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Final Report: Lake County Forest Preserve District Bird Surveys.

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Final Report for Lake County Forest Preserve District Bird Surveys

Project Information

a) Project Title: The Forests and Woodlands Campaign of the Illinois Wildlife Action Plan

b) Legal Name of Entity doing the Project: The Board of Trustees of the University of Illinois

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Lake County Forest Preserve Research Proposal

At the Lake County Forest Preserve sites, located in northeastern Illinois, relatively small (e.g. < 10 acre) units within various forest community types (e.g. northern flatwoods, mesic forests, dry mesic oak woodlands) are being managed to promote oak woodland habitat and to demote the presence of invasive exotic plants in the understory. The active management on the site, including light to moderate canopy thinning, creation of canopy gaps, understory plant removal, and invasive-exotic plant species eradication, lends itself to obtaining before-after-treatment-control data at a management scale likely to affect the breeding bird community.

Proposal Objective

Our primary objective was to use a monitoring framework (with replication) at locations within the Lake County Forest Preserve (106 established bird survey points) to document the immediate and longer-term effects of forest management on populations of forest and woodland-dwelling songbirds.

Preliminary Breeding Bird Point Count Survey Data from 2013

Following some initial forest management during the winter of 2012/2013, 70 bird survey points were established and visited during the summer (breeding season) of 2013. A total of 52 species were documented at bird survey points in the forests at Lake County Forest Preserve sites. For the purposes of a general summary, bird surveys associated with the different forest management treatment types were grouped into three simplified categories including no treatment, understory removal plus light to moderate canopy thinning, and understory removal only categories. The overall numbers of species detected in each of the three categories were 46, 40, and 38 in the no treatment, understory removal plus light to moderate thinning, and understory removal only categories, respectively. The mean species diversity per survey point was not significantly different among categories. These bird survey results supported the conclusion that the management had mostly a neutral effect, but did have positive and negative effects on some species of forest birds. Seven species of forest birds showed a positive response to the canopy thinning (higher abundance in the

thinning category compared to the no treatment category) at Lake County Forest Preserve, including two species that are on the SGNC list for Illinois (Red-headed Woodpecker and Northern Flicker). Eight species showed a positive response to the understory removal while three species (e.g. Wood Thrush, Hairy Woodpecker and Ovenbird) were more abundant where management did not occur. This illustrates that forest management even at the scale of a few acres can affect breeding bird abundances, and again emphasizes that some species respond negatively to forest management. It appears that there is a net positive response of breeding forest birds to the forest management in the Lake County Forest Preserve. Over time, it is important to collect additional data to see how long these effects last and whether there are any lagged responses (e.g. initial negative that becomes neutral or positive over time). Brown-headed Cowbirds were also very common throughout these sites and may have been slightly more common where thinning had occurred, suggesting that rates of cowbird parasitism are likely high for songbirds nesting throughout this area.

Additional Forest Management

Since 2013 there has been some additional understory management and control of understory buckthorn, and more understory work and canopy tree removal is slated to occur during the 2016/2017 and 2017/2018 winters. We propose to revisit the initial 70 bird points (surveyed during 2013) and also add additional points where possible (for a total of 106 points), to further assess the effects of this ongoing forest management on the breeding bird community during the summers of 2017-2019.

Bird Surveys

We revisited all 70 of the initial bird survey points and established 36 additional points at as many locations as possible (given a minimum spacing of 200m between points) to maximize replicates in each forest management (including no management) type across MacArthur and Wright Woods, Elm Road Forest, Ryerson, and Old School. We used a standard point-count technique to determine forest songbird species diversity, relative abundance, and a cowbird abundance which provides a

good relative index of community-wide cowbird parasitism rates) in the various treatment (various types of forest management) and control (not managed) areas visited. Each survey point was visited 1 time during the breeding survey period (May 15 to July 5), in 2019. The 2017 and 2018 information has been reported previously so here I present the 2019 data. Estimates of individual species relative abundance (average number of individuals detected per point per species) were compared among various groups of survey points (e.g. for numerous types of forest management, and control) to determine the effects of a given treatment regime on the the breeding bird community. Vegetation structure and composition data have been and are being collected by others and these data may allow for additional comparisons to determine how vegetation structure/composition specifically influences the breeding bird community.

Timeline

The 106 survey points were visited May-July 2019, and data were entered and summarized in preparation of this progress report.

Research Summary

Lake County Forest Preserve Bird Survey Results

Breeding Bird Point Count Survey Data. A total of 53 species were documented at bird survey points at Lake County Forest Preserve (LCFP) sites and 49 were within 100m of the survey points at least once and eligible for inclusion in estimates of species relative abundance. These numbers were down from the previous year (2018) mainly because there were different field techs doing the surveys in each year. For the purposes of a general summary, bird surveys associated with the different LCFP sites are presented in Table 1. The relative abundance of particular species can vary substantially among the different sites, owing to the predominant forest types and/or forest management regimes at each site.

The bird survey results from the 2019 breeding season based on forest management among LCFP sites are summarized in Table 2. There had to be at least 7 points in a given forest

management category (categories A-F and None described at bottom of Table 2) in order to compare relative abundances among categories. The various types of forest management are having mostly positive or mixed effects on the relative abundance of forest birds. Of the 29 species common enough (with overall abundance values > 0.07) to assess a response (positive, mixed, negative, or neutral; highlighted in Table 2) to management activities, 13 species (45%) of forest birds showed a **positive response** (**abundance higher but not lower in one or more treatment categories compared to no-management category**) to management activities including the Ovenbird (a Species in Greatest Conservation Need – SGCN), as well as Eastern Wood Peewee, Indigo Bunting, Common Yellowthroat, Song Sparrow, Downy Woodpecker, Great-crested Flycatcher, Hooded Warbler and Baltimore Oriole among others (examples given in Figure 1 and complete list in Table 2). Many of these same species also showed positive responses in 2018. Thirteen (45%) species had a **mixed response** (**more abundant in at least one management category and less abundant in at least one management category compared to the no-management category**) including Red-headed Woodpecker (SGCN), as well as Blue Jay, Brown-headed Cowbird, Red-bellied Woodpeckers, Red-eyed Vireo and Scarlet Tanager among others (examples given in Figure 2 and complete list in Table 2). Three species (10%) including Northern Flicker (SGCN), Black-capped Chickadee, and Rose-breasted Grosbeak had a **negative response** (**abundance higher in the no-management category than one or more of the other categories**) to some of the treatments (Figure 3). No species had a **neutral response** (**abundances were similar across all of the categories**) to forest management. Most of the species responding positively to forest management at LCFP did so across most or all types of forest management (most or all bars on graph for a particular species were taller than the green bar which represents no management; Figure 1). These species represent, in general, species that respond favorably to forest disturbance (thinning, understory manipulations, etc.) that creates a mosaic of forest structure and forest habitat within the forest. Species with mixed responses to forest management likely responded positively and negatively to some of the different management categories based on how the management affected species-specific foraging and/or nesting

substrates. It is likely that the mixed responses may change over time as the habitat changes with each passing year following active management. If the various forms of forest management going on at the LCFP sites achieve the forest structure and composition desired by managers, there is nothing in the breeding bird data at this point to suggest that the management is not also having mostly beneficial effects on breeding forest songbirds. The relatively small size of management units (a few acres) also allows for there to be a mosaic of forest structure and forest habitat within each site where management is occurring. This could also make it easy for species only to have to move small distances within a given site from one year to the next to find suitable/preferred habitat following forest management activities.

Cowbird Abundance. A concern for breeding forest songbirds when thinning opens up the forest canopy or understory management reduces/removes ground cover, is the potential for increased brood parasitism of songbird nests by Brown-headed Cowbirds. Female cowbirds may cue in on or use more heavily areas of the forest where the canopy has been opened up or understory removed. The more-open canopy may make it easier for female cowbirds to view the nest building and mating activities of potential hosts while the cowbirds are searching for nests to parasitize. Female cowbirds may also be able to successfully forage for insects and exposed seeds on the forest floor if the understory has been removed recently, reducing their need to leave the forest to forage in nearby non-forest areas (e.g. pasture, row-crop, or mowed areas). This could lead to higher rates of cowbird parasitism in forests that are thinned and/or have had recent understory management compared to those that have not. Brown-headed Cowbird overall abundance at LCFP in 2019 was in the middle of the spectrum for Illinois forest habitat (0.55) and relatively similar among individual sites with the exception of being higher at Wright Woods (Table 1). Cowbird abundance was relatively moderate in the no management category, but was higher in the categories (A-C) where some understory had been removed relatively recently, and lower in categories (D-F) where there have been recent tree thinning activities. We could reasonably expect parasitism rates for cowbird hosts to be moderate overall at LCFP with rates possibly higher where recent understory removal has

occurred and lower where there has been recent gap creation or tree thinning. Why relative abundances were somewhat higher in the management categories A-C remains to be determined, but it is possible that this type of management creates open areas in the forest understory that may allow for cowbirds to forage some on exposed forest floor within the forest rather than having to go to nearby open habitat.

Using Breeding Forest Birds to Measure Responses to Management

Breeding forest songbirds in Illinois include more than 100 different species that fall into various guilds (e.g. nesting on the ground, in shrubs, sub-canopy, or canopy; foraging in leaf litter, on bark, on shrub or tree foliage; nesting on or near the ground, in shrubs, or in the canopy; etc.), making them highly responsive to changes in forest structure and composition and, therefore, a great group to monitor in association with various forest management practices. Over 20 of these species are on the list of Species in Greatest Conservation Need (SGCN) for Illinois. There are additional species of raptors and wading birds that are on the SGCN that also associate with the various types of forest being managed.

There are a number of attributes of forest songbirds that make them particularly well suited for studying responses to forest management. One is that most if not all of these species are territorial during the breeding season and their territory sizes are typically between 1-3 acres in size. Therefore local forest management activities done at scales of 1, 5, 10, 50, or 100 acres are all highly relevant to these birds that occupy a relatively small area throughout the breeding season. Another attribute of songbirds is that several species are known to return the next breeding season to places where they reproduced successfully, and to move away from those areas where they failed to reproduce. This behavior tends to lead to an increase in densities in the “better” habitats and a decrease in densities in the “poorer” habitats. In this regard, relative densities are a good predictor of habitat quality with densities being highest in the best habitats. These two attributes in combination should make the

songbirds highly responsive to the various types of forest management being done, and changes in their densities will tell us whether the forest management is having a positive, negative, or neutral effect on their local populations. Forests with a mosaic of habitat (e.g. forests where disturbance – either natural or management related – creates structural and compositional complexity) tend to have higher songbird species diversity than a similarly-sized forest lacking disturbance. In addition, disturbances within the forest, as long as they do not remain non-forest permanently, tend to have little or no long-term negative effect on rates of nest predation and cowbird parasitism.

Much of what we know about habitat requirements and habitat use in songbirds comes from observational studies documenting attributes of the forest where songbirds set up their territories. This has led to recommendations to manage forests for songbirds by achieving a particular tree species composition or vegetation structure and complexity, but the actual responses of the songbirds to the management have usually not been measured. There have been some studies that have documented songbird responses to various kinds of silvicultural practices, and it is my hope that the data on songbird responses to different types of forest management (understory removal, thinning, gap creation, etc.) collected at LCFP sites will add valuable and much needed information important to the management effort and to the vast songbird literature.

Table 1. Results of bird surveys completed during the 2019 breeding season at Lake County Forest Preserve sites, Illinois. Species ranked from most to least abundant based on total point counts. Values represent number of individuals seen per point averaged across points within each category. Categories represent different preserves.

		Average Number per 100-m radius point						
		Forest Preserve						
Species code	Species*	Grainger (n=11)	MacArthur (n=28)	Old School (n=7)	Ryerson (n=29)	Wright (n=18)	Wright, Elm Rd (n=13)	Total (n=106)
AMRO	American Robin	1.09	1.04	1.14	1.14	0.83	1.69	1.12
EAWP	Eastern Wood Peewee	1.18	0.96	1.00	0.97	1.44	1.38	1.12
BLJA	Blue Jay	1.27	0.79	1.43	1.00	1.22	1.54	1.10
INBU	Indigo Bunting	1.82	0.39	0.14	1.21	1.39	0.92	0.98
RWBL	Red-winged Blackbird	1.18	0.39	0.29	1.59	0.17	1.46	0.89
COYE	Common Yellowthroat	1.00	0.29	0.43	1.00	0.50	0.54	0.63
NOCA	Northern Cardinal	0.09	0.93	0.29	0.62	0.22	0.77	0.58
BHCO	Brown-headed Cowbird	0.55	0.32	0.57	0.55	0.89	0.54	0.55
RBWO	Red-bellied Woodpecker	0.27	0.43	0.29	0.76	0.44	0.69	0.53
SOSP	Song Sparrow	0.91	0.00	0.14	0.38	0.50	0.77	0.39
WBNU	White-breasted Nuthatch	0.45	0.04	0.14	0.52	0.61	0.15	0.33
BCCH	Black-capped Chickadee	0.27	0.21	0.29	0.17	0.33	0.46	0.26
REVI	Red-eyed Vireo	0.45	0.04	0.00	0.38	0.61	0.00	0.26
NOFL	***Northern Flicker***	0.36	0.21	0.29	0.21	0.33	0.15	0.25
BGGN	Blue-gray Gnatcatcher	0.18	0.18	0.00	0.28	0.33	0.23	0.23
DOWO	Downy Woodpecker	0.09	0.11	0.00	0.52	0.11	0.08	0.21
GCFL	Great Crested Flycatcher	0.00	0.14	0.00	0.14	0.39	0.54	0.21
HOWA	Hooded Warbler	0.27	0.00	0.00	0.31	0.39	0.23	0.21
BAOR	Baltimore Oriole	0.09	0.07	0.00	0.41	0.06	0.23	0.18
RHWO	***Red-headed Woodpecker***	0.27	0.00	0.00	0.34	0.33	0.00	0.18
SCTA	Scarlet Tanager	0.55	0.00	0.00	0.10	0.44	0.15	0.18
HAWO	Hairy Woodpecker	0.18	0.29	0.00	0.17	0.11	0.08	0.17
EATO	Eastern Towhee	0.36	0.00	0.14	0.31	0.11	0.00	0.15
HOWR	House Wren	0.00	0.18	0.14	0.14	0.22	0.15	0.15
AMCR	American Crow	0.00	0.18	0.00	0.00	0.00	0.77	0.14
RTHA	Red-tailed Hawk	0.64	0.00	0.00	0.03	0.17	0.31	0.14
EABL	Eastern Bluebird	0.00	0.00	0.00	0.14	0.28	0.08	0.09
OVEN	***Ovenbird***	0.00	0.00	0.00	0.21	0.00	0.23	0.08
RBGR	Rose-breasted Grosbeak	0.00	0.18	0.14	0.07	0.00	0.08	0.08
AMGO	American Goldfinch	0.09	0.00	0.00	0.07	0.17	0.08	0.07
CANG	Canada Goose	0.00	0.25	0.00	0.00	0.00	0.00	0.07
WOTH	***Wood Thrush***	0.00	0.07	0.29	0.03	0.00	0.08	0.06
CEDW	Cedar Waxwing	0.00	0.00	0.00	0.17	0.00	0.00	0.05
GRCA	Gray Catbird	0.00	0.00	0.00	0.10	0.06	0.08	0.05
PIWO	Pileated Woodpecker	0.00	0.00	0.14	0.14	0.00	0.00	0.05
COGR	Common Grackle	0.36	0.00	0.00	0.00	0.00	0.00	0.04
FISP	***Field Sparrow***	0.09	0.07	0.00	0.00	0.06	0.00	0.04
RTHU	Ruby-throated Hummingbird	0.00	0.00	0.00	0.03	0.06	0.08	0.03
YEWA	Yellow Warbler	0.00	0.04	0.14	0.00	0.06	0.00	0.03
CSWA	Chestnut-sided Warbler	0.09	0.00	0.00	0.00	0.00	0.08	0.02
MODO	Mourning Dove	0.00	0.00	0.14	0.00	0.00	0.08	0.02
CHSP	***Chipping Sparrow***	0.00	0.00	0.00	0.03	0.00	0.00	0.01
CHSW	***Chimney Swift***	0.00	0.00	0.00	0.00	0.00	0.08	0.01
COHA	Cooper's Hawk	0.00	0.00	0.00	0.03	0.00	0.00	0.01
DICK	Dickcissel	0.00	0.04	0.00	0.00	0.00	0.00	0.01
EAPH	Eastern Phoebe	0.00	0.00	0.00	0.03	0.00	0.00	0.01
TUTI	Tufted Titmouse	0.00	0.00	0.00	0.03	0.00	0.00	0.01
YTVI	Yellow-throated Vireo	0.00	0.04	0.00	0.00	0.00	0.00	0.01
YTWA	Yellow-throated Warbler	0.00	0.04	0.00	0.00	0.00	0.00	0.01

* Species on the Illinois' Species in Greatest Need of Conservation (SGNC) list are given in bold and italics.

Table 2. Results of bird surveys completed during the 2019 breeding season at Lake County Forest Preserve sites, Illinois. Species ranked from most to least abundant based on total point counts. Values represent number of individuals seen per point averaged across points within each category. Categories represent different types of forest management.

		Average Number per 100-m radius point							
		Management***							
Species code*	Species**	A (n=9)	B (n=12)	C (n=13)	D (n=9)	E (n=8)	F (n=7)	None (n=23)	Total (n=106)
AMRO (+ -)	American Robin	0.67	0.92	0.77	1.56	1.13	1.57	1.04	1.12
EAWP (+)	Eastern Wood Peewee	1.67	1.08	1.31	1.22	1.13	1.29	1.09	1.12
BLJA (+ -)	Blue Jay	1.89	0.58	0.85	0.89	1.25	1.00	1.26	1.10
INBU (+)	Indigo Bunting	1.33	1.42	0.92	1.33	0.75	0.71	0.70	0.98
RWBL (+)	Red-winged Blackbird	1.00	1.08	0.23	1.89	1.88	1.71	0.43	0.89
COYE (+)	Common Yellowthroat	1.44	0.67	0.54	0.44	0.50	0.43	0.26	0.63
NOCA (+ -)	Northern Cardinal	0.33	0.25	0.85	0.44	0.88	0.86	0.74	0.58
BHCO (+ -)	Brown-headed Cowbird	0.67	0.83	0.69	0.22	0.38	0.29	0.57	0.55
RBWO (+ -)	Red-bellied Woodpecker	0.44	0.25	0.69	0.67	0.63	0.86	0.48	0.53
SOSP (+)	Song Sparrow	0.89	0.50	0.23	0.44	0.50	0.43	0.17	0.39
WBNU (+ -)	White-breasted Nuthatch	0.89	0.33	0.23	0.11	0.38	0.14	0.30	0.33
BCCH (-)	Black-capped Chickadee	0.22	0.08	0.15	0.44	0.13	0.14	0.35	0.26
REVI (+ -)	Red-eyed Vireo	0.00	0.33	0.54	0.00	0.13	0.00	0.35	0.26
NOFL (-)	***Northern Flicker***	0.11	0.17	0.23	0.22	0.25	0.00	0.48	0.25
BGGN (+ -)	Blue-gray Gnatcatcher	0.11	0.17	0.08	0.22	0.38	0.00	0.22	0.23
DOWO (+)	Downy Woodpecker	0.33	0.08	0.23	0.44	0.13	0.14	0.00	0.21
GCFL (+)	Great Crested Flycatcher	0.33	0.00	0.38	0.33	0.25	0.14	0.13	0.21
HOWA (+)	Hooded Warbler	0.22	0.25	0.31	0.11	0.13	0.14	0.13	0.21
BAOR (+)	Baltimore Oriole	0.22	0.08	0.08	0.44	0.25	0.14	0.04	0.18
RHWO (+ -)	***Red-headed Woodpecker***	0.56	0.17	0.15	0.00	0.13	0.00	0.13	0.18
SCTA (+ -)	Scarlet Tanager	0.11	0.25	0.23	0.00	0.38	0.14	0.13	0.18
HAWO (+)	Hairy Woodpecker	0.11	0.17	0.08	0.11	0.25	0.43	0.09	0.17
EATO (+)	Eastern Towhee	0.11	0.17	0.00	0.11	0.13	0.29	0.13	0.15
HOWR (+ -)	House Wren	0.33	0.00	0.15	0.00	0.13	0.14	0.17	0.15
AMCR (+)	American Crow	0.00	0.08	0.00	0.11	0.25	0.57	0.04	0.14
RTHA (+ -)	Red-tailed Hawk	0.00	0.25	0.00	0.33	0.13	0.14	0.22	0.14
EABL (+ -)	Eastern Bluebird	0.22	0.00	0.08	0.00	0.25	0.00	0.13	0.09
OVEN (+)	***Ovenbird***	0.11	0.00	0.00	0.22	0.00	0.00	0.00	0.08
RBGR (-)	Rose-breasted Grosbeak	0.11	0.00	0.00	0.00	0.13	0.14	0.17	0.08
AMGO	American Goldfinch	0.44	0.00	0.00	0.22	0.00	0.00	0.00	0.07
CANG	Canada Goose	0.00	0.58	0.00	0.00	0.00	0.00	0.00	0.07
WOTH	***Wood Thrush***	0.11	0.00	0.00	0.00	0.00	0.00	0.13	0.06
CEDW	Cedar Waxwing	0.00	0.00	0.08	0.22	0.00	0.29	0.00	0.05
GRCA	Gray Catbird	0.11	0.00	0.00	0.11	0.13	0.00	0.04	0.05
PIWO	Pileated Woodpecker	0.00	0.00	0.15	0.11	0.00	0.00	0.04	0.05
COGR	Common Grackle	0.00	0.33	0.00	0.00	0.00	0.00	0.00	0.04
FISP	***Field Sparrow***	0.11	0.00	0.00	0.00	0.13	0.00	0.04	0.04
RTHU	Ruby-throated Hummingbird	0.11	0.00	0.00	0.11	0.00	0.00	0.00	0.03
YEWA	Yellow Warbler	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.03
CSWA	Chestnut-sided Warbler	0.00	0.08	0.00	0.00	0.13	0.00	0.00	0.02
MODO	Mourning Dove	0.00	0.00	0.00	0.00	0.13	0.00	0.04	0.02
CHSP	***Chipping Sparrow***	0.00	0.00	0.00	0.11	0.00	0.00	0.00	0.01
CHSW	***Chimney Swift***	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.01
COHA	Cooper's Hawk	0.00	0.00	0.00	0.00	0.00	0.14	0.00	0.01
DICK	Dickcissel	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
EAPH	Eastern Phoebe	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01
TUTI	Tufted Titmouse	0.11	0.00	0.00	0.00	0.00	0.00	0.00	0.01
YTVI	Yellow-throated Vireo	0.00	0.00	0.00	0.00	0.00	0.00	0.04	0.01
YTWA	Yellow-throated Warbler	0.00	0.00	0.00	0.00	0.13	0.00	0.00	0.01

* (+) = positive, (-) = negative, and (+ -) = mixed response to forest management

** Species on the Illinois' Species in Greatest Need of Conservation (SGNC) list are given in bold and italics.

*** A= 2013-2016 understory only

B= 2015-2018 small buckthorn removal

C= 2014-2015 understory + canopy gaps

D= 2013-2014 understory + light thinning; 2016-2018 phaseIII canopy thinning and small buckthorn removal

E= 2013-2014 understory + moderate thinning; 2016-2018 phaseIII canopy thinning and small buckthorn removal

F= 2013-2014 understory + heavy thinning; 2016-2018 phaseIII canopy thinning and small buckthorn removal

None= no management during 2013 to present

Total= all points surveyed

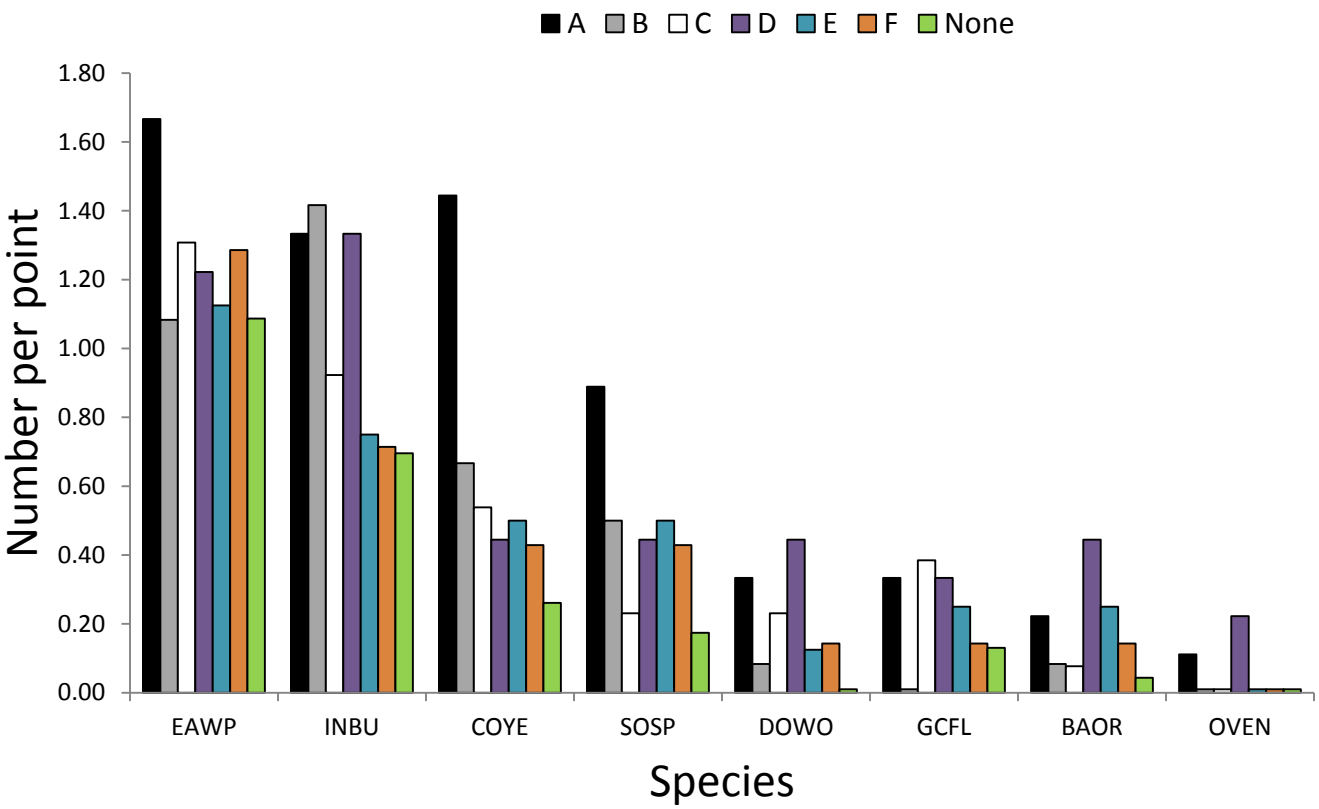

Figure 1. Relative abundance (average number of individuals observed per 100-m-radius survey point) of various bird species at **Lake County Forest Preserve Sites** during the 2019 breeding season showing **positive** responses to different types of forest management. Species codes and types of management (A-F and None) defined in Table 2.

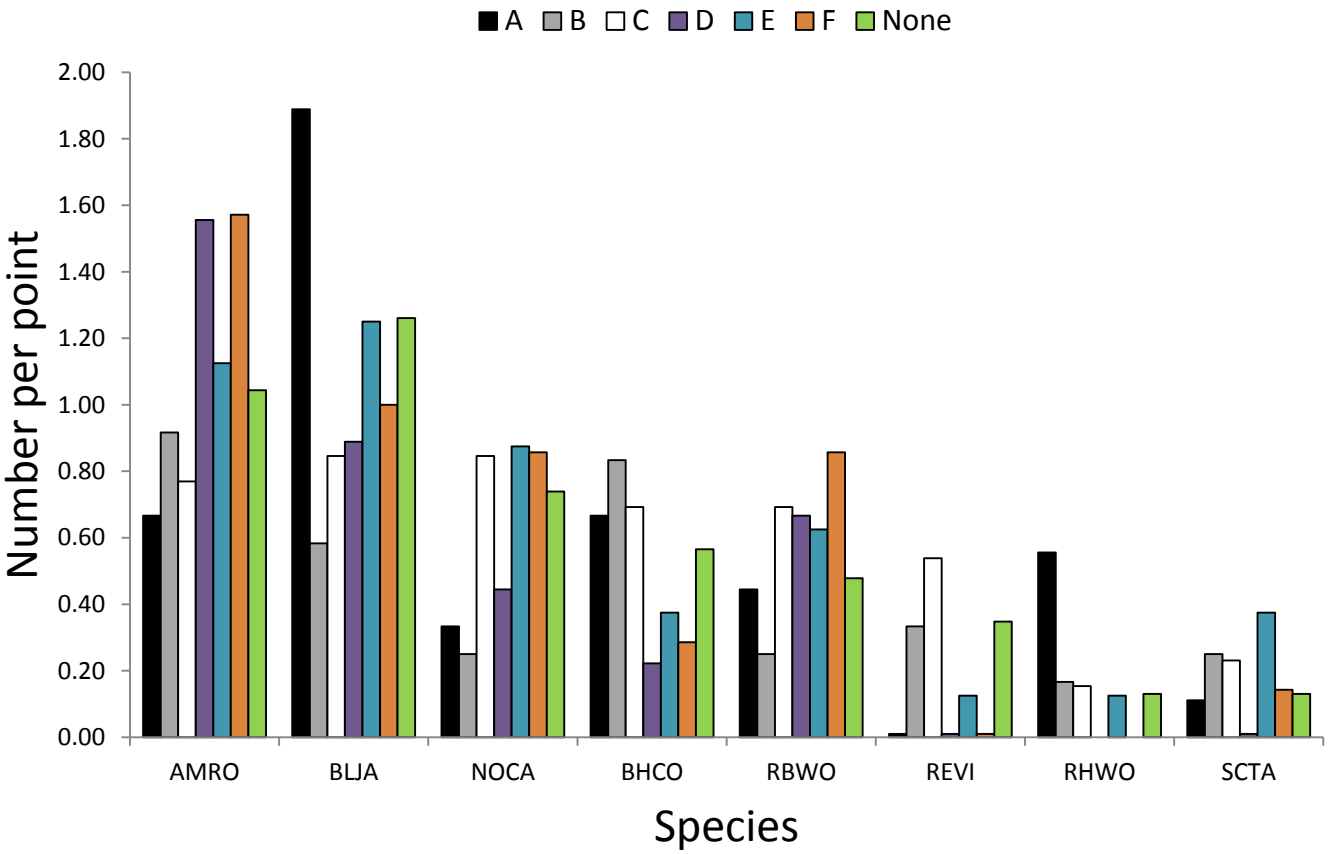

Figure 2. Relative abundance (average number of individuals observed per 100-m-radius survey point) of various bird species at **Lake County Forest Preserve Sites** during the 2019 breeding season showing **mixed** responses to different types of forest management. Species codes and types of management (A-F and None) defined in Table 2.

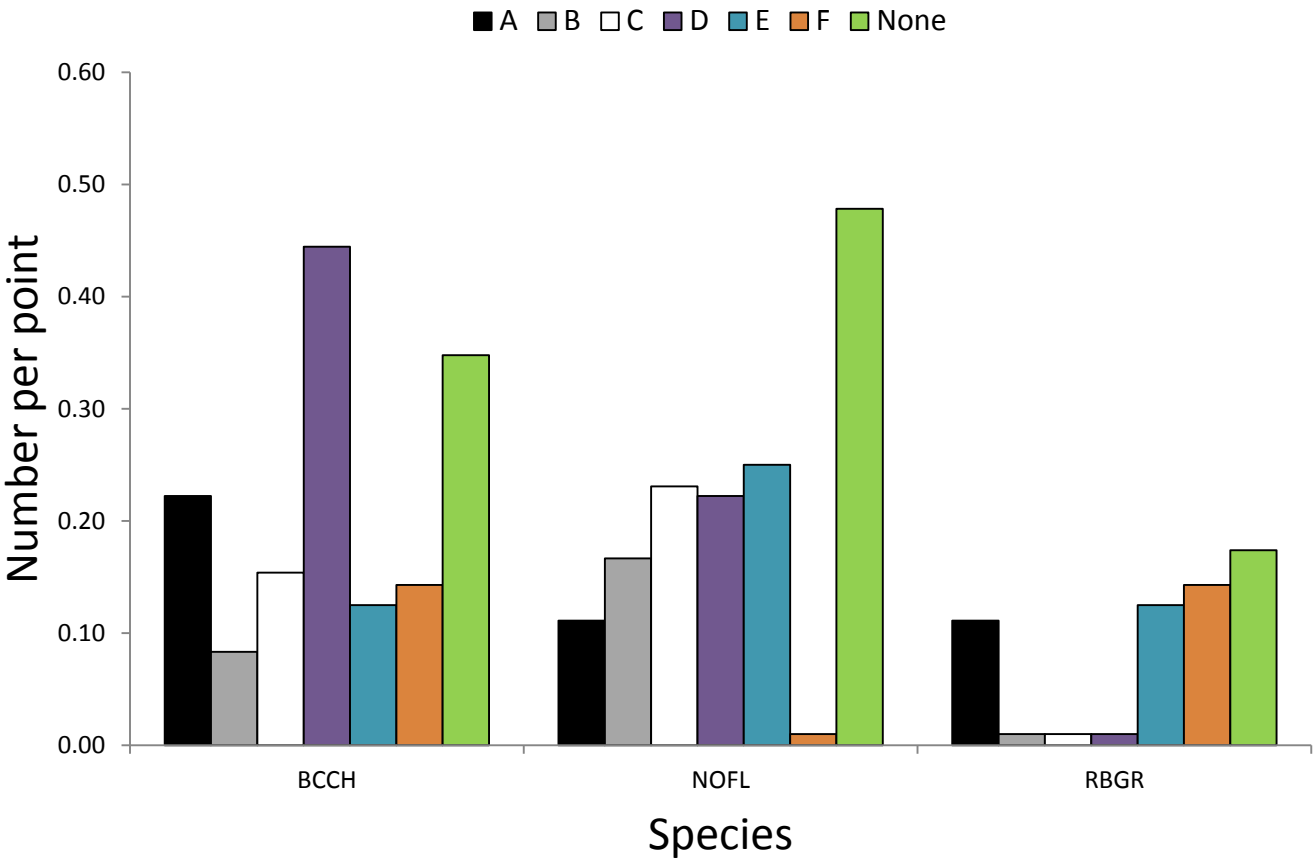

Figure 3. Relative abundance (average number of individuals observed per 100-m-radius survey point) of various bird species at **Lake County Forest Preserve Sites** during the 2019 breeding season showing **negative** responses to different types of forest management. Species codes and types of management (A-F and None) defined in Table 2.