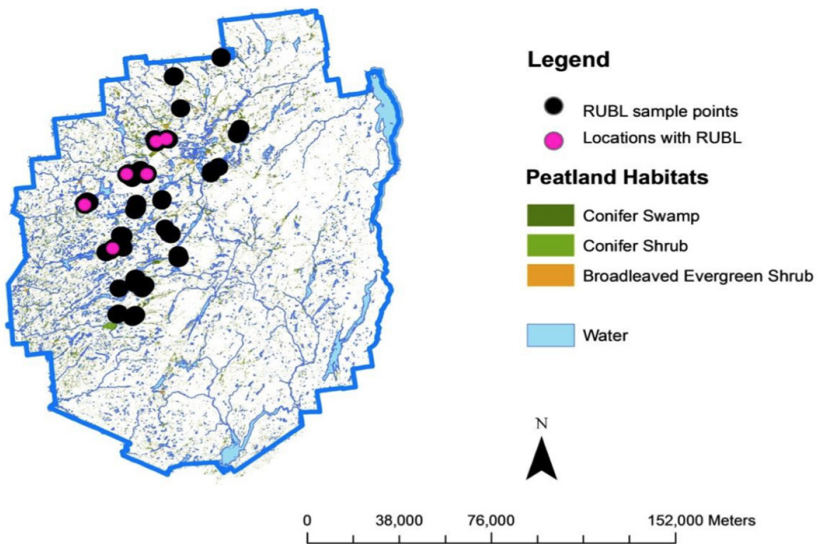
in many of our most effective environmental regulatory systems are critical, we need to simultaneously implement policy programs designed to ameliorate the various impacts human activities have had on species, and allow for flexibility and adaptation.

The example provided in this paper is localized to the Adirondack Park, however the tools and policy options used throughout are applicable to conservation efforts globally. This paper identifies an opportunity for research and conservation action regarding the decline of RUBL in the Northeastern United States, outlines regional constraints affecting action, selects an applicable management plan, and develops policy options to encourage research and conservation. Conservation efforts globally would benefit from following a similar course of action.

## APPENDIX

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### Distribution of Rusty Blackbirds in the Adirondack Region of New York State in 2010



*Fig. 1 This figure summarizes the distributions of Rusty Blackbird sightings in 2010 within the Adirondack Park. Rusty Blackbird presence is indicated by a pink dot on the map above their location. This map was created by Melanie McCormack in 2012 as a part of the presentation titled Occupancy of Rusty Blackbirds (*Euphagus carolinus*) In the Adirondack Region of New York State (McCormack, 2012)*

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