

COWBIRD CONTROL: MANAGEMENT ISSUES, CONTROVERSIES AND PERCEPTIONS, AND THE FUTURE

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Abstract: Brood-parasitic brown-headed cowbirds (*Molothrus ater*) have been implicated as a cause of songbird population declines. Cowbirds can have particularly severe negative impacts on already endangered hosts. Removal of cowbirds by trapping has become a popular management action to benefit hosts. Cowbird trapping often decreases parasitism frequency and can help to increase the reproductive success of hosts. However, its role in the recovery of host populations is equivocal. Based on our experience at Fort Hood Military Reservation, Texas, the site of a long-term, landscape-scale trapping program, we discuss factors that we believe are important for the success of a trapping program (e.g., timing of trapping). Although cowbird removal is generally accepted as a songbird conservation tool, its use is not without controversy. So, we also review some of the economic, ethical, legal, and scientific issues associated with cowbird trapping. Ultimately, our continued ability to remove cowbirds as a tool for songbird conservation may depend on the resolution of these controversies. Although cowbird removal may not be a viable long-term solution to songbird population declines in of itself, it can be an integral part of integrated songbird management strategies.

Key words: brown-headed cowbird, cowbird management, endangered species, ethics, *Molothrus ater*, shooting, trapping

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INTRODUCTION

Brown-headed cowbirds (*Molothrus ater*) (hereafter cowbirds) are native, migratory songbirds found throughout most of North America (Lowther 1993). Because of their generalist (> 150 host species) brood-parasitic breeding behavior (Lowther 1993), cowbirds can have significant negative impacts on their hosts' reproductive success (Eckrich et al. 1999, Kus and Whitfield 2005). Declines in songbird populations have been attributed in part to parasitism by cowbirds (Brittingham and Temple 1983, Robbins et al. 1989). Parasitism by cowbirds has been acknowledged as a contributing factor to the

endangered status of songbirds including the Kirtland's warbler (*Dendroica kirtlandii*; DeCapita 2000), southwestern willow flycatcher (*Empidonax traillii extimus*; Kus and Whitfield 2005), least Bells' vireo (*Vireo bellii pusillus*; Kus and Whitfield 2005), and black-capped vireo (*Vireo atricapilla*; Eckrich et al. 1999).

Because of the "damage" they inflict on songbirds, particularly endangered songbirds, the cowbird has received a lot of management attention (Rothstein and Peer 2005). Much of this attention has focused on the lethal removal of cowbirds (Morrison et al. 1999, Smith et al. 2000, Ortega et al. 2005a).

We have 3 objectives. First, we provide recommendations on how cowbird trapping efforts and cowbird management efforts in general might be improved. These recommendations are based largely on our experiences at Fort Hood Military Reservation in Texas, the site of a long-term, landscape-scale cowbird trapping program (Eckrich et al. 1999, Hayden et al. 2000, Kostecke et al. 2005). We also discuss alternatives to trapping. Second, we discuss some of the issues and perceptions of cowbird control that have made it a controversial management action. Third, we briefly comment on the future of cowbird control.

MANAGEMENT ISSUES

Trapping

The deployment of decoy traps is the most widely used method of cowbird removal (DeCapita 2000, Griffith and Griffith 2000, Whitfield 2000, Kostecke et al. 2005). Although alternatives exist, trapping is often emphasized as the primary means of controlling cowbirds (Eckrich et al. 1999, Siegle and Ahlers 2004). The emphasis on trapping is due in part to its proven effectiveness in reducing parasitism by cowbirds and increasing the reproductive success of some host species (Smith et al. 2002, Kostecke et al. 2005, Kus and Whitfield 2005). Arguably, the emphasis on trapping is also due to its relative ease of application compared to the alternatives, regardless of whether it is the most applicable or effective management option for a given situation (Ortega et al. 2005c). Despite criticisms of trapping (Rothstein 2004, Ortega et al. 2005c, Rothstein and Peer 2005), we expect that trapping will continue to be the most popular means of controlling cowbirds. If so, how might trapping efforts be improved? We provide several suggestions.

We believe that timing is critical to the success of trapping efforts. Siegle and Ahlers (2004) provide recommendations for the timing of trapping efforts. However, their recommendations may not hold for all situations (Summers et al. 2006a). Generally, captures of cowbirds decrease as the breeding season progresses (DeCapita 2000, Summers et al. 2006a). This decrease is related to factors such as the passing of migrant cowbirds and changes in cowbird behavior. Thus, an early start may be essential for removing a sufficient number of locally breeding cowbirds to have an impact on host populations. For example, in central Texas, traps should be opened at the beginning of March (Summers et al. 2006a). The Fort Hood Project supplies decoy cowbirds to various agencies and individuals that deploy traps. In our experience, it is not unusual to receive requests for decoys throughout March and April, and sometimes even in May (Summers, personal observation). Trappers that open their traps later in the breeding season are potentially minimizing the positive effect that they could be having on local hosts. Further, trapping efforts should probably be discontinued later in the breeding season when traps capture few cowbirds and non-target hazards increase (e.g., May and June in central Texas; Summers et al. 2006a).

Trap placement can also be critical to the success of a trapping program. Cowbirds are territorial on their breeding grounds; whereas, they are gregarious on their foraging grounds (Lowther 1993). Thus, decoy traps are likely to be more effective, in the sense of capturing more birds, when placed on cowbirds' communal foraging grounds (Eckrich et al. 1999). However, the majority of captures on the foraging grounds may be of cowbirds, such as migrants heading further north, which do not threaten local hosts (Summers et al. 2006a). It is important to note, though, that

a substantial number of locally breeding cowbirds may be captured, too (Summers et al. 2006a). Thus, it is often suggested that traps be placed in host breeding habitat (Siegle and Ahlers 2004). Such placement of traps limits the capture of non-target cowbirds, those cowbirds that are not parasitizing the local hosts that are of management concern, and may almost exclusively capture cowbirds that are parasitizing local hosts. However, placement of traps within host breeding habitat may also reduce cowbird captures (Eckrich et al. 1999). Managers need to consider the trade-offs between placing traps within host breeding habitat and within cowbird foraging habitat in terms of effectiveness and non-target captures. Ultimately, landscape configuration may influence where traps are set. For host species that utilize linear habitats (i.e., riparian areas; Griffith and Griffith 2000, Kus and Whitfield 2005), placement of traps within cowbird foraging areas may draw in non-target cowbirds from adjacent areas. In contrast, when cowbird foraging habitats are surrounded by host habitat, like on Fort Hood (The Nature Conservancy, unpublished data), placing traps within cowbird foraging areas may be a reasonable strategy.

Scale and consistency of trapping programs are also likely to be important. Success of cowbird trapping at Fort Hood can largely be attributed to an aggressive, long-term, landscape-level trapping program (Eckrich et al. 1999, Hayden et al. 2000, Kostecke et al. 2005). An annual average of 31 traps has been deployed at Fort Hood since 1988 (Kostecke et al. 2005). The Fort Hood trapping program has also been supplemented with shooting of cowbirds that exhibit breeding behavior within the breeding habitat of endangered hosts, as well as a temporary reduction in cattle stocking rate (Kostecke et al. 2005). The

benefits of less aggressive, shorter-term, and smaller scale trapping programs to host populations are unclear (Rothstein et al. 2003). For example, private landowners operate cowbird traps in many counties in Texas as part of a program sponsored by Texas Parks and Wildlife (2007). However, in 23 of the 43 counties with participating landowners in 2006, only 1 or 2 traps were active (Fortenberry 2006). Further, the number of traps operated within a county is not consistent among years (Texas Parks and Wildlife 2005, Fortenberry 2006). Although well-intentioned, we doubt that such limited and inconsistent efforts will have significant population-level effects on songbirds.

Alternatives to Trapping

Because trapping is controversial (Ortega et al. 2005c) and not always effective (e.g., southwestern willow flycatcher; Kus and Whitfield 2005), alternatives should at least be considered. Some alternatives, such as the addition of artificial or real but inviable cowbird eggs to host nests (Ortega et al. 1994) or removal of cowbird eggs and nestlings from host nests (Morrison and Averill-Murray 2002), although effective, are impractical to apply at scale. Other alternatives, such as shooting, are typically considered only when the use of traps is unfeasible (Winter and McKelvey 1999, Summers et al. 2006b). When used, these alternatives are generally considered to be supplemental to trapping efforts (Eckrich et al. 1999, Siegle and Ahlers 2004). However, few comparative assessments of costs, benefits, and efficacy exist for cowbird management techniques (Summers et al. 2006a). This begs the question of whether trapping is truly the best and most preferable means of cowbird management in many situations. Perhaps, as some critics have suggested, it is just the most culturally and politically expedient

means of cowbird management (Rothstein 2004, Ortega et al. 2005c).

For example, there is evidence that shooting alone can dramatically lower parasitism frequency (Stutchbury 1997, Kostecke et al. 2005, Summers et al. 2006b). Because shooting is a selective removal technique that only removes the problem cowbirds (i.e., those that exhibit breeding behavior within host habitat), non-target hazards are negligible (Summers et al. 2006a). In contrast, the capture of non-targets (species other than cowbirds, as well as cowbirds that are not local or regional breeders) is a constant concern when traps are used (Rothstein 2004, Rothstein and Peer 2005). The monetary cost of shooting is also generally comparable to trapping or less (Summers et al. 2006a). Yet, despite these positive characteristics, shooting is rarely implemented as a primary means of controlling cowbirds. Perhaps, reluctance to utilize shooting is related to vaguely stated safety concerns (Siegle and Ahlers 2004). Granted, unlike trapping, shooting can not be applied in some settings (e.g., within city limits). However, such a limitation does not apply to most of the lands where cowbird management has been practiced; relatively large tracts of public land (DeCapita 2000, Whitfield 2000, Kostecke et al. 2005). Assumedly because of safety issues, it has been recommended that shooting be conducted only by trained wildlife professionals (Summers et al. 2006b). In contrast, safety concerns are generally not associated with trapping. Further, it seems to be acceptable for volunteers from the general public to trap cowbirds (Texas Parks and Wildlife Department 2007). Thus, in many situations, it may be more economically and politically palatable to trap, rather than to use a limited number of time-stressed wildlife professionals to shoot cowbirds.

Habitat and Land-use

Ultimately, problems with cowbirds are a symptom of anthropogenic changes to the landscape (Rothstein 2004). Although it is unrealistic to remove all human influences from a landscape (Siegle and Ahlers 2004), we can mitigate them to a certain extent. Whenever possible, large contiguous patches of host breeding habitat should be maintained (Morgan et al. 2006). Features that attract cowbirds (e.g., livestock; Goguen and Mathews 1999) or facilitate their movement into host habitat (e.g., road and utility corridors, perches; Gates and Evans 1998) can be reduced or removed. Because incidence of parasitism is often related to the degree of nest concealment (Saunders et al. 2002, Sharp and Kus 2006), habitat management practices that create the appropriate cover can be implemented. However, there is at least a perceived reluctance on the part of agencies to consider habitat management or changes in land use that might be difficult or politically unpopular to implement (Ortega et al. 2005a). Livestock removals are a prime example, which we will discuss in more detail.

Cowbirds often forage in association with livestock (Morris and Thompson 1998, Goguen and Mathews 1999). Because of the strong association between cowbirds and livestock, manipulation of livestock grazing patterns can effectively disperse cowbirds, thus reducing the frequency of parasitism (Goguen and Mathews 2000). Unlike trapping, grazing manipulations are non-lethal and do not put non-target species at risk. Thus, critics of trapping often suggest grazing manipulations as a solution to the cowbird problem (Ortega et al. 2005c, Rothstein and Peer 2005). Unfortunately, the term "livestock removal", which is often used in the literature (Goguen and Mathews 1999), could be interpreted as anti-grazing, as well as a seemingly permanent action. In

reality, most calls to remove livestock do not require permanent removal of grazing, only during the songbird breeding season, and could possibly be applied within established rotational grazing systems (Goguen and Mathews 2001, Kostecke et al. 2003). Further, the targets of grazing manipulations should only be landscapes that contain habitat critical to host breeding populations (Goguen and Mathews 2001). Withdrawal of livestock should be a selective, not a blanket, management action. Particularly in the case of maintaining critical populations of endangered songbirds, we believe that greater consideration of grazing manipulations is needed. If we are truly concerned about declines in songbirds caused in greater or lesser degrees by cowbirds, then we should not discard out-of-hand any management action that could help. However, it should also be noted that grazing manipulations will not necessarily work in all landscapes (Goguen and Mathews 2000, Kostecke et al. 2003, Sechrist and Ahlers 2003). Further, there is a cost to moving livestock accrued by ranchers which has not been mentioned in the literature. If manipulation of grazing patterns is to work, managers need to consider providing incentives to ranchers who are willing to participate in such an activity.

CONTROVERSIES AND PERCEPTIONS

Regardless of the apparent benefits to some hosts (Smith et al. 2002, Kostecke et al. 2005, Kus and Whitfield 2005), removal of cowbirds by trapping has been controversial (Schram 1994, Rothstein 2004, Ortega et al. 2005c). Economic, ethical, legal, and practical (e.g., efficacy) arguments have all been made for the reduction or cessation of trapping. We discuss some of these arguments.

Is Removal of Cowbirds Justified?

Cowbird parasitism has been implicated as a factor in songbird population declines (Brittingham and Temple 1983, Robbins et al. 1989). Undeniably, cowbird parasitism has a negative effect on individual hosts (Rothstein and Peer 2005). Compared to non-parasitized nests, parasitized nests often have lower nest survival rates, for example (Payne and Payne 1998, McLaren and Sealy 2000). However, the impact of cowbird parasitism on host populations may be overstated because most studies fail to account for annual reproductive success (Zanette et al. 2007). Many hosts can off-set the negative effects of a parasitism event by multiple nesting attempts over the course of a breeding season (Schmidt and Whelan 1999, Whitehead and Schweitzer 2000). In general, except for a few endangered species (e.g., Kostecke et al. 2005, Kus and Whitfield 2005), there is little evidence that cowbirds are a major limiting factor for most songbird populations (Rothstein and Cook 2000, Smith et al. 2002). Other factors, such as nest predation, typically have greater effects on the annual reproductive success of songbirds (Schmidt and Whelan 1999). Even for endangered hosts, in many instances it is, arguably, habitat that is the most limiting factor (Rothstein et al. 2003, Rothstein and Peer 2005).

However, several academics perceive that cowbird trapping is now presented as a panacea for all that ails songbirds (Ortega et al. 2005c, Rothstein and Peer 2005). Certainly, when parasitism on an endangered species is excessive, cowbird management may be required (e.g., black-capped vireos at Fort Hood, Texas; Eckrich et al. 1999, Hayden et al. 2000). The justification for removing cowbirds in such instances is not really debated, though the duration of the removal programs may

be (Rothstein et al. 2003, Ortega et al. 2005c, Rothstein and Peer 2005). However there is, arguably, justified concern that cowbird trapping may be excessively or inappropriately applied. For example, cowbird trapping has not always benefited targeted host populations (e.g., southwestern willow flycatcher; Kus and Whitfield 2005). Indeed cowbird trapping may sometimes be applied when evidence suggests that other management actions, such as predator control, may be more appropriate (Schmidt and Whelan 1999). Further, even large-scale cowbird removal efforts, may be insufficient to reduce cowbird populations below a threshold that would benefit songbird populations (Citta and Mills 1999). Arguably, if cowbird removal produces little real benefit, then it should not be pursued (Rothstein et al. 2003).

Further, any threat that was posed by cowbirds may currently be reduced. Although their population dynamics are complex, cowbirds are decreasing nationally and in many regions (Rothstein and Peer 2005, Sauer et al. 2005). Indeed, cowbirds are even declining within the breeding ranges of sensitive hosts (e.g., black-capped vireo; Wilkins et al. 2006). In the case of the black-capped vireo's breeding range, the decline in cowbirds is likely related to changes in land-use (e.g., declining numbers of domestic grazers that serve as cowbird attractants; Wilkins et al. 2006). Because there is generally a positive, if not always linear, correlation between the number of cowbirds and a host's risk of parasitism (Thompson et al. 2000), parasitism risks to hosts should now be lower in many areas due to the reduced number of cowbirds. Further, significant recovery of host populations may serve to reduce per capita risk of parasitism (Rothstein et al. 2003). For example, in the case of the black-capped vireo at Fort Hood (Kostecke et al. 2005), there were numerous cowbirds and few

vireos in the late 1980s. Thus, risk of parasitism was high. Currently, there are numerous vireos and few cowbirds. Because of their greater numbers, Fort Hood's vireos may now be able to sustain themselves regardless of whether they are parasitized, and cowbird removal may not be necessary.

Finally, the burden of proof is on managers to provide data to show that the initiation of cowbird removal is reasonably justified. Inevitably, this means that host demography needs to be monitored, which is not necessarily an easy or inexpensive endeavor. Suggested demographic thresholds for the initiation of cowbird removal are provided by Smith (1999). Further, managers should also be able to provide data to show that cowbird removal has helped meet population and recovery goals set for hosts. Even though it is commonly used as a measure of success (e.g., Texas Parks and Wildlife 2007), we agree with Rothstein and Peer (2005) that number of cowbirds removed is not a meaningful surrogate for monitoring host species' responses to cowbird management. Although some would argue that large numbers of captured cowbirds coupled with declining cowbird populations prove that removal programs have been successful (Texas Parks and Wildlife 2007), declines in cowbird populations actually began before the initiation of any of the removal programs and thus can not be attributed to the removal programs (Rothstein and Peer 2005). The bottom-line is that even though a large number of cowbirds may be removed, a host population may still be failing due to other factors (Robinson 1992), thus it is critical to monitor host demographics.

The Potential Costs of Cowbird Removal

Host response to cowbird removal has been assessed in many instances (Griffith and Griffith 2000, Smith et al.

2002, Kus and Whitfield 2005). In contrast, there has been little meaningful assessment of the economics of cowbird removal (Summers et al. 2006a). In particular, there has been no assessment of the cost-effectiveness (short- as well as long-term) of lethal versus non-lethal management strategies. Because relatively large sums of public money can be devoted to cowbird removal (\$1,000,000/year in California; Hall and Rothstein 1999), inevitably questions will arise concerning whether these funds are being appropriately and wisely spent. For example, there is a perception that potential profit incentives exist for individuals and organizations to lobby for cowbird removal, regardless of whether it is actually needed (Hall and Rothstein 1999, Rothstein 2004, Ortega et al. 2005c). In such instances, funds spent on cowbird removal might be better applied to other conservation measures (Rothstein et al. 2003, Rothstein and Peer 2005). Ultimately, managers should be ready to provide both biological and economic justifications for their cowbird removal programs.

There is also a cost associated with cowbird trapping accrued by non-target species. Capture of non-target species is undesirable but unavoidable. In fact, it is technically illegal (Ortega et al. 2005c). Non-target species captured in traps may suffer mortality or breeding failure due to time spent away from nests (Rothstein et al. 2003). To a certain extent, however, we believe the capture of non-targets has been sensationalized (e.g., Rothstein 2004). In our experience at Fort Hood, the majority of non-target captures are of common, hardy, and migrating species (e.g., blackbirds; The Nature Conservancy, unpublished data). Further, the capture of truly sensitive non-target species, such as golden-cheeked warblers (Terpening 1999), are exceptions rather than the rule. Regardless, any non-target capture should be taken seriously.

Trap maintenance protocols should insure that non-target captures are released as soon as possible after their capture (Eckrich et al. 1999, Hayden et al. 2000). Further, placement of traps in cowbird foraging habitat versus host breeding habitat may reduce non-target captures, though there may be other trade-offs (e.g., the capture of non-target cowbirds). Although there are no set guidelines for determining a threshold beyond which non-target captures become unacceptable (managers must determine that threshold for themselves), at Fort Hood we quickly close traps that develop a tendency to capture non-targets, particularly later in the season when non-target trap-mortality is more likely to occur (The Nature Conservancy, unpublished data). Finally, although is not always presented as such (Rothstein 2004), a certain number of non-target captures may be an acceptable cost, especially if endangered host species receive substantial benefit from the removal of cowbirds (Rothstein et al. 2003, Rothstein and Peer 2005).

Finally, there may be some so-called hidden costs to excessive cowbird removal. Our presentation of these costs is necessarily brief, as discussion of and research on them has only recently begun (Rothstein 2004, Peer et al. 2005). For example, cowbird removal may disrupt host-parasite relationships. By removing cowbirds, we may actually be doing hosts a disservice by preventing the expression or evolution of defenses against parasitism (Peer et al. 2005). We may also be selecting for trap-wary cowbirds, which could hinder future cowbird removal efforts when they are needed the most (Rothstein and Peer 2005). For legal (i.e., many permits only allow the removal of certain ages and sexes of cowbirds) and ethical reasons (i.e., to reduce the total number of cowbirds killed), many trapping programs only remove female cowbirds. The ramifications of creating sex-

biased cowbird populations are unknown (Ortega et al. 2005c). Lastly, similar to predator removal, excessive removal of cowbirds may have unanticipated effects on biodiversity and ecosystem function (Rothstein and Peer 2005).

Is Cowbird Trapping Ethically Applied?

Cowbirds elicit strong emotions from academics, managers, and the general public (Schram 1994, Ortega et al. 2005c). Despite a general dislike by many for cowbirds and their breeding behavior, cowbirds are a native, migratory species that is protected by the Migratory Bird Treaty Act (16 USC 703-711; 40 Stat. 755). However, exceptions to this protection are allowed under Federal Depredation Order (DO) § 21.43. Regardless of the legality of removing cowbirds, we believe managers have an ethical duty to carefully weigh the potential costs (e.g., economic, ethical, and public opinion) and benefits (e.g., saving an endangered host from extinction) before initiating cowbird removal. Inevitably, cowbird removal programs will be controversial as there is no shared ethos concerning the removal of cowbirds (Kostecke 2006). For some, mass removal (i.e., removal at feedlots or winter roosts) of cowbirds is justifiable (Grzybowski and Pease 1999, Ortega 2000). For others (e.g., animal-rights activists), the killing of any cowbird is unethical and unjustifiable (Rothstein and Peer 2005). Although it will not convince everyone, adequate data should be gathered and presented to justify the need for cowbird removal in a particular situation (Rothstein and Peer 2005). Further, as discussed in the preceding section, in many instances the benefits of cowbird removal are questionable at best. We venture that if the benefits of cowbird removal program are generally and vaguely stated (e.g., to benefit hosts in general) and unquantifiable, then cowbird removal is likely unethical and

scientifically unjustified in that particular situation. Additionally, we venture that managers have an ethical duty to continually assess their removal programs. Even if justified initially, cowbird removal may not always be needed because the assumptions and conditions under which we apply our management change. For example, because recovery goals have been exceeded for endangered hosts at Fort Hood (Kostecke et al. 2005) and per capita risk of parasitism may now be low (Rothstein et al. 2003), we are now in the process of assessing whether cowbird removal can be reduced or stopped at Fort Hood through demographic modeling efforts and an experimental partial cessation of cowbird removal. However, in general, we agree that there is too little interest in such reassessment efforts (Rothstein et al. 2003, Rothstein and Peer 2005).

Another ethical issue is the care and maintenance of cowbird decoys, and the euthanasia of trapped cowbirds. Cowbird trapping programs will be scrutinized by academics and the general public (Rothstein 2004, Ortega et al. 2005c). Thus, it behooves cowbird trappers to be as professional and humane as possible in the care, handling, trapping, and euthanasia of cowbirds. Accepted, standardized protocols should be followed in all cases (Andrews et al. 1993, Gaunt and Oring 1997, Siegle and Ahlers 2004). In particular, participants in the private landowner trapping program in Texas (Texas Parks and Wildlife 2007) have been singled out as possibly departing from standardized protocols (Rothstein 2004, Ortega et al. 2005c). In such instances, additional training and greater oversight may be needed to insure that standardized protocols are met at all times. Further, it is not a bad idea to go above and beyond these standards when possible. For example, although it is not a mandate, we provide a nutritional supplement to the normal grain diet fed to decoy and trapped cowbirds at

Fort Hood. This supplement, which is relatively inexpensive, increases the survival of cowbirds held in traps (Summers, unpublished data). Provision of this supplement not only shows concern for the condition of cowbirds in traps, which is good for public relations, but also has the practical benefit of reducing the need to replace decoy cowbirds over time. Regardless of their ultimate fate (typically euthanasia), providing cowbirds in traps with the most humane treatment possible is a good idea.

Is Cowbird Trapping Legally Applied?

As previously mentioned, cowbirds are protected by the Migratory Bird Treaty Act. Typically, permits are needed for the take of any migratory bird. However, Federal DO § 21.43 states that cowbirds can be taken without a Federal permit "when found committing or about to commit depredations upon ornamental or shade trees, agricultural crops, livestock, or wildlife, or when concentrated in such numbers and manner as to constitute a health hazard or other nuisance...". A common misperception seems to be that cowbird removal can only be used to benefit endangered hosts. Even though there is little evidence that removal programs benefit populations of more abundant and widespread hosts (Rothstein 2004, Rothstein and Peer 2005), such programs are legal under the DO (though permits would be needed to hold decoy cowbirds in traps). A bigger legal issue is that there have been multiple interpretations of the language used in the DO (Ortega et al. 2005c). In particular, there is inconsistency in the interpretation of "about to commit depredations". Ortega et al. (2005c) suggest that only female cowbirds can be removed under the DO and only during the breeding season because breeding females are the only cowbirds that actually commit acts of

depredation (i.e., nest parasitism) against songbirds. Under this strict interpretation, it is illegal to remove males or juveniles, which are incapable of laying eggs and thus incapable of committing nest parasitism. This interpretation would also rule out removal of cowbirds during the non-breeding season for the purpose of reducing parasitism (though removal during the non-breeding season could be allowable to prevent other types of depredation). In contrast, other interpretations allow for the removal of all cowbirds, regardless of age or sex, as well as the removal of cowbird eggs and nestlings from host nests. Further, there is little consistency in permitting for cowbird removal activities (Ortega et al. 2005c). Even within a regulatory region or state, permitting can be inconsistent. For example, we can not remove male cowbirds at Fort Hood, but the landowner trapping program in Texas can (Fortenberry 2006). Much, if not all, of the legal controversy surrounding cowbird trapping would likely be eliminated if the language of the DO was clarified and national permitting standards were enacted.

Perception

We agree with Ortega et al. (2005c) that "emotional responses can be dangerous in the context of wildlife management". Yet, perceptions of cowbird removal have been shaped to a large extent by emotional responses rather than data. The result has been a polarization of viewpoints (Faaborg 2005, Ortega et al. 2005c). You are either for or against cowbird removal. There is little middle ground. Such polarization prevents a meaningful dialogue between some academics and managers which could serve to advance songbird conservation. In our opinion, a prime example of an emotional response that has damaged the dialogue between academics and managers is the so-called "Texas Tennis Racquet

Incident", which has been reported in both the birding (Rothstein 2004) and scientific (Ortega et al. 2005c) literature.

During the 2002 breeding season, a cowbird trapper in Texas was accused of periodically killing trapped cowbirds by beating them with a tennis racquet (for one account of the incident, see Ortega et al. 2005a). Such behavior is unethical, inhumane, and completely unacceptable. However, trout nets, which can resemble tennis racquets from a distance, are commonly used in Texas as a means of collecting cowbirds and other birds in traps for euthanasia or release. Though the alleged use of the tennis racquet was repeatedly observed, to our knowledge no hard evidence was ever presented to prove that the trapper actually beat cowbirds to death with a tennis racquet. Further, there was only the single eye-witness to the event. It is even our understanding that the incident was investigated and that there was no evidence to indicate that cowbirds were beaten to death with a tennis racquet. Sadly, even though this is a he said-she said type of incident at best, it has been presented in the media (Rothstein 2004) and scientific literature (Ortega et al. 2005) as a factual example of the abuses of cowbird trapping. In our opinion, the continued telling of this story, which presents accusations without apparent definitive proof, as fact can only be viewed as the promotion of an anti-trapping agenda. On the other hand, there have also been suggestions that the administrative and regulatory agencies that initially received this complaint did not take it seriously. If true, more objectivity is needed by all of the parties involved.

THE FUTURE

Cowbird control is controversial and will likely remain controversial. Controversy over cowbird control can be reduced if managers not only provide data

supporting the need for cowbird control in specific instances, but also data that shows that the implementation of cowbird control actually helped to meet specified, measurable recovery goals for host populations. It is imperative that all cowbird control programs be carried out under the highest ethical and professional standards.

Although the removal of cowbirds by trapping is justified and can be effective in some situations, managers also need to realize that it is not appropriate for all situations. Arguably, the use of trapping has been over-emphasized. Therefore, managers need to put more thought into the use of alternative means (lethal and non-lethal) of managing cowbirds. To date, there has been little serious assessment of the short- and long-term tradeoffs between different means of managing cowbirds. Ultimately, we believe that a balanced, integrated pest management (IPM) approach using multiple means of managing cowbirds and their hosts will likely be more effective than the use of trapping by itself. The Fort Hood program is a good example of the successful use of an IPM approach. Removal of cowbirds by trapping and shooting, a limited-duration reduction in the number of cattle, and habitat creation and maintenance have all helped to grow endangered songbird populations at Fort Hood (Kostecke et al. 2005).

Finally, controversy would be further reduced if the DO was clarified so that universal definitions of language such as "about to commit depredations" existed. Such clarity would likely result in greater consistency in permitting for cowbird trapping programs. Hopefully, efforts by the United States Fish and Wildlife Service to create national standards and, thus, consistency for the cowbird trapping permits will continue, though bureaucracy and politics may already have derailed such efforts (Ortega et al. 2005c).

A large amount of information currently exists on how to implement cowbird control, as well as its effects on some hosts (Morrison et al. 1999, Smith et al. 2000, Ortega et al. 2005a). This information has helped to create a strong impetus to apply cowbird control, essentially, in perpetuity, even though it is considered to only be a stop-gap measure by many academics. Despite the wealth of data that already exists for cowbird control, more data are needed as there are still no answers for questions such as can host populations recover to the point that cowbird control is not needed and does cowbird control really need to be applied in perpetuity (Ortega et al. 2005b).

Cowbird control is a complex issue with many ethical and scientific uncertainties. If these uncertainties are to be resolved, then greater, more meaningful (and perhaps more congenial) dialogue between academics and managers will be needed. For example, although *Ornithological Monographs 57* is presented as a meaningful dialogue between academics and managers (Ortega et al. 2005c), key parties involved in the cowbird issue were not present at the symposium upon which it was based (e.g., Texas Parks and Wildlife Department). However, ultimately, it will be public perception of cowbird removal, of its justification, of its ethical application, of its success or failure at meeting specified conservation goals that will determine whether cowbird control will be accepted as a songbird conservation tool in the future. Although there has been some recent effort to inform the public about the complexities of cowbird control (e.g., Rothstein 1994, Kostecke 2006), more such efforts will be needed to dispel long-standing notions of cowbirds as agents of songbird extermination (e.g., Mayfield 1977) and to update the public on the

continually growing scientific literature related to cowbirds and their management.

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