Brown-headed Cowbird Management Plan

St. Catherine Creek National Wildlife Refuge

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Life history and habitat requirements

Brown-headed Cowbirds (*Molothrus ater*) , hereinafter BHCOs, are generalist species that have caused concern across management areas due to parasitizing other birds' nests along wooded edges (Wiens 1963). BHCO brood parasitism has been found to affect over 200 host species (Davies 2000). They can remove eggs from host nests, reduce the size of host clutches, destroy entire host broods, and/or cause the host female to raise the BHCO young instead of its own due to the generally larger body size of the BHCO young in comparison to the host's young (Smith et al. 2002). These parasitic birds scan for host nests by perching along forest edges. The probability of brood parasitism decreases as distance from the wooded edge increases (Wiens 1963).

Species that are threatened by BHCO parasitism should be evaluated before any management plan is enacted. Many species are not affected by BHCO parasitism; for example, Song Sparrow (*Melospiza melodia*) broods often fledge before BHCOs begin to reproduce. As a result, they can successfully raise their own young and completely avoid parasitism (Nice 1937, Smith 1981, Smith and Arcese 1994). Most acceptor BHCO hosts are smaller and have longer incubation periods than do rejecter hosts (Rothstein 1975; Davies 2000). Lind found that the White-eyed Vireo and Indigo Bunting have significantly higher parasitism rates on edge plots than interior plots (1998). The BHCO breeding season is limited to the temperate spring and summer seasons in North America (Lowther 1993). Female BHCOs also maintain largely exclusive breeding territories that encompass the nesting territories of several hosts (Darley 1983; Hahn et. al 1999).

For sustenance, BHCOs can travel long distances to grasslands which provides access to arthropods and allows them to forage for other forms of food (Patten et. al 2006). Often large

agricultural fields can be prime foraging areas, but BHCOs may still persist even if a smaller grassland area is available (Mayfield 1965). At St. Catherine Creek NWR, many areas are blanketed along its east boundary by mixed land, including crops and pasture, which may add to the problem of providing foraging areas for BHCOs. Lind states that the negative effects of edge habitat compared to interior habitat may be regulated at a larger scale (over 300 m) by the amount of forested area in a landscape and also that parasitism rates may depend more upon landscape scale factors rather than smaller scale factors like distance to edge (1998). On a smaller scale, the intensity of the effect of edge may depend on BHCO abundance because overpopulation of forests would be more of an important factor than edge (Robinson et al. 1995; Hoover et al. 1995). BHCOs may frequent various fragmented areas to forage and thus the landscape scale is important to consider as increasing the distance that they travel may reduce their abundance (Lind 1998). Fragmentation at the landscape scale also affects the abundance of many sensitive forest-interior bird species.

Management objectives

- Determine grassland vegetation height that minimizes BHCO usage while increasing native bird abundance.
- Evaluate grassland vegetation height use by ground-nesting birds (e.g. Northern Bobwhite) and mammals (e.g. rabbits).
- Develop management strategies that minimize BHCO parasitism on the refuge and provide abundant habitat for nesting and production.

Methods

Site Selection – Prior to the initiation of this study, maintenance staff mowed several grassland sites at specific heights (0-6", 6-12", and >12"). The control sites did not receive any mechanical manipulation. In the future, a minimum of two sites for each group (4 classifications of manipulated and non-manipulated sites, [n = 8]) should be selected to conduct transect and observational sampling. Site manipulation should begin prior to April 15 and may need to be conducted every 3-4 weeks to maintain the consistency of site conditions for the duration of the study.

Transect Surveys – Fifteen transects were sampled at previously manipulated and non-manipulated grassland sites (control; Table 1) to evaluate avian use of small (<2 acre) upland grassland habitats located along two roads on the refuge (Pintail Lane and Wildlife Drive). A crew of 2-4 refuge staff members horizontally spaced two meters apart was used to search each 200 m linear transect during the study. Each crew member used a 1-2 m wooden stick to displace the grass in a semi-circle motion while walking along each transect. When an individual bird was spotted, the crew would stop to identify and record the species and nesting status of the bird that was flushed. Other animals such as rabbits also were documented along each transect. In addition to species richness and species abundance, height of grass and time of survey were also recorded at each transect. The center of each transect was recorded using a GPS device (UTM coordinates, NAD 83, Zone 15) along each 200 m long by 6.5 m wide transect. Timing of sampling occurred during the first and last week of June 2009.

Future sampling should coincide with the arrival of migratory songbirds (i.e., April 15) and continue once every 15 days until most ground nesting birds have finished nesting (i.e., July 15). Statistical analyses should be made between manipulated and non-manipulated sites for species richness, abundance, and time interval (e.g., 15 day intervals) using fixed-effects analysis

of variance. Also, the number of transects sampled across manipulated and non-manipulated sites should be equal for the duration of the study. At minimum, staff should sample two transects for each manipulated or non-manipulated site for each time interval (n = 8).

Observational Road-side Surveys – Six designated sites were chosen to monitor avian use of manipulated and non-manipulated sites along Wildlife Drive and Pintail Lane on the refuge. At each site, observers recorded grass height, species richness, and species abundance during a 5 minute interval. During 2009, observations were collected in mid-morning from June 3, 2009 until June 17, 2009.

Future sampling should include an equal number of observations at sunrise, mid-day, and at sunset. Additionally, future observations should occur at eight designated sites that represent manipulate sites (0-6" [n = 2], 6-12" [n = 2], and >12" [n = 2]) and non-manipulated sites (control [n = 2]). Similar to line transect sampling, road-side observational surveys should begin with the arrival of migratory songbirds and continue through July 15. Observations may need to be conducted frequently to ensure that an appropriate number of samples are recorded for statistical comparisons. Statistical analyses among sites should be compared between species, time intervals (e.g., 10 or 15 day intervals), and between time of day sampled using fixed-effects analysis of variance tests.

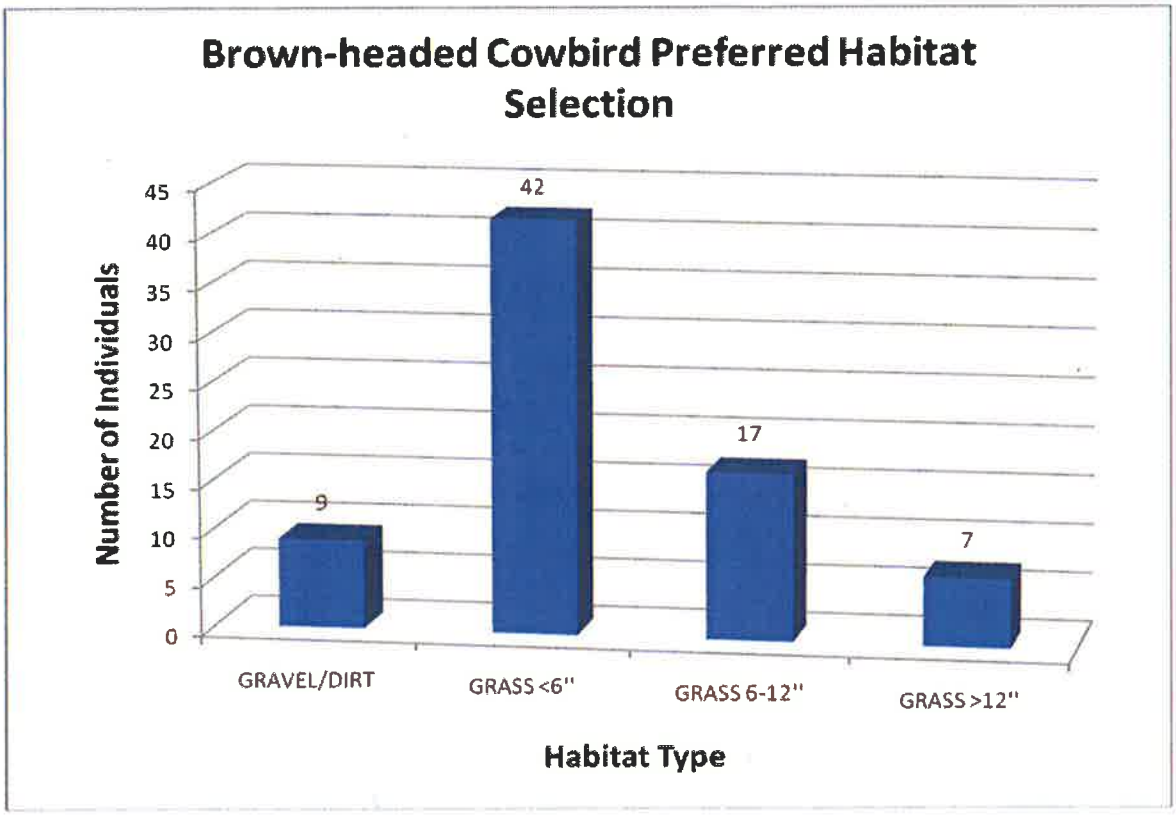
Table 1: Location and description of survey sites.

Site Name	UTM coordinates	Description	Average Grass Height (on June 2, 2009)
T1	650504/3470897	Near entrance to refuge;	12 inches
T2	650517/3470898	Near entrance to refuge;	12 inches
T3	650450/3470678	1st house on right; forested	
T4	650350/3470595	1st house on right	
T5	650336/3470429	Deer check station; length: 200 yards, width: 20-30 feet	12 inches
T6	650413/3470340	Roadside near deer check station	
T7	650231/3470175	2nd house on right	+12 inches
T8	650279/3469924	Headquarters	0-6 inches
T9	650196/3469472	Down hill from office ~.25 mile; both road sides (left forested, right grassy).	6-12 inches
T10	649950/3469259	Field across from shop	12 inches
T11	649914/3468853	Magnolia Trailhead; both trail sides.	0-6 inches
T12	649824/3469246	Shop field	+12 inches
T13	649925/3469391	Field near kid's pond	0-6 inches (near road) to +12 inches
T14	649642/3470104	Wildlife and Swamp roads intersection	0-6 inches (near road) to +12 inches
T15	649026/3471071	Wildlife drive	

Results

A total of 42 BHCOs (56%) were located in grass less than 6" tall (Figure 1) and seventeen BHCOs were seen in the 6" to 12" grass height range. In addition, 9 were found on the gravel/road and seven were found in grass greater than 12". The method of using 2 inch diameter sticks to flush out mammals or birds in the grass was ineffective and no animals were seen.

Figure 1



Total Observed: 75

Management recommendations

There are four general recommendations for the management of the BHCO on St. Catherine Creek NWR. Each may be affected by budget, staff availability, other management plans, or time of year.

First, an overall recommendation to reduce a BHCO population would be to increase forest cover (Robinson and Smith 2000) where open grassland areas exist and are not being used

as refuge facilities, public use, or for priority management activities. Because BHCOs rarely occur near contiguous forests, increasing cover may need to be a priority for reducing BHCO abundance. For example, planting willow trees may be beneficial because it creates or enhances microhabitat conditions for susceptible passerine hosts (Sharp and Kus 2006). Planting other hardwood tree species may be beneficial to nesting birds since willow trees are already abundant on St. Catherine Creek. Decreasing the amount of fragmentation should also be considered to increase the amount of contiguous forest and the diversity of forest-interior bird species (Fuller 1998). Maintaining larger areas of 0.5-1.0+ acre areas of dense perennial and short woody vegetation may benefit nesting buntings and thrush as well as habitat for wintering woodcock.

Second, in areas where adding forest cover is not an option, grassland birds could be helped by removing [low growing] woody vegetation along roads (Patten et. al 2006). This could help to discourage BHCO abundance in a given area by reducing the number of perching sites and number of potential nest predators (Patten et. al 2006). However, the American Woodcock (*Scolopax minor*) may benefit from large dense vegetation if wintering nests are concealed well. Wiens (1963) found higher frequencies of parasitism in a study area defined by several years of growth of low, brushy vegetation. Local densities of BHCOs in grassland habitats can be reduced by removing this brush. However, this reduction may cause problems for other nesting birds like the Indigo Bunting, Painted Bunting, Wood Thursh, and American Woodcock which use this habitat type. Managers can decrease the amount of suitable BHCO habitat with the removal of woody brush thickets and by planting more seeded grassland, which has been found to have the lowest frequency of parasitism but also likely the lowest nesting density of all birds (Wiens 1963; Johnson and Temple 1990).

Mowing is the third option, which is common at St. Catherine Creek National Wildlife Refuge to maintain road access and reduce the spread of invasive species (i.e. Johnson grass). Reducing the amount of short grass that BHCOs require for foraging may reduce their numbers. Any BHCO management plan enacted on the refuge may need to incorporate a minimal amount of mowing. As shown in Figure 1, 56% of BHCOs on the study site used grass that was less than 6" tall and nearly 80% were seen in grass < 12" tall. In effect, mowing should be kept at greater than 12" to minimize the amount of habitat preferred by BHCO. However, this could reduce the abundance of native bird species. Delaying mowing in areas where deer fawn are resting in the grass (early July to September 15) and after nearly all forest breeding birds have finished nesting may provide enough time for grass to grow to appropriate levels. Nonetheless, additional research is necessary over a longer duration of time (e.g. March 1 to July 1) to determine BHCO occupation of grassland vegetation on the refuge, as well as grass height usage of native species. Grassland birds, such as the Northern bobwhite (*Colinus virginianus*) may also benefit from mowing square plots and leaving strips of taller grass and shrub areas perpendicular to roads between each plot, which provides brood-rearing and nesting cover, as well as foraging sites. Mowing should however be use mainly to control invasive plants and woody vegetation (as well as herbicide use where necessary). Fall discing, instead of mowing, of irregular shaped plots may enhance habitat for bobwhite by providing more edge and various cover, as well as potential growth of legumes. Specific sizes of grassland areas and strips will vary depending upon site location and species of interest.

In addition to the preceding recommendations, the final option is that of direct removal if enough personnel are available. Griffith (2000) found that direct BHCO removal by trapping or

shooting nearly always succeeds in increasing the production of host young and sometimes leads to spectacular recovery of host populations.

These options should be conducted before the nesting seasons of affected host species. Tabled below are examples of nesting periods for general species of interest at this refuge. For more information and literature on specific species, refer to the Cornell Lab of Ornithology and American Ornithologists' Union website (Birds of North America Online).

Species	Begin Nesting	End Nesting	Additional Notes
Swainson's Warbler	mid- May	Mid-July	
Prothonotary Warbler	mid- to late April in TN and VA	Late June	Nestlings hatch early in May in the south and 2nd broods occur regularly.
Pine Warbler	mid –to late March in southern and central states, but are also recorded sporadically into late June	Late July	one of the earliest nesting N. Am. wood warblers
Common Yellowthroat	AL- approximately between April 26–July 6	Early August	
Hooded Warbler	SC range from May 1-July 15	Early August	first egg dates for second broods range from June 21 to July 19
Kentucky Warblers	VA lay eggs between May16–July 1	Early August	Later attempts at 1st nesting are not known to be successful. If nests are destroyed, females may attempt to re-nest up to 4 times through mid-July in northern VA. Peak hatching is mid-to late June but few pairs raise 2 broods. A second nesting attempt may be initiated about 10 days after the first brood leaves the nest.
Yellow-breasted Chat	AL –May 6–July 3 AR- May 14–July 15	Early August	A later brood may arise after young have left the first nest or following nest depredation.

Painted Bunting	TX from April 27-August 19 and from March 28–July 26. In GA, have been found to lay eggs from April 7-July 20.	Early August	no seasonal difference in the distribution of egg-laying between eastern and western populations. *recommend earlier removal of BHCO because this priority species nests in dense edge cover
Acadian Flycatcher	First eggs in AR between May 17and May 19. Dates for initiation for second and replacement clutches for AR sites are from mid-June to late July	Late August	If first nest fails, ACFL usually re-nests several times. There are several instances of pairs attempting 5 nests in 1 breeding season.

Future Considerations

- Additional evaluation during consecutive years and nesting seasons would provide additional insight into our findings.
- Researchers may want to evaluate patch size of grassland vegetation, abundance of BHCO relative to forest edge, and the distance of BHCO sightings to roads and forested edges.
- Manipulations of grassland vegetation plots should be maintained at consistent levels throughout the sampling period (1 March-15 July).
- Habitat sampling may be necessary to determine BHCO use of plant species and alternatively usage of plant species by desired passerine species.

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