



# United States Department of the Interior



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IN REPLY REFER TO:

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## Memorandum

To: *Chief, Resources Management, SHEN*

From: Regional Chief of Interpretation, Western Region

Subject: The Cowbird Peril: A Resources Management Problem  
and an Interpretive Story

Enclosed is a copy of the above titled paper for your consideration.

The National Park Service is a signatory agency, along with several other agencies and organizations, to the Migratory Bird Conservation Program (also known as Partners in Flight). Migratory birds are an important part of the biological diversity of our National Park System and a resource to which the NPS is committed to conserve.

It is becoming evident that one of the major threats to neotropical migratory birds is brood parasitism by cowbirds, of which there are now three species in the United States. In an effort to inform and educate our own staff, and eventually the public, I have written the enclosed paper. It is primarily for NPS interpreters and resources management specialists.

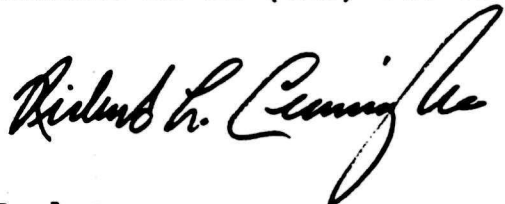
The paper contains enough background information on the impact by cowbirds on migratory birds for an interpreter to prepare an interpretive program on this subject. Suggestions are provided for specific slides to illustrate the program and a source for bird slides.

For the resources management specialist, information is provided on avian brood parasitism in general, the impacts of cowbirds in particular, specific threatened and endangered species, lists of cowbird host species and frequencies, and a diagram of a cowbird trap and statistics on a trapping program at Big Bend National Park.

This paper (while still in draft form) prompted the science and resources management staff at the Western Regional Office to prepare and submit an NRPP Proposal (WR-N-02, Neotropical Migratory Bird Population Management: Parasitic Cowbird Removal).

I hope your interpreters and resources management staff will find this of interest and will be motivated to develop public interpretive/educational programs and cowbird control programs where applicable and appropriate.

If you have any questions or seek further information, please contact me at (415) 744-3910.

A handwritten signature in black ink, reading "Richard L. Cunningham". The signature is written in a cursive style with a large, looping initial "R".

Enclosure

**THE COWBIRD PERIL:**  
**A RESOURCES MANAGEMENT PROBLEM**  
**and an**  
**INTERPRETIVE STORY**

By Richard L. Cunningham  
Regional Chief of Interpretation  
National Park Service  
Western Region

September 1993

The Cowbird Peril: A Resources Management Problem  
and an Interpretive Story

CONTENTS

Introduction	
Brood Parasitism	1
Brown-headed Cowbird	2
Bronzed Cowbird	6
Shiny Cowbird	7
Neotropical Migratory Birds and Cowbirds	10
Some Threatened and Endangered Birds	11
Willow Flycatcher	11
Least Bell's Vireo	12
Black-Capped Vireo	12
Golden-cheeked Warbler	13
Combating Cowbirds	14
Interpreting the Cowbird Menace	17
Appendixes:	
A. Cowbird Brood Parasitism Frequency by Species	20
B. Cowbird Brood Parasitism by Category	24
C. Species Known to Reject Cowbird Eggs	29
D. 1991 Christmas Bird Counts: Total Cowbirds Recorded	30
E. Selected References	32

## INTRODUCTION

Birds are a significant biological resource found throughout the National Park System. Many of the national parks, monuments, and recreation areas are recognized as some of the most important birding sites within the United States. Each year thousands of birders visit these park areas to watch birds. Many thousands of visitors who have little or no specific interest in birds, become fascinated by the wide variety of birds they see in the parks.

Many units within the National Park System preserve important habitat for neotropical migratory birds and many park areas in the continental United States contain several species of breeding migrants. Almost every unit within the National Park System hosts at least a few migratory birds during their annual spring and autumn passage. Several parks provide crucial habitat for stopover migrants and form critical links during northward and southward migrations. As unprotected habitats are developed, the parks will become even more important in years to come as feeding and resting refugia for migratory birds.

The National Park Service has a responsibility for protecting, preserving, and managing the natural resources of the National Park System. There is increasing evidence that cowbirds are having significant impacts on many species of North American birds, particularly neotropical migratory birds. This includes many species of passerines that nest in National Parks.

What should be the role of the National Park Service in managing its avian resources? Should the Service be actively involved in cowbird capture and reduction programs in parks? If so, should these programs be for general control only or in conjunction with approved threatened and endangered species programs? The answers to these questions must be addressed by the appropriate science, resources management, and administrative staffs of the National Park Service. Regardless of the answers, the cowbird impacts are real and affect the biological diversity of many units within the System.

As with almost all of the science and natural resources management issues confronting the National Park Service, there is one field of endeavor in which the Service can take a leading role. That role is in the field of interpretation and education. The ecological implications of the cowbird "problem" offer National Park Service interpreters an opportunity for communicating this story to our many publics.

This interpretive paper hopefully will provide ample background information for both the resources management specialist and the park interpreter. To the resources management specialist I hope this information will cause consideration for investigating the cowbird situation and its impacts in your park. To the park

interpreter I hope the background information and the section on "Interpreting the Cowbird Menace" will inspire you or another interpreter on your staff to develop a program on this matter, or at minimum, to incorporate some of this information into an appropriate existing program.

To be of further assistance to the interpreter I have identified specific slides that could be used in an interpretive program, the source for procuring these slides, and the approximate cost. The enclosed information could be condensed and rewritten as a feature article for a park newsletter or rewritten as a site bulletin for general public information.

From both the resources management specialist and the park interpreter I would appreciate any type of response to the cowbird problem in general and to this interpretive paper in particular.



Richard L. Cunningham  
Regional Chief of Interpretation  
Western Regional Office  
September 1993

**Acknowledgement:**

I would like to thank the following people for their review of this interpretive paper or for their assistance during my research: Dr. Charles Stone, Hawaii Volcanoes National Park; Dr. Ted Simons, CPSU, North Carolina State University; Dr. Charles Van Riper, III, and Mr. Mark Sogge, Center for Colorado Plateau Studies; Dr. Mietek Kolipinski, Western Regional Office, NPS; and Mr. Mike Fleming, Big Bend National Park.

## BROOD PARASITISM

Brood parasitism occurs when one species (the parasite) exploits the parental behavior of another species (the host). Brood parasitism is not unique to birds as it also occurs among social insects and freshwater fishes. Some bird species will occasionally lay their eggs in the nests of other species or in the nests of others of their own kind. Brood parasitism is a relatively rare behavior among birds, occurring in only about one percent of all bird species.

The South American Black-headed Duck is known to lay its eggs in the nests of other ducks and in the nests of coots, rails, ibises, herons, and even a species of caracara. In North America the Redhead is a well-known nest parasitizer, laying its eggs in the nests of many other ducks, especially the closely related Canvasback. Redhead young are more successfully reared when they "dump" their eggs into nests of other Redheads than into nests of other duck species. The Ruddy Duck often lays its eggs in other Ruddy Duck nests or in nests of other ducks.

Perhaps the best known and most studied brood parasite is the Cuckoo (also known as the Common Cuckoo) of Eurasia. Old World cuckoos parasitize many bird species. In fact, of the almost 130 cuckoo species in the world about one-half are brood parasites. Some of the cuckoos are species-specific in their selection of hosts, while other cuckoos are generalists and will lay their eggs in many different host species' nests. Individual female cuckoos are known to lay from 18 to 25 eggs in a single breeding season. Old World cuckoos have evolved a high degree of egg mimicry, laying their own eggs in color and pattern to match those of the host species they are parasitizing. Stealing an egg of the host species by swallowing seems to be a common habit of female Old World cuckoos and the swallowed eggs may be an important part of their diet. It also reduces the host egg count by one, replacing it with the cuckoo egg. The incubation period for parasitic cuckoo eggs is from 11 to 14 days, which is about 2 to 4 days less than for the eggs of the host species. After the cuckoo egg hatches the nestling cuckoo pushes the eggs or young of the host species out of the nest. From then on it receives all of the food brought to the nest by the host parents. The cuckoo nestling may stay in or near the nest for up to four weeks, at which time it may be several times larger than the host parents.

In North America the Yellow-billed and the Black-billed Cuckoo rarely lay their eggs in the nests of other bird species, but will occasionally lay eggs in the nests of others of their own species. Yellow-billed Cuckoos have been known to parasitize the Gray Catbird, American Robin, Wood Thrush, Cedar Waxwing, Northern Cardinal and Dickcissel. Black-billed Cuckoo eggs have been found

in nests of Eastern Wood-Pewee, Gray Catbird, Wood Thrush, Cedar Waxwing, Yellow Warbler, Northern Cardinal, and Chipping Sparrow. Like the Old World Cuckoos, nestlings of the Yellow-billed and Black-billed cuckoo are known to oust the young of the host species.

The eggs of the parasitic species usually hatch earlier than the eggs of the host, giving their young a distinct advantage over the host nestlings. The nestlings of the brood parasites normally develop at a faster rate than the nestlings of the host species and command a greater amount of food and attention from the host parents. It is crucially important to the parasitic species to lay their eggs in nests of species that are capable of feeding and caring for their nestlings. For example, cuckoos are insectivorous and will not normally lay their eggs in the nests of seed-eating species. Cowbirds are seed-eaters but they also eat insects and small invertebrates; they generally parasitize birds that eat the same foods. However, Brown-headed Cowbird eggs have been found in the nests of Blue-winged Teal, Ferruginous Hawk, Virginia Rail, Killdeer, Spotted Sandpiper, Upland Sandpiper, Wilson's Phalarope, California Gull, Common Tern, Ruby-throated Hummingbird, and Red-headed Woodpecker. Because these species have vastly different living habits than cowbirds, attempts to rear young cowbirds failed in all cases.

An unusual type of brood parasitism is that performed by the colonial nesting Cliff Swallow. It has recently been discovered that Cliff Swallows often lay their eggs in the nests of other members of their breeding colony. Even more astounding, Cliff Swallows have been observed transporting eggs in their bills to be placed into the nests of other colony members. In large Cliff Swallow colonies perhaps as many as one-fourth of the nests are parasitized by other swallows.

Two factors affect the successful expansion of bird parasites into new geographic regions: the availability of suitable habitat and of host species. At least three factors are important in the selection of host species: They must breed during the same season as the parasite; they must live in habitat suitable for the parasite; and the host species must feed their young a diet physiologically compatible to the parasites.

#### BROWN-HEADED COWBIRD

The Brown-headed Cowbird (Molothrus ater) is a native North American species. The generic name Molothrus is Latin for "vagabond"; the specific name ater is Latin for black. Some other names for the Brown-headed Cowbird are: Brown-headed Blackbird, Brown-headed Oriole, Buffalo Bird, Cow Blackbird, Cow Bunting, Cowpen bird, Cuckold, and Lazy-bird.



The Brown-headed Cowbird may have originated from South American ancestors and entered North America via Central America. Once they arrived in North America they spread throughout the Central Great Plains, associating themselves with the great herds of wandering bison (thus the name "Buffalo Birds").

Occurring, at least in some degree, in the eastern United States at the time of European settlement, it was only after the Europeans arrived with livestock and cleared the forests that the range of the Brown-headed Cowbird began to expand. (Could the use of fire by Native Americans in the eastern U.S. have aided cowbird expansion due to the creation of increased edge habitat?) It is also interesting to speculate what impacts, if any, upon the numbers and distribution of the cowbird were caused by the introduction of horses, cattle, oxen, burros, and donkeys by the Spanish into the New World in the 1500 - 1600s). Elliott Coues (Birds of the Northwest, 1874) provides interesting comments on Brown-headed Cowbirds following wagon-trains crossing the Great Plains and adapting to horses and cattle. The cowbirds fed around the feet of the animals and perched upon their backs, a behavior they commonly exhibited with bison.

Apparently cowbirds spread eastward quickly as the landscape opened up. By the late 18th and early 19th centuries the Brown-headed Cowbird was known and well-established in many areas of the eastern U.S. One of America's pioneer ornithologists, Alexander Wilson (1766 - 1813), wrote the first account of this cowbird's parasitic habits in 1810.

Only during this century have Brown-headed Cowbirds impacted the many host species they now parasitize. This is especially so for the eastern forest, western forest, and Pacific coast host species now affected. Before European settlement the Brown-headed Cowbird may have parasitized about 50 species. It is now known to parasitize about 220 species, of which at least 144 have successfully raised young cowbirds. It is speculated that at one time in their evolution the cowbirds were not brood parasites, but constructed nests and incubated their own eggs as other birds do. If true, when and how cowbirds lost their egg-rearing ability are fascinating questions.

About twenty percent of the Brown-headed Cowbird's diet is insects, especially grasshoppers. Much of the cowbird's insect diet are crop pests. About sixteen percent of their diet is grain and about fifty percent is weed seeds; they also consume a small amount of wild fruits. Even though cowbirds do provide some economic benefit by eating insect pests and weed seeds, they also cause severe ecological and economic impacts by parasitizing a large number of small insect-eating birds, and they eat large amounts of grains and other crops.

Cowbirds are highly gregarious throughout the year, though males and females disperse through their breeding territories. Cowbirds will mix with starlings and other blackbirds, both on their feeding ground and in overnight roosts. There are millions of Brown-headed Cowbirds in the United States. The December 15, 1991, Christmas Bird Count at Pine Prairie, Louisiana, totaled 1,438,358 cowbirds, the most for any bird count for that year.

The increase in Brown-headed Cowbird populations this century may be due to increases in their winter food supply and in additional wintering habitat. In the southeastern U.S. waste grain in rice fields provides an abundant source of winter food for starlings, blackbirds, grackles, and cowbirds. Bird feeders also provide additional food during times of winter scarcity.

### Breeding

The female Brown-headed Cowbird closely observes the nesting activity of other birds to determine when her best opportunity will be to dart in and lay her egg at an unattended nest. Recent studies indicate that females will lay about 40 eggs a year and live for about two breeding seasons. Thus each female may lay up to 80 eggs in its short life span. However, fledgling success may be as low as 0.15. It is estimated that only about three percent of the cowbird's eggs survive to reach adulthood; thus about ninety-seven percent of the cowbird's fail to reach maturity. However, due to the large number of eggs laid per individual female, and the wide range of host species, the Brown-headed Cowbird is undergoing a continental range expansion and population explosion.

Unlike the European Cuckoo, cowbird eggs do not closely mimic the eggs of their hosts. The female Brown-headed Cowbird will usually remove one or two of the host species' eggs although she will not do it at the time she lays her own eggs. The female cowbird will pierce a host species' egg with its bill and carry it away to eat the contents. Female cowbirds have also been known to remove a nestling of the host species, though this may not be a frequent custom.

Brown-headed Cowbird eggs hatch in 11 to 13 days (average about 11.6 days) which is usually one or two days less than the eggs of their host. The young cowbirds fledge in about 10 - 11 days. For comparison, incubation periods of a few commonly parasitized host species are: Common Yellowthroat - 12 days; Yellow Warbler - 11-12 days; Song Sparrow - 12-14 days; Rufous-sided Towhee - 12-13 days; Red-eyed Vireo - 11-14 days; Warbling Vireo - 12 days; Wood Thrush - 13-14 days; Bell's Vireo - 14 days; Kirtland's Warbler - 14-15 days; and Eastern Phoebe - 16 days.

Most parasitized nests contain only one cowbird egg, but as many as one-third of the nests contain two or three cowbird eggs.

A Wood Thrush nest once had 12 cowbird eggs in it! Brown-headed Cowbirds have even been known to lay their eggs in the nests of Yellow-billed and Black-Billed Cuckoos, two species that occasionally parasitize each other. Cowbirds lay their eggs predominately in the nests of five passerine bird families: tyrant-flycatchers, thrushes, vireos, wood-warblers, and sparrows.

Female cowbirds will occasionally lay their eggs in nests that already contain the nestlings of the host species. Cowbird nestlings apparently do not eject the eggs or nestlings of the host species as do the young of the European Cuckoo. However, hatching in advance of the host species' eggs gives the cowbird nestling an advantage because they grow faster, become larger, and consume a greater portion of the food than do the nestlings of the host. In spite of this, host parents are frequently successful in rearing at least one or two of their own young, as well as the cowbird nestling.

#### Impacts on other Species

Writing in 1895, Charles E. Bendire stated: "According to my observations, the Least Vireo seems to be oftener imposed upon, in southern Arizona, than any other bird . . .". In a study done in San Diego County on Least Bell's Vireos in the 1970's, about fifty percent of the nests contained Brown-headed Cowbird eggs. Also in San Diego County the Brown-headed Cowbird is known to parasitize the following species: Willow Flycatcher (proposed as endangered), Western Wood Pewee, Blue-gray Gnatcatcher, California Gnatcatcher (proposed as endangered), Hutton's Vireo,, Least Bell's Vireo (endangered), Warbling Vireo, Yellow Warbler, Common Yellowthroat, Hooded Oriole, Dark-eyed Junco, Song Sparrow, American Goldfinch and Lesser Goldfinch. In other parts of California the Brown-headed Cowbird is allegedly responsible for reducing, or actually extirpating, local populations of the Least Bell's Vireo, the Yellow-breasted Chat, and the Willow Flycatcher. Studies done by David Gaines on the riparian songbirds breeding in the Sacramento Valley of California indicated that virtually all of the species that declined this century are highly parasitized by the Brown-headed Cowbird. In the midwestern states the Dickcissel has become locally "endangered" due to cowbird parasitism.

#### Species that Avoid Parasitism

Several species of birds successfully reject cowbird eggs on a regular or occasional basis. Birds that are aggressive, such as kingbirds and shrikes, are seldom or rarely parasitized. Birds that nest in tree holes, such as woodpeckers, chickadees, nuthatches, bluebirds, and the House Wren are seldom parasitized.

Some bird species will build a new nest floor over cowbird eggs. The list includes: Red-eyed Vireo, Yellow-throated Vireo, Solitary Vireo, Warbling Vireo, Prothonotary Warbler, Yellow Warbler,

Chestnut-sided Warbler, American Redstart, Eastern Meadowlark, Northern Cardinal, Indigo Bunting, and White-crowned Sparrow. A Yellow Warbler once built a nest with six levels that contained 11 buried cowbird eggs.

When a female cowbird lays her egg in a nest and removes the host's egg, nest desertion by the host species is common. Even with species that are known to raise cowbirds there is a high rate of failure for the cowbird eggs. When cowbird egg-laying is not synchronized with the egg-laying of the host species, the nest is often deserted or covered over by the host.

One species that is adversely impacted by the Brown-headed Cowbird, yet provides a low success rate of cowbird fledgling, is the Field Sparrow. This species is a frequent cowbird victim and usually deserts its nest after a cowbird egg has been laid in it, thus abandoning their own eggs as well as those of the cowbird. The Field Sparrow's incubation period is 11 days, one day shorter than that of the cowbird. This gives the Field Sparrow nestlings a one day advantage over the cowbird chicks.

Other frequent rejector species are: Gray Catbird, American Robin, Eastern Kingbird, Cedar Waxwing, Brown Thrasher, and Northern Oriole.

For a more detailed list, see Appendix C: Species Known to Reject Cowbird Eggs.

#### BRONZED COWBIRD

The Bronzed Cowbird (Molothrus aeneus) has spread northward from Mexico into the United States. Its species name aeneus is Latin for brassy or bronze, referring to the metallic sheen of the male birds. It is also known as the Red-eyed Cowbird, Red-eye, and Glossy Cowbird.

The Brone cowbird is distributed from Panama northward through Central America to southernmost California, central Arizona and New Mexico, to eastern Texas. It is expanding its breeding range northward and eastward in the United States. It winters throughout most of its breeding range except for its northernmost U.S. populations.

Like the Brown-headed Cowbird, the Bronzed Cowbird is also a brood parasite. At least 77 bird species are known hosts for this cowbird. The Bronzed Cowbird is a larger species than the Brown-headed Cowbird (8 3/4 in. and 7 1/2 in. respectively) and can therefore parasitize larger species than the Brown-headed. The Bronzed frequently parasitizes orioles. In fact, from the mid-1950s to the 1970s the Bronzed Cowbird apparently eliminated the Hooded Oriole as a breeding species along the Rio Grande River between Laredo and Boca Chica, Texas. Where ranges of both the

Bronzed and Brown-headed Cowbirds overlap, eggs of both species have been discovered in the nest of host species.

The Bronzed Cowbird seems to be more restrictive in its selection of hosts than is the Brown-headed Cowbird. The Bronzed is more of a "specialist", while the Brown-headed is definitely an opportunistic "generalist". Like the other cowbirds, usually only one egg per female cowbird is laid in a nest. An Orchard Oriole's nest was once found to contain four Bronzed Cowbird eggs. Incubation period for Bronzed Cowbird eggs is 12 - 13 days (incubation of oriole eggs averages about 12 - 14 days), giving the rapid-growing cowbird fledglings a head start.

Except during the breeding season, Bronzed Cowbirds tend to roam in loose flocks of up to 30 or so birds. Open fields, pastures, and riparian areas are preferred habitat. In parts of Central America this species occurs from the lowlands up to 8,500 to 9,000 feet elevation in the mountains. It avoids heavily forested areas and current deforestation in Central America is creating new cleared habitat at an increasing rate.

This species normally associates with grazing cattle, feeding on insects disturbed by the moving livestock. Bronzed Cowbirds have been seen to alight on the backs of cattle and mules and eat ticks and insects found there. Grain and grass seeds are also major parts of their diet.

#### SHINY COWBIRD

The Shiny Cowbird (Molothrus bonariensis) is a northern South American species expanding its range northward and southward. Its species name bonariensis is Latin for "of Bonaire". This species is also known as the Glossy Cowbird.

Originally occurring in northernmost South America and on Trinidad and Tobago, it has undergone a rapid and aggressive range expansion during this century. It now ranges from Panama southward to Chile and Argentina and throughout the Lesser and Greater Antilles. The Shiny Cowbird arrived in Puerto Rico about 1955, spread to Hispaniola in the 1970s, and reached Cuba by 1982. It was first reported in the United States in the Florida Keys in June 1985. Shiny Cowbirds now occur annually in the United States and they have been recorded from Florida to Maine and west to Texas. The population predominately withdraws south of the U.S. during the winter. Presumably this species will continue to expand its summer breeding range in the U.S. How its range expansion will be affected by the expanding ranges of the Brown-headed and Bronzed Cowbirds remains to be determined.

Like the Brown-headed and Bronzed Cowbirds, the Shiny Cowbird is a brood parasite. Throughout its range, the Shiny Cowbird is known to parasitize at least 201 host species. It specializes in

colonial-nesting blackbirds. At least 20 species of birds in Trinidad are known hosts.

The Shiny Cowbird occurs in second growth forest, forest clearings, farms, and cultivated areas, pastures, marshes, and in suburban areas. It roosts by the thousands in coastal mangroves. Unlike the Brown-headed Cowbird, the Shiny does not seem to show any preference for feeding among grazing cattle. Usually occurring in small flocks, they feed on the ground and in trees. Food items include grain, seeds, and insects (beetles, caterpillars, moths, froghoppers, etc.). Being a gregarious species and traveling in small flocks seems to be advantageous in colonizing new areas such as islands. As deforestation took place throughout the West Indies, it created open habitat suitable for Shiny Cowbird expansion.

Both male and female Shiny Cowbirds are promiscuous in their mating habits. Each female cowbird probably lays only one egg in each nest but they may lay at least five eggs (more?) in five different nests in the course of a breeding season. Several female cowbirds may lay an egg in a nest; one nest contained 14 cowbird eggs. The female cowbird will sometimes eat or destroy the host's eggs. Incubation time for Shiny Cowbird eggs is 11 to 12 days. Cowbird nestlings apparently are not aggressive toward the fledglings of the host; they coexist in the same nest. However, if there is severe competition for food, the larger, more demanding young cowbirds may cause the host's young to die from starvation.

The populations of several West Indian bird species have declined apparently due to Shiny Cowbird expansion and subsequent parasitism. The list includes the House Wren on Grenada; Yellow Warbler on Barbados; Martinique Oriole on Martinique; and the Yellow-shouldered Blackbird on Puerto Rico. Once the Shiny Cowbird selects a species as a host, it continues to exploit that species almost solely until the host's population becomes so low that the cowbird has to seek a new preferred host. On Puerto Rico the Shiny Cowbird almost exclusively parasitizes the Yellow-shouldered Blackbird. Due to habitat degradation and cowbird parasitism, the Yellow-shouldered Blackbird is federally listed as endangered. Female cowbirds have been observed puncturing and destroying the blackbird's eggs. Species frequently parasitized in the West Indies by the Shiny Cowbird includes the Black-whiskered Vireo, blackbirds, orioles, and flycatchers. Since 1980 there has been a Shiny Cowbird control program on Puerto Rico. The trapping methods are modeled after those used to control Brown-headed Cowbirds parasitizing Kirtland's Warblers in Michigan. During eleven days in July 1980, a total of 1,692 Shiny Cowbirds were captured in twelve traps. However, the Yellow-shouldered Blackbird remains imperiled.

Since its arrival in the Florida keys in 1985 the Shiny Cowbird has been rapidly expanding its range in the United States. A

wholesale invasion of this species is underway. At the same time, the Brown-headed and Bronzed Cowbird continue their range expansion. Nowhere is this more apparent than in Florida where all three cowbird species occur. On March 4, 1990, all three cowbirds were found together for the first time at a single location at a feed lot in Lake Harbor, Florida.

At this time it is not known which United States species will be the most heavily impacted by the arrival of the Shiny Cowbird. However, some reasonable "guesses" can be made and Florida, unfortunately, may provide us with some clues. The Red-winged Blackbird is a likely victim. So too are the Black-whiskered Vireo, the Yellow Warbler, and the Prairie Warbler. These three species are all breeding birds of the coastal mangrove fringe of Florida. The southward expanding Brown-headed Cowbird prefers this coastal habitat and is now known to be parasitizing the vireo and the two warblers (records from Everglades National Park and other south Florida locations). A male Shiny Cowbird was sighted in the breeding colony of the Cape Sable Sparrow race of the Seaside Sparrow near Mahogany Hammock in Everglades National Park. Thus one unit of the National Park System lies at the locus of two invasive species at which a biological drama will be waged.

## NEOTROPICAL MIGRATORY BIRDS AND COWBIRDS

About 160 species of land birds that breed in the United States and Canada winter in Mexico, Central and South America, and the Caribbean. These species are the classic neotropical migrants and include warblers, vireos, tanagers, orioles, thrushes, grosbeaks, and flycatchers. Another 100 or so landbird species winter in both the southern United States and in nearby sub-tropical and tropical countries. Furthermore, many species of waterbird, waterfowl, shorebird, and raptor also winter in Latin America and in the Caribbean.

Recent studies indicate that populations of many neotropical migrant landbird species are declining. Many of these birds are forest-dwelling species. Data collected by the U.S. Fish and Wildlife Service for the Breeding Bird Survey, indicate that populations of 71 percent of neotropical migrants declined during the period 1978 to 1987.

Two primary factors have been suggested as contributing to these recent declines and both concern loss of or significant alteration of habitat. The two factors are forest fragmentation on breeding grounds in the United States and Canada and deforestation on the Latin American and Caribbean wintering grounds.

Several negative impacts occur on the breeding grounds due to forest fragmentation, all of which may be contributing to migrant population decline. When large forests are reduced to smaller fragmented patches there is increased opportunity and pressure from predators (such as raccoons, dogs, cats, Blue Jays, grackles, and nest parasites). Certain forest-interior species, for example, the Ovenbird and the Worm-eating Warbler, apparently cannot breed successfully in the smaller, isolated forest patches and local extirpation takes place.

Besides loss of habitat on both the breeding and wintering grounds (and at migratory stopover areas) there is growing speculation that a third factor may be a major contributor to neotropical migratory birds population decline. This factor is the current population explosion and expanding range of the Brown-headed Cowbird. Add to this the expanding ranges of the Bronzed and Shiny Cowbirds and the impact of nest parasitism on migratory birds could be enormous.

Various studies indicate that cowbird parasitism is high among forest-dwelling migratory birds where their habitat has become accessible to cowbirds.

In California the Brown-headed Cowbird has been responsible for either reducing, or actually extirpating, local populations of the Least Bell's Vireo, the Yellow-breasted Chat, and the Willow Flycatcher. In San Diego County, the Brown-headed Cowbird is known to parasitize the Willow Flycatcher (threatened species), Western



Wood Pewee, Blue-gray Gnatcatcher California Gnatcatcher (endangered species), Hutton's Vireo, (Least Bell's Vireo (endangered), Warbling Vireo, Yellow Warbler, Common Yellowthroat, Hooded Oriole, American Goldfinch, Lesser Goldfinch, Dark-eyed Junco, and Song Sparrow.

#### SOME THREATENED AND ENDANGERED BIRDS

Several species that are currently listed on the Endangered and Threatened Wildlife and Plants list compiled by the U.S. Fish and Wildlife Service are impacted by cowbirds. Many other species that are, or may be, proposed for listing are cowbird victims, including many neotropical migrants.

I have selected five threatened and/or endangered species that are parasitized by cowbirds. Some basic conservation information is given for each species: (Willow Flycatcher, (Least) Bell's Vireo, Black-capped Vireo, Golden-cheeked Warbler, Kirtland's Warbler). The following species parasitized by cowbirds are also of special concern:

- Least Flycatcher
- Wood Thrush
- California Gnatcatcher
- Golden-winged Warbler
- Yellow Warbler
- Yellow-breasted Chat
- Henslow's Sparrow
- Dickcissel
- Eastern Meadowlark
- Orchard Oriole

#### Willow Flycatcher

Range: Breeds from New England, New York, southern Ontario westward to southern British Columbia southward to North Carolina, Ohio, Indiana, Illinois, Arkansas, Oklahoma, Texas, the Southwest, Nevada, and central California. Winters from southern Mexico to Panama and northern South America.

Breeds in willow thickets, swamps, brushy fields, and open woodland edges. Destruction of riparian habitat and its degradation by cattle grazing are major reasons for its decline. Deforestation of habitat on wintering grounds is another concern.

While populations of the Willow Flycatcher in the northeastern U.S. may be expanding, the opposite is the case for western populations. Populations in the Southwest, especially in Arizona, New Mexico, California, and Baja California are approaching extinction. Other

western populations are also declining. The Southwestern race of this species is a category 2 candidate for the Endangered Species List.

#### (Least) Bell's Vireo

Range: Formerly throughout the Central Valley of California, the Sierra Nevada foothills, and throughout the California Coast Range from Santa Clara County southward to northwestern Baja California. Range now is greatly reduced and species is confined to riparian woodland from Santa Barbara south to northwestern Baja California. Winters in Baja California.

This subspecies is dependent upon riparian woodland and has undergone severe population decline due to loss of habitat. Livestock grazing, highway construction, urban development (including golf courses), and invasive alien plants have all contributed to habitat loss or degradation.

Now listed as an Endangered Species the Least Bell's Vireo has been eliminated from about 95 percent of its former range. The U.S. population numbers now less than 400 pairs.

This species is commonly parasitized by the Brown-headed Cowbird which has become a major factor in the vireo's decline. In a study done in San Diego County in the 1970s about 50 percent of the vireo's nests contained cowbird eggs.

#### Black-Capped Vireo

Range: Breeds from Oklahoma south through central Texas to Coahuila, Mexico. Formerly bred in Kansas but extirpated there by 1954. Winters primarily in Sinaloa and Nayarit, Mexico.

The Black-capped Vireo breeds in oak-juniper woodlands and scrub hillsides and ravines. Since the beginning of this century its U.S. breeding range has been constantly shrinking due to habitat loss or degradation by development and grazing of sheep and goats. Housing development and road construction are major threats to almost ninety percent of the U.S. population.

This vireo is heavily parasitized by cowbirds which is reaching one hundred percent of vireo nests with zero production of young vireos in Texas and Oklahoma. Cowbird control programs are underway in these two states. However, in conjunction with continued loss of habitat and cowbird parasitism there is a high possibility of this species becoming extirpated in the United States.

The Black-capped Vireo is listed as an Endangered Species. The U.S. population is estimated between 250 to 500 birds, most of them near Austin, Texas. The size of the Mexican population is unknown, with estimates ranging from fewer than 50 birds to over 3,000

birds. An active campaign by The Nature Conservancy has been trapping cowbirds on a preserve in Oklahoma since 1990.

### Golden-cheeked Warbler

Range: Breeds on the Edwards Plateau area in central Texas near Dallas. Winters in pine-oak woodlands of Mexico, Guatemala, Honduras, and Nicaragua.

Listed as an Endangered Species, less than 5,000 birds remain.

The Golden-Cheeked Warbler is threatened by habitat loss on its breeding grounds due to urban and industrial development, the logging of Ashe juniper (in which they nest), and overgrazing by sheep and goats.

Cowbird parasitism is heavy and has had severe impacts on this species throughout its very limited breeding range. This species is parasitized by both the Brown-headed and the Bronzed Cowbird.

### Kirtland's Warbler

Range: Breeds only in six counties in northern lower Michigan near the Au Sable River. Winters in the Bahamas.

Kirtland's Warbler has extremely specific requirements for its breeding habitat, nesting only on sandy soils in stands of young jack pines with grassy clearings. The birds breed in colonies.

Listed as an Endangered Species, the total population numbers about 200 pairs.

The Kirtland's Warbler has the longest incubation period of any North American warbler (14 - 15 days). This makes them highly susceptible to cowbird parasitism which began in the early part of this century. In a study of the Kirtland's Warbler, Harold Mayfield discovered that about 55 percent of all the warbler's nests were parasitized by Brown-headed Cowbirds resulting in the loss of 43 percent of the warbler's eggs.

From 1961 to 1971 the Kirtland's Warbler population declined by almost 60 percent during which time cowbird nest parasitism rose to over 70 percent. Since the 1970s, there has been an active and successful cowbird trapping program. By 1980, 40,000 cowbirds had been trapped in and near the warbler nesting area; 8,000 cowbirds were trapped in 1989 as cowbird numbers continue to rise. The Kirkland's Warbler will continue to be dependent upon manipulation of its breeding habitat, including fire management, cowbird control, and preservation of its wintering grounds in the Bahamas. and will probably be very susceptible to destruction of its existing habitat due to global climate change.

## COMBATING COWBIRDS

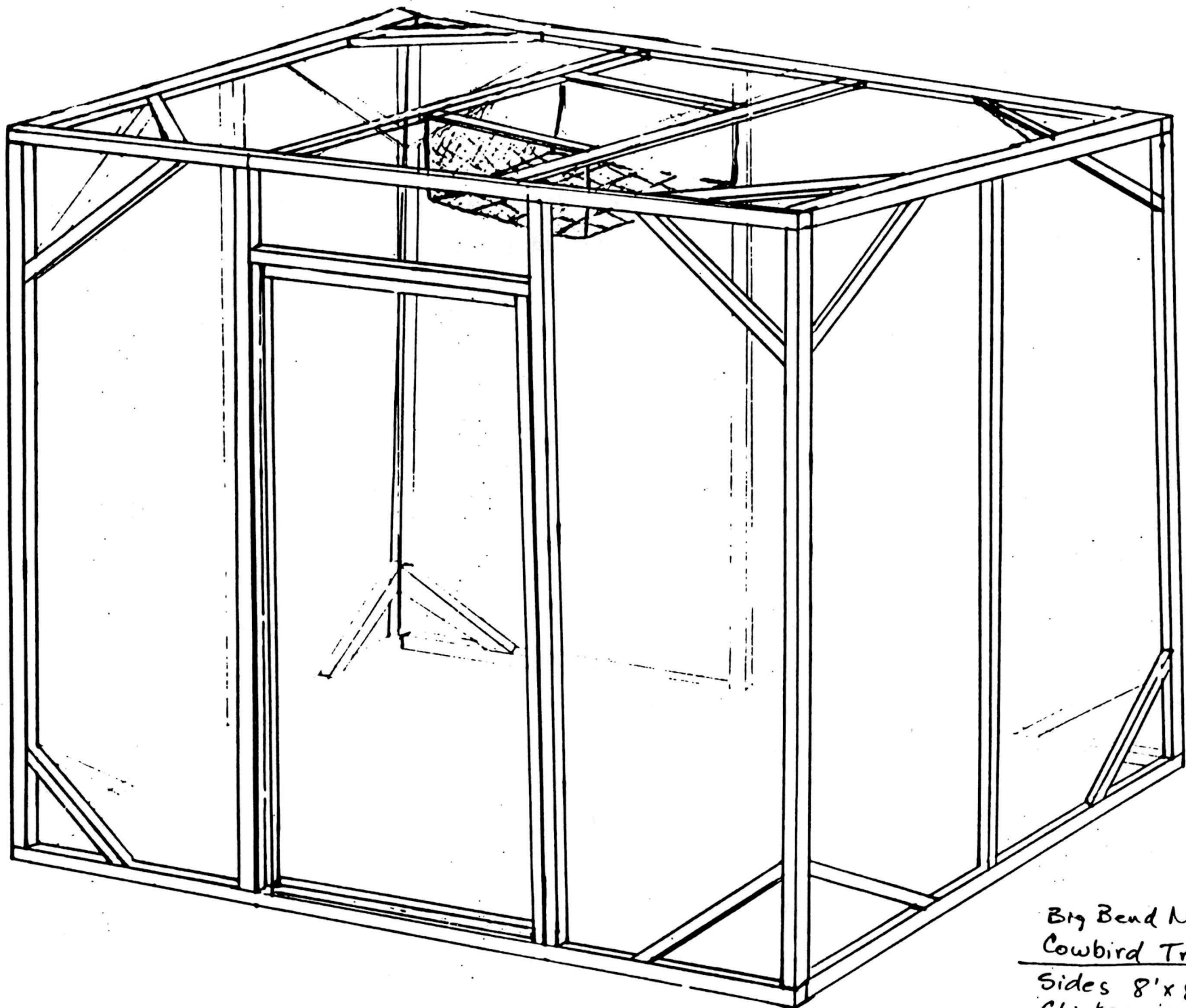
In order to control cowbird impacts on the Kirland's Warbler, in 1972 several Michigan organizations began a cowbird control program. Cowbird traps were baited with sunflower seeds and water and stocked with live decoy cowbirds. The traps were placed in warbler nesting areas. During the 1972 warbler breeding season 15 traps captured about 2,200 cowbirds which were asphyxiated.

Big Bend National Park conducted a spring and fall trapping program from 1986 to 1991. During 434 days of trapping over the six years of operations, a total of 8,553 cowbirds were trapped. The enclosed table shows distributions of cowbird trapping days and results. The diagram illustrates the chickenwire trap used. For further information on the Big Bend program, contact their Resources Management Staff, Big Bend National Park, P.O. Box 129, Big Bend National Park, Texas, 79834, telephone (915) 477-2251.

For cowbird reduction to have any significant effects upon the cowbird population there must be large scale trapping done on their wintering grounds where they congregate by the thousands.

However, the National Park Service can make an important contribution to cowbird reduction by conducting prudent cowbird trapping at specific sites within certain parks. This is an issue that park resource managers should be seriously considering. At the very least we can be combating the cowbirds that menace the breeding birds of the National Parks. That is no insignificant contribution on our part.

Parks considering cowbird reduction programs need to consult closely with their regional office science and resources management staff prior to any actual on-site trapping. Consultation with other state and Federal agencies, as appropriate, is also advised.



Frame of 2" x 2" Lumber

Big Bend Nat'l Park.  
Cowbird Trap

Sides 8' x 8' x 8'  
Chickenwire Cover  
4" mesh in bottom of  
trap

Big Bend National Park  
Cowbird Trapping Results  
1986 - 1991

Year	Dates	Days	Location		STot	Panther Junction		STot	Yearly Total
			Chisos Basin Male	Female		Male	Female		
1986	4/18-6/27	71	118	93	211	NT	NT	-	211
1987	4/20-8/13	116	151	276	427	NT	NT	-	424
1988	5/02-7/14	74	109	91	200	559	579	1138	1338
1989	4/29-5/26	28	7	9	16				
	4/25-5/26	33				330	294	624	
	8/09-8/31	23	NT	NT	-	Unk	Unk	2070	2710
1990	5/01-5/29	29	NT	NT	-	141	214	355	
	7/25-9/04	42	NT	NT	-	Unk	Unk	3284	3639
1991	5/07-5/24	18	NT	NT	-	135	96	231	231

NT - No Trapping  
Unk - Unknown

Fall trapping periods (beginning 1989) probably include high numbers of migrants

Trapping discontinued in Chisos Basin (1989) due to staff shortage

All trapping discontinued after 1991

**TOTAL** 8 5 5 3

## INTERPRETING THE COWBIRD MENACE

The impacts of cowbirds on the avian resources of the National Parks can make an exciting interpretive story. It is well suited to the standard evening campfire slide program format. Such a program could include such topics as: Brown-headed Cowbirds in association with the bison herds; westward expansion and settlement; deforestation and the expansion of agriculture; adaptation and spread of the Brown-headed Cowbird; the invasion and dispersal of the Bronzed and Shiny Cowbirds; cowbird impacts on threatened and endangered species; cowbird impacts upon Neotropical Migratory Birds; the biology of brood parasitism; National Parks as refugia for biodiversity and for natural processes.

Enclosed is a list of slides that could be used as a nucleus for an interpretive program on the cowbird story. You may wish to add others of your own choice, especially of your own park.

For a source of slides, I would recommend "The North American Catalog" of bird slides produced by VIREO. The catalog itself is free and will be mailed upon request. For each species of North American bird, the catalog lists which slides are available as to: male, female adult, winter, immature, nest, flight, painting, or specimen.

All slides listed in the catalog are \$3.00 each. VIREO is accumulating slides of birds of the rest of the world; these are available as non-catalog slides. For these slides you should indicate the common and scientific names and type of a slide needed (i.e., male, female, etc). Non-catalog slides cost \$4.00 each. For example, the catalog lists both the Brown-headed and the Bronzed Cowbirds, but not the Shiny Cowbird (which must be ordered as a non-catalog species. The Common Cuckoo and the Yellow-shouldered Blackbird are also special order non-catalog slides). VIREO is now the best source of bird slides in the United States and the slides can be used for non-commercial purposes only. They can be used for interpretive and educational purposes.

VIREO  
The Academy of Natural Sciences  
1900 Ben Franklin Parkway  
Philadelphia, PA 19103-1195  
telephone (215) 299-1069

Please contact VIREO directly for a catalog and their methods of payment.

The cowbird story would make an interesting feature article for a park newspaper or as a site bulletin. Information on the cowbird menace and the songbird plight can be easily integrated into park bird walks or other natural history walks. A special temporary

exhibit could be developed for display in a visitor center. The cowbird story (through a slide program) would be an appropriate off-site talk to organizations and at schools as part of an environmental education program.



## COWBIRD INTERPRETIVE SLIDE PROGRAM BY TOPICS

Some suggested slides (not in any order):

Brown-headed Cowbird - male, female, immature, nest with cowbird eggs

Bronzed Cowbird - male, female

Shiny Cowbird - male

Supplemental slides - bison, cattle grazing, feed lots, pasture, Yellow-billed Cuckoo, Blue-winged Teal, Killdeer, Ruby-throated Hummingbird, Cliff Swallow, Field Sparrow, any chickadee

Species that accept cowbird eggs - Yellow Warbler, Red-eyed Vireo, Common Yellowthroat, Song Sparrow, Wood Thrush Prairie Warbler

Species that reject cowbird eggs - Gray Catbird, American Robin, Brown Thrasher

Threatened and Endangered Species parasitized by cowbirds - Kirtland's Warbler, Golden-cheeked Warbler, Least Bell's Vireo, Black-capped Vireo, Willow Flycatcher

Other brood parasitic birds - Common Cuckoo (European), Redhead (duck), Ruddy Duck

Typical Neotropical Migrants that are parasitized by the Brown-headed Cowbird - Wood Thrush, Veery, White-eyed Vireo, Yellow-throated Vireo, Red-eyed Vireo, Warbling Vireo, Yellow Warbler, Blue-winged Warbler, Black-and-White Warbler, Chestnut-sided Warbler, Prairie Warbler, Ovenbird, Yellow-breasted Chat, American Redstart, Common Yellowthroat, Rose-breasted Grosbeak, Chipping Sparrow, Orchard Oriole, Scarlet Tanager

Various National Park areas important for breeding and stopover migration sites for Neotropical Migrants: Acadia, Everglades, Gulf Islands, Padre Island, Indiana Dunes, Great Smoky Mountains, Blue Ridge Parkway, Shenandoah, Cape Cod, Big Bend, Yellowstone, Grand Teton, Grand Canyon, Organ Pipe Cactus, Olympic, Redwood, Sequoia-Kings Canyon, Point Reyes, Golden Gate, Channel Islands, Cabrillo, (this is a partial list only).

Appendix A.

COWBIRD BROOD PARASITISM FREQUENCY BY SPECIES  
(according to Ehrlich, Dobkin, and Wheye, 1988)

Common Ground Dove	Rare
Mourning Dove	Rare (By both Brown-headed and Bronzed)
Eastern Kingbird	Common
Western Kingbird	Rare
Tropical Kingbird	Rare (by Bronzed Cowbird)
Couch's Kingbird	Rare ? (ejects Bronzed Cowbird eggs)
Scissor-tailed Flycatcher	Rare (by both Brown-headed and Bronzed)
Great Crested Flycatcher	Rare
Olive-sided Flycatcher	Rare
Eastern Wood Pewee	Uncommon
Western Wood Pewee	Rare
Eastern Phoebe	Common
Black Phoebe	Rare
Say's Phoebe	Rare
Vermilion Flycatcher	Rare
Least Flycatcher	Uncommon
Acadian Flycatcher	Common
Willow Flycatcher	Common
Alder Flycatcher	Occasional
Yellow-bellied Flycatcher	Rare
Pacific Slope Flycatcher (Western Flycatcher)	Rare
Cordilleran Flycatcher (Western Flycatcher)	Rare
Buff-breasted Flycatcher	Rare
Rose-throated Becard	Rare
Tree Swallow	Rare
Bank Swallow	Rare
Cliff Swallow	Rare
Barn Swallow	Rare
Green Jay	Rare (by Bronzed Cowbird)
Wrentit	Uncommon
Tufted Titmouse	Uncommon
Black-capped Chickadee	Rare
Carolina Chickadee	Rare
Bushtit	Rare
Brown Creeper	Rare
White-breasted Nuthatch	Rare
House Wren	Rare
Carolina Wren	Uncommon
Rock Wren	Occasional
Golden-crowned Kinglet	Rare
Ruby-crowned Kinglet	Rare
Blue-gray Gnatcatcher	Common

Black-tailed Gnatcatcher	Uncommon
Eastern Bluebird	Rare
Western Bluebird	Rare
Mountain Bluebird	Rare
Wood Thrush	Frequent
Veery	Common
Swainson's Thrush	Rare
Hermit Thrush	Rare
Gray Catbird	Uncommon
Northern Mockingbird	Rare (Brown-headed); Occasional (Bronzed)
Brown Thrasher	Occasional
Long-billed Thrasher	Common (by Bronzed Cowbird)
Curve-billed Thrasher	Rare
Bendire's Thrasher	Rare
LeConte's Thrasher	Rare (by Bronzed Cowbird)
Sprague's Pipit	Rare
Cedar Waxwing	Uncommon
Phainopepla	Rare
White-eyed Vireo	Common
Black-capped Vireo	Common; serious threat
Yellow-throated Vireo	Common
Bell's Vireo	Common
Hutton's Vireo	Uncommon
Gray Vireo	Frequent
Solitary Vireo	Common
Red-eyed Vireo	Common (one of most frequent cowbird hosts)
Warbling Vireo	Common
Philadelphia Vireo	Rare
Prothonotary Warbler	Frequent
Blue-winged Warbler	Frequent
Golden-winged Warbler	Uncommon
Tennessee Warbler	Rare
Orange-crowned Warbler	Rare
Nashville Warbler	Uncommon
Virginia's Warbler	Rare
Lucy's Warbler	Occasional
Northern Parula	Uncommon
Tropical Parula	Common
Black-and-White Warbler	Frequent
Black-throated Blue Warbler	Uncommon
Cerulean Warbler	Uncommon
Cape May Warbler	Rare
Chestnut-sided Warbler	Frequent
Blackburnian Warbler	Uncommon
Magnolia Warbler	Uncommon
Yellow-rumped Warbler	Common in East, Rare in West
Black-throated Gray Warbler	Rare
Townsend's Warbler	Rare
Hermit Warbler	Rare
Black-throated Green Warbler	Uncommon

Golden-cheeked Warbler	Frequent; threatened by cowbirds
Yellow-throated Warbler	Rare
Grace's Warbler	Rare
Kirtland's Warbler	Frequent; threatened by cowbirds
Prairie Warbler	Frequent
Bay-breasted Warbler	Rare
Pine Warbler	Uncommon
Palm Warbler	Uncommon
Yellow Warbler	Common (one of the 3 most frequent hosts)
Mourning Warbler	Uncommon
MacGillivray's Warbler	Uncommon
Connecticut Warbler	Uncommon
Kentucky Warbler	Uncommon
Canada Warbler	Common
Wilson's Warbler	Uncommon
Hooded Warbler	Frequent
Worm-eating Warbler	Rare
Swainson's Warbler	Common
Ovenbird	Frequent
Louisiana Waterthrush	Common
Northern Waterthrush	Uncommon (?)
Common Yellowthroat	common; (one of 3 most frequent hosts)
Yellow-breasted Chat	Frequent, Brown-headed; rare, Bronzed
American Redstart	Frequent
Painted Redstart	Rare
Rose-breasted Grosbeak	Common
Black-headed Grosbeak	Uncommon
Northern Cardinal	Common
Pyrrhuloxia	Uncommon
Blue Grosbeak	Frequent
Indigo Bunting	Frequent
Lazuli Bunting	Uncommon
Painted Bunting	Frequent
Varied Bunting	Rare
Olive Sparrow	Uncommon (by Brown-headed and Bronzed)
Rufous-sided Towhee	Frequent
Green-tailed Towhee	Uncommon
Canyon Towhee	Uncommon
California Towhee	Uncommon
Abert's Towhee	Common (may be threatened by cowbirds)
Grasshopper Sparrow	Uncommon
Baird's Sparrow	Uncommon
Henslow's Sparrow	Uncommon
LeConte's Sparrow	Uncommon
Seaside Sparrow	Rare
Sharp-tailed Sparrow	Rare
Vesper Sparrow	Common

Savannah Sparrow	Uncommon
Lark Sparrow	Occasional
Black-throated Sparrow	Uncommon
Five-striped Sparrow	Frequent
Sage Sparrow	Uncommon
Bachman's Sparrow	Uncommon
Cassin's Sparrow	Uncommon
Rufous-winged Sparrow	Uncommon
Field Sparrow	Frequent
Chipping Sparrow	Frequent
Clay-colored Sparrow	Common
Brewer's Sparrow	Uncommon
Black-chinned Sparrow	Uncommon
Dark-eyed Junco	Uncommon
White-crowned Sparrow	Uncommon
White-throated Sparrow	Uncommon
Fox Sparrow	Uncommon
Lincoln's Sparrow	Rare
Swamp Sparrow	Common
Chestnut-collared Longspur	Uncommon
McCown's Longspur	Uncommon
Dickcissel	Frequent
Lark Bunting	Uncommon
Bobolink	Uncommon
Western Meadowlark	Uncommon
Eastern Meadowlark	Common
Red-winged Blackbird	Frequent
Yellow-headed Blackbird	Rare
Rusty Blackbird	Rare
Brewer's Blackbird	Common
Common Grackle	Rare
Scott's Oriole	Rare (by Bronzed Cowbird)
Orchard Oriole	Common
Audubon's Oriole	Frequent (by Bronzed Cowbird)
Northern Oriole	Uncommon
Hooded Oriole	Frequent (by Bronzed Cowbird)
Altamira Oriole	Frequent (by Bronzed Cowbird)
Scarlet Tanager	Common
Western Tanager	Rare
Summer Tanager	Uncommon
Hepatic Tanager	Rare
Pine Siskin	Uncommon
Lawrence's Goldfinch	Rare
Lesser Goldfinch	Rare
American Goldfinch	Common
Purple Finch	Uncommon
House Finch	Uncommon (West), Common (East)
Evening Grosbeak	Rare

Appendix B.

COWBIRDS BROOD PARASITISM BY CATEGORY

COMMON

Eastern Kingbird  
Eastern Phoebe  
Acadian Flycatcher  
Willow Flycatcher  
Blue-gray Gnatcatcher  
Veery  
Long-billed Thrasher (by Bronzed)  
White-eyed Vireo  
Black-capped Vireo  
Yellow-throated Vireo  
Bell's Vireo  
Solitary Vireo  
Red-eyed Vireo  
Warbling Vireo  
Tropical Parula  
Yellow-rumped Warbler (in eastern U.S.)  
Yellow Warbler  
Canada Warbler  
Swainson's Warbler  
Louisiana Waterthrush  
Common Yellowthroat  
Rose-breasted Grosbeak  
Northern Cardinal  
Abert's Towhee  
Vesper Sparrow  
Song Sparrow  
Clay-colored Sparrow  
Swamp Sparrow  
Eastern Meadowlark  
Brewer's Blackbird  
Orchard Oriole  
Scarlet Tanager  
American Goldfinch  
House Finch (eastern U.S.)

FREQUENT

Wood Thrush  
Gray Vireo  
Prothonotary Warbler  
Blue-winged Warbler  
Black-and-white Warbler  
Chestnut-sided Warbler  
Golden-cheeked Warbler  
Kirtland's Warbler  
Prairie Warbler

FREQUENT cont.

Kentucky Warbler  
Hooded Warbler  
Ovenbird  
Yellow-breasted chat (by Brown-headed)  
American Redstart  
Blue Grosbeak  
Indigo Bunting  
Painted Bunting  
Rufous-sided Towhee  
Five-striped Sparrow  
Field Sparrow  
Chipping Sparrow  
Dickcissel  
Red-winged Blackbird  
Audubon's Oriole (by Bronzed)  
Hooded Oriole (by Bronzed)  
Altamira Oriole (by Bronzed)

OCCASIONAL

Alder Flycatcher  
Rock Wren  
Northern Mockingbird (by Bronzed)  
Brown Thrasher  
Lucy's Warbler  
Lark Sparrow

UNCOMMON

Eastern Wood-Pewee  
Least Flycatcher  
Wrentit  
Tufted Titmouse  
Carolina Wren  
Black-tailed Gnatcatcher  
Gray Catbird  
Cedar Waxwing  
Hutton's Vireo  
Golden-winged Warbler  
Nashville Warbler  
Northern Parula  
Black-throated Blue Warbler  
Cerulean Warbler  
Blackburnian Warbler  
Nagnolia Warbler  
Black-throated Green Warbler  
Pine Warbler  
Palm Warbler  
Mourning Warbler  
MacGillivray's Warbler

UNCOMMON cont.

Connecticut Warbler  
Wilson's Warbler  
Northern Waterthrush ?  
Black-headed Grosbeak  
Pyrrhuloxia  
Lazuli Bunting  
Olive Sparrow (by Brown-headed and Bronzed)  
Canyon Towhee  
California Towhee  
Green-tailed Towhee  
Grasshopper Sparrow  
Baire's Sparrow  
Henslow's Sparrow  
LeConte's Sparrow  
Savannah Sparrow  
Black-throated Sparrow  
Sage Sparrow  
Bachman's Sparrow  
Cassin's Sparrow  
Rufous-winged Sparrow  
Brewer's Sparrow  
Black-chinned Sparrow  
Dark-eyed Junco  
White-crowned Sparrow  
White-throated Sparrow  
Fox Sparrow  
Chestnut-collared Longspur  
McCown's Longspur  
Lark Bunting  
Bobolink  
Western Meadowlark  
Northern Oriole  
Summer Tanager  
Pine Siskin  
Purple Finch  
House Finch (western U.S.)

RARE

Common Ground Dove  
Mourning Dove (both Brown-headed and Bronzed)  
Western Kingbird  
Tropical Kingbird (by Bronzed)  
Couch's Kingbird ? (by Bronzed)  
Scissor-tailed Flycatcher (by both Brown-headed and Bronzed)  
Great Crested Flycatcher  
Olive-sided Flycatcher  
Western Wood Pewee  
Black Phoebe  
Say's Phoebe



Rare cont.

Vermilion Flycatcher  
Yellow-bellied Flycatcher  
Western Flycatcher (Pacific Slope and Cordilleran Flycatchers)  
Buff-breasted Flycatcher  
Rose-throated Becard (by Bronzed)  
Tree Swallow  
Bank Swallow  
Cliff Swallow  
Barn Swallow  
Green Jay (by Bronzed)  
Black-capped Chickadee  
Carolina Chickadee  
Bushtit  
Brown Creeper  
White-breasted Nuthatch  
House Wren  
Golden-crowned Kinglet  
Ruby-crowned Kinglet  
Eastern Bluebird  
Western Bluebird  
Mountain Bluebird  
Swainson's Thrush  
Hermit Thrush  
Northern Mockingbird (by Brown-headed)  
Curve-billed Thrasher  
Bendire's Thrasher  
LeConte's Thrasher (by Bronzed)  
Sprague's Pipit  
Phainopepla  
Philadelphia Vireo  
Tennessee Warbler  
Orange-crowned Warbler  
Virginia's Warbler  
Cape May Warbler  
Yellow-rumped Warbler (in Western U.S.)  
Black-throated Gray Warbler  
Townsend's Warbler  
Hermit Warbler  
Yellow-throated Warbler  
Grace's Warbler  
Bay-breasted Warbler  
Worm-eating Warbler  
Yellow-breasted Warbler (by Bronzed)  
Painted Redstart  
Varied Bunting  
Seaside Sparrow  
Sharp-tailed Sparrow  
Lincoln's Sparrow  
Yellow-headed Blackbird  
Rusty Blackbird

RARE cont.

Common Grackle  
Scott's Oriole (by Bronzed)  
Western Tanager  
Hepatic Tanager  
Lawrence's Goldfinch  
Lesser Goldfinch  
Evening Grosbeak

Appendix C.

SPECIES KNOWN TO REJECT COWBIRD EGGS

Eastern Kingbird - Usually ejects or damages cowbird eggs  
Couch's Kingbird - ejects eggs of Bronzed Cowbird  
Eastern Phoebe - may build second floor over cowbird eggs  
Gray Catbird - ejects eggs from nest  
Sage Thrasher - rejects eggs  
Crissal Thrasher - ejects eggs  
Cedar Waxwing - deserts nest, ejects eggs or damages cowbird eggs  
Yellow-throated Vireo - occasionally builds second floor over  
cowbird eggs  
Bell's Vireo - occasionally builds second floor over cowbird eggs  
Gray Vireo - occasionally builds second floor over cowbird eggs  
Solitary Vireo - often builds second floor if cowbird egg laid  
first  
Chestnut-sided Warbler - may destroy cowbird eggs by burying them  
in botton of nest  
Yellow-rumped Warbler - may bury cowbird eggs in botton of nest  
Prairie Warbler - often deserts parasitized nest  
Pine Warbler - may bury cowbird eggs in bottom of nest  
Palm Warbler - may bury cowbird eggs in bottom of nest  
Yellow Warbler - may bury cowbird eggs in bottom of nest  
American Redstart - may bury cowbird eggs in bottom of nest  
Indigo Bunting - may bury cowbird eggs in bottom of nest  
Clay-colored Sparrow - may desert parasitized nest  
Great-tailed Grackle - ejects eggs of Bronzed Cowbird  
Northern Oriole - may eject eggs

## Appendix D.

1991 CHRISTMAS BIRD COUNTS:  
TOTAL COWBIRDS RECORDED

<u>STATE</u>	<u>BROWN-HEADED</u>	<u>BRONZED</u>	<u>SHINY</u>
Alabama	2,548		
Alaska	none		
Arizona	1,169	4	
Arkansas	21,413		
California	8,634		
Colorado	147		
Connecticut	2,699		
Delaware	9,077		
Florida	33,440	3	3
Georgia	1,332		
Hawaii	none		
Idaho	4		
Illinois	12,603		
Indiana	6,923		
Iowa	736		
Kansas	983	15	
Kentucky	1,106		
Louisiana	1,478,631	2	
Maine	19		
Maryland	6,792		
Massachusetts	429		
Michigan	2,461		
Minnesota	23		
Mississippi	3,342		
Missouri	1,040		
Montana	none		
Nebraska	2		
Nevada	639		
New Hampshire	31		
New Jersey	7,541		
New Mexico	715		
New York	2,069		
North Carolina	32,074		
North Dakota	none		
Ohio	2,299		
Oklahoma	4,668		
Oregon	310		
Pennsylvania	9,703		
Rhode Island	1,642		
South Carolina	1,950		
South Dakota	1		
Tennessee	15,217		
Texas	238,775	8,029	
Utah	13		
Vermont	168		

1991 CHRISTMAS BIRD COUNTS:  
TOTAL COWBIRDS RECORDED cont.

<u>STATE</u>	<u>BROWN-HEADED</u>	<u>BRONZED</u>	<u>SHINY</u>
Virginia	8,340		
Washington	205		
West Virginia	40		
Wisconsin	468		
Wyoming	1		
District of Columbia	1,017		

Appendix E.

SELECTED REFERENCES

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