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**1995 AREA 1 BIRD SURVEY/
ZONE 1, OPERABLE UNIT 2
ROBINS AIR FORCE BASE, GEORGIA**

August 1995

Prepared for
HAZARDOUS WASTE REMEDIAL ACTIONS PROGRAM
ENVIRONMENTAL AND ENRICHMENT
FACILITY MANAGEMENT
OAK RIDGE, TENNESSEE 37831

by the
OAK RIDGE NATIONAL LABORATORY
Oak Ridge, Tennessee 37831
managed by
LOCKHEED MARTIN ENERGY SYSTEMS, INC.
for the
DEPARTMENT OF ENERGY
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CDM FEDERAL PROGRAMS CORPORATION
Atlanta, Georgia 30339

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1995 AREA 1 BIRD SURVEY/
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M. C. Wade
ORNL Staff Member

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1. INTRODUCTION

Robins Air Force Base is located in Warner Robins, Georgia, approximately 90 miles southeast of Atlanta, Georgia. As part of the Baseline Investigation (CDM Federal 1994) a two day bird survey was conducted by M. C. Wade (Oak Ridge National Laboratory) and B. A. Beatty (CDM Federal Programs) in May 1995. The subject area of investigation includes the sludge lagoon, Landfill No. 4, and the wetland area east of the landfill and west of Hannah Road (including two ponds) (Fig. 1). This is known as Area 1. The Area 1 wetlands include bottomland hardwood forest, stream, and pond habitats.

2. OBJECTIVE

The objectives of this survey were to document bird species using the Area 1 wetlands (Fig. 1) and to see if the change in hydrology (due to the installation of the Sewage Treatment Plant effluent diversion and stormwater runoff control systems) has resulted in changes at Area 1 since the previous survey of May 1992 (CDM Federal 1994).

3. METHODS

A census of birds was conducted using the variable circular-plot method (Reynolds et al. 1980). In the variable circular-plot method, stations are established within a plant community either at equal intervals along a transect or scattered at distances which minimize the possibility of counting the same bird twice. Each bird seen or heard during a specified time period is counted and the horizontal distance from the point to the bird is recorded.

Field observations for the bird survey were documented from two main areas. These areas include (1) the wetlands east and southeast of Landfill No. 4 and (2) the ponds at Light Service Road and Hannah Road (Fig. 1).

Fig. 1. Area 1 study area including stations L1-L5 and the transect survey location.

Observations in the landfill area were recorded from five (L1–L5) widely scattered stations (Fig. 1). All of these stations were associated with bottomland hardwood forests adjacent to Landfill No. 4 and correspond, except for L4 and L5, to the same locations used in the 1992 bird survey. Due to exceptionally high water conditions along Hannah Road, surveys for L4 and L5 could not be conducted at the same exact locations used in 1992. Locations as close as possible to the originals were used instead. Additional observations were made at the ponds (Fig. 1).

To assure that all birds would be counted within the effective detection distance, the maximum listening time of 10 minutes as described by Reynolds et al. 1980 was used. On each day, surveys were conducted within 3.5 to 4.5 hours of local sunrise, the time of greatest bird activity (Robbins 1981). Each station was censused twice. The direction from which the bird was seen or heard was also recorded. Birds were recorded as singing males, nonsinging males, females, immatures, or birds of unknown sex or age. Flyovers were recorded incidentally when sighted. An additional transect survey by vehicle was conducted between Landfill No. 4 and the residential area to the south (Fig. 1). A nocturnal survey for owls was completed using tape recordings at Light Service Road (Fig. 1).

4. RESULTS

Bird surveys were conducted at the Stations L1–L5 and the pond area on May 16 and 17, 1995. The results are presented in Sections 4.1.1 and 4.2.1 below. Forty-seven bird species were identified during the two days.

A comparison of breeding season (May to August) survey results of a four day survey in May of 1992 with observations recorded from 1993–1995 (including informal observations in 1993 and 1994 and the formal two day survey in 1995) for the Landfill No. 4 area is included in Section 4.1.2. A similar comparison of survey results from 1991–1992 with results of 1993–1995 is included in Section 4.2.2 for the pond area. These comparisons are important because in 1993 two major projects were completed that changed the flow of water in Area 1. The sewage treatment plant effluent was diverted away from Area 1 to the Ocumulgee River in the spring of 1993 and a runoff control system around Landfill No. 4 was installed in the winter of 1993 (Fig. 1). A complete listing of birds is included in Appendix A.

4.1 LANDFILL AREA

4.1.1 1995 Survey Results

Forty-two species were identified in the landfill area during the two day survey (Table 1 part A). Fifteen of the 42 species recorded are considered to be forest-dependent (i.e., birds dependent on contiguous forest habitats). With the exception of green-backed and great-blue herons (wetland species recorded as flyovers) the remaining bird species recorded could generally be classified as forest-edge species. Forest-edge species are species which frequent fragmented forests, field, old field, suburban, or forest-edge (the meeting of field and forest) habitats.

Other notable wildlife observations includes one adult beaver (*Castor canadensis*) near a culvert in the vicinity of L4. It was the damming of this culvert and resultant high water levels which made access to the original L4 and L5 survey locations (established in 1992) impossible. A raccoon (*Procyon lotor*) was seen in the vicinity of L4. An eastern grey squirrel (*Sciurus carolinensis*) and snapping turtle (*Chelydra serpentina*) were observed on the transect between the residential area and the landfill (Fig. 1).

4.1.2 Comparison of 1992 to 1993–1995 Results

From 1993–1995 47 species of birds were documented in the landfill area while 44 were noted in 1992 (Table 2). Overall, the bird species recorded between 93 and 95 are very similar to those identified in 1992. Thirty-eight species were common to both survey periods. The same four woodpecker species and two vireo species were recorded for each survey period. Six warblers (prothonotary, pine, Kentucky, and hooded warblers, northern parula, and common yellowthroat) were observed from 1993 to 1995 as opposed to seven (prothonotary, yellow-throated, Kentucky, hooded, and Swainson's warblers, common yellowthroat, and American redstart) in 1992. Five forest-dependent species (red-tailed hawk, barred owl, yellow-throated vireo, northern parula, and pine warbler) were identified in 1993–1995 that were not in 1992 and six forest-dependent species (eastern wood pewee, red-eyed vireo, yellow-throated warbler, Swainson's warbler, American redstart, and scarlet tanager) were identified in 1992 that were not recorded in 1993–1995. It is noteworthy that three forest-dependent warbler species (yellow-throated, Swainson's, and American redstart) were not recorded from 1993–1995.

**Table 1. Birds identified May 16 and 17, 1995, Robins Air Force Base,
Warner Robins, Georgia**

Part A—Landfill Area (L1-L5)	Part B—Pond Area
Green-backed Heron	Great-blue Heron
Great-blue Heron	Killdeer
*Red-shouldered Hawk	Red-shouldered Hawk
*Red-tailed Hawk	Mourning Dove
Mourning Dove	Yellow-billed Cuckoo
*Yellow-billed Cuckoo	Barred Owl ^b
*Barred Owl	Chimney Swift
Common Nighthawk	Belted Kingfisher
Chimney Swift	Pileated Woodpecker
*Ruby-throated hummingbird ^a	Blue Jay
Red-bellied Woodpecker	American Crow
Northern Flicker ^a	Tufted Titmouse
Downy Woodpecker ^a	Carolina Chickadee
*Pileated Woodpecker	Carolina Wren
*Acadian Flycatcher	Blue-gray Gnatcatcher
Blue Jay	Northern Mockingbird
American Crow	White-eyed Vireo
Fish Crow	Prothonotary Warbler
Tufted Titmouse	Indigo Bunting
Carolina Chickadee	Red-winged Blackbird
Carolina Wren	Common Grackle
Blue-gray Gnatcatcher	Orchard Oriole
*Wood Thrush	
American Robin	
Northern Mockingbird	
Brown Thrasher	
European Starling	
White-eyed Vireo	
*Prothonotary Warbler	
*Northern Parula ^a	
*Pine Warbler	
*Kentucky Warbler	
*Hooded Warbler	
Common Yellowthroat	
Northern Cardinal	
Indigo Bunting	
*Rufous-sided Towhee	
Red-winged Blackbird	
Brown-headed Cowbird	
Common Grackle	
*Summer Tanager	
House Finch ^a	

*Forest-dependent (Robbins 1979)

^aTransect survey between residential and the landfill.

^bIdentified by use of audio tapes.

**Table 2. Comparisons of birds recorded from 1993–1995 and in 1992 in
Area 1 (Landfill No. 4 area)**

Species	1993–95 observations	1992 observations
Green-backed Heron	X	
Great-blue Heron	X	
Killdeer ^c	X	X
Red-shouldered Hawk	X	X
Red-tailed Hawk	X	
Northern Bobwhite		X
Mourning Dove	X	X
Yellow-billed Cuckoo	X	X
Barred Owl	X	
Common Nighthawk	X	
Chimney Swift	X	X
Ruby-throated hummingbird ^a	X	X
Red-bellied Woodpecker	X	X
Northern Flicker ^a	X	X
Downy Woodpecker ^a	X	X
Pileated Woodpecker	X	X
Eastern Kingbird		X
Eastern Wood Pewee		X
Eastern Phoebe ^b	X	
Acadian Flycatcher	X	X
Blue Jay	X	X
American Crow	X	X
Fish Crow	X	X
Tufted Titmouse	X	X
Carolina Chickadee	X	X
Carolina Wren	X	X
Blue-gray Gnatcatcher	X	X
Wood Thrush	X	X
American Robin	X	X
Loggerhead Shrike ^c	X	X
Northern Mockingbird	X	X
Brown Thrasher	X	X
European Starling	X	X
White-eyed Vireo	X	X
Yellow-throated Vireo ^b	X	
Red-eyed Vireo		X
Prothonotary Warbler	X	X
Northern Parula ^a	X	
Yellow-throated Warbler		X
Pine Warbler	X	
Kentucky Warbler	X	X
Hooded Warbler	X	X
Swainson's Warbler		X
Common Yellowthroat	X	X
American Redstart		X
Northern Cardinal	X	X
Indigo Bunting	X	X
Rufous-sided Towhee	X	X
Eastern Meadowlark ^a	X	X
Red-winged Blackbird	X	
Brown-headed Cowbird	X	X
Common Grackle	X	X
Scarlet Tanager		X
Summer Tanager	X	X
House Finch ^a	X	

^aTransect survey between residential and the landfill.

^bSeen in 1993 only.

^cSeen in 1994 only.

4.2 POND AREA

4.2.1 1995 Survey Results

Twenty-two bird species were identified in the pond area (Table 1 part B). Five of the 22 species (red-shouldered hawk, yellow-billed cuckoo, barred owl, pileated woodpecker, and prothonotary warbler) are forest-dependent. Four others are wetland dependent (great-blue heron, killdeer, belted kingfisher, and red-winged blackbird). The remaining 13 birds are forest-edge species. Four barred owls were identified using tape recordings at Light Service Road.

4.2.2 Comparison of 1991–1992 to 1993–1995 Results

From 1993 to 1995, 38 bird species were recorded versus 48 in 1991 and 1992 (Table 3). It is interesting to note that 23 out of 48 species (48%) identified in 1991 and 1992 were not recorded during the breeding season of 1993–1995.

The water levels of the ponds has decreased and allowed the area to change from basically pond habitat to a stream and wetland habitat dominated by cattails (*Typha sp.*). This area is now used extensively by common grackles and red-winged blackbirds as breeding habitat.

Only one large wading bird (great-blue heron), was seen in the pond area in 1995. In 1993 and 1994 little blue heron, snowy egret, and white ibis were identified. A group (15 individuals) of immature white ibis were observed in the summer of 1993. Green-backed heron, cattle egret, and great egret were identified in 1991 and 1992.

Fish eating birds (anhinga and double-crested cormorants) were noted in 1991 and 1992 and were not seen from 1993–1995. In 1992 barred owls were observed feeding extensively on fish in the shallows of the larger pond. This behavior was not observed from 1993–1995, even though the owls were called in with use of audio tapes in 1995.

Only one nutria (*Myocastor coypus*) was seen during the survey of 1995. In 1992, however, nutria heavily populated the pond area. The change may be due to the presence of American alligators (*Alligator mississippiensis*), a major predator of nutria (Chapman and Feldhammer 1982),

Table 3. Comparison of birds recorded from 1993–1995 to those recorded from 1991–1992 in the Pond Area

Species	1993–95	1991–1992
Anhinga		X
Double-crested Cormorant		X
Green-backed Heron		X
Little Blue Heron ^c	X	
Cattle Egret		X
Snowy Egret ^a	X	
Great Egret		X
Great-blue Heron	X	X
White Ibis ^a	X	
Mallard		X
Blue-winged Teal ^b	X	
Wood Duck ^a	X	X
Killdeer	X	X
Lesser Yellowlegs		X
Solitary Sandpiper		X
Spotted Sandpiper		X
Short-billed Dowitcher ^b	X	
Red-shouldered Hawk	X	X
Broad-winged Hawk		X
Red-tailed Hawk		X
Mourning Dove	X	X
Yellow-billed Cuckoo	X	X
Barred Owl	X	X
Chimney Swift	X	X
Belted Kingfisher	X	X
Red-bellied Woodpecker ^b	X	
Northern Flicker		X
Yellow-bellied Sapsucker		X
Downy Woodpecker ^b	X	X
Pileated Woodpecker	X	X
Eastern Kingbird		X
Acadian Flycatcher ^a	X	
Tree Swallow		X
Northern Rough-winged Swallow ^b	X	
Barn Swallow		X
Blue Jay	X	X
American Crow	X	X
Fish Crow		X
Tufted Titmouse	X	
Carolina Chickadee	X	X
Carolina Wren	X	X
Blue-gray Gnatcatcher	X	
Eastern Bluebird ^b	X	X
Loggerhead Shrike		X
Gray Catbird		X
Northern Mockingbird	X	X
Brown Thrasher ^b	X	X
European Starling ^a	X	X
White-eyed Vireo	X	X
Prothonotary Warbler	X	
Yellow-rumped Warbler		X
Yellow Warbler ^b	X	
Common Yellowthroat ^b	X	X
Northern Cardinal		X
Indigo Bunting	X	
Rufous-sided Towhee		X
Song Sparrow		X
Red-winged Blackbird	X	X
Brown-headed Cowbird ^b	X	X
Common Grackle	X	X
Orchard Oriole	X	

^aTransect survey between residential and the landfill.

^bSeen in 1993 only.

^cSeen in 1994 only.

from 1993 to 1995 that were not observed during the 1992 survey (Chapman and Feldhammer 1998, Hamilton and Whitaker 1979). Wood ducks with young were observed in 1993. Blue-winged teal have been observed during the breeding season in the pond area and may be breeding.

4.3 FOOD WEBS

As a result of all the surveys (informal and formal) conducted since the Ecological Risk Assessment was finalized in 1992, the terrestrial and aquatic food web models used in that report can be updated. These refined models appear as Figs. 2 and 3.

The only change to the terrestrial food web is the substitution of first level consumers Acadian flycatcher/scarlet tanager for small bird. Changes to the aquatic food web include adding the insectivore Acadian flycatcher and top level predators red-shouldered hawk and bobcat. The nutria is now included as a food source for the alligator.

5. CONCLUSIONS

5.1 LANDFILL NO.4 AREA

It appears that hydrology changes in Area 1 have not impacted avian habitat or bird use. The landfill area is providing habitat for a number of bird species. Forty-two bird species were identified during the two day survey of May 1995. There is still a mixture of forest-dependent and forest-edge species using these habitats. However, there was a decrease in the number of forest-dependent warbler species identified from 1993 to 1995 versus the 1992 survey. This may be more of a reflection of forest habitat fragmentation that has resulted from construction projects (e.g., runoff control, leachate collection, landfill access roads, and fence installation) rather than from changes in hydrology.

Fig. 2. Updated terrestrial food web for Area 1.

Fig. 3. Updated aquatic food web for Area 1.

5.2 POND AREA

In the pond area, it appears that hydrology changes, which resulted in lower surface water levels in Area 1, may have had some impact on avian habitat. The pond areas are still being used by a number of birds as shown in Table 3. However, the bird species composition has changed dramatically since 1992. Twenty-three out of 48 species seen in 1991 and 1992 were not identified during the surveys of 1993–1995.

The water level of the ponds has decreased, changing the habitats from basically pond to a stream and wetland habitat dominated by cattails. There is now more opportunity for birds that nest in shrub habitats (i.e., blackbirds and grackles).

The area seems to be used less by fish eating birds, possibly due to the decrease in the amount of shallow fishing areas available. No barred owls were observed in 1995 feeding on fish as they were in 1992.

Finally, the lower water level in the ponds exposes potentially contaminated sediments that were previously covered by water. This means more birds (e.g., ibis, egrets, herons) and other wildlife could be exposed to the sediments, which would then increase the likelihood of contaminant uptake in the food chain.

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APPENDIX A—OVERALL BIRD LISTS

Anhinga (*Anhinga anhinga*)
 Double-crested Cormorant (*Phalacrocorax auritus*)
 Green-backed Heron (*Butorides striatus*)
 Little Blue Heron (*Egretta caerulea*)
 Cattle Egret (*Bubulcus ibis*)
 Snowy Egret (*Egretta thula*)
 Great Egret (*Casmerodius albus*)
 Great-blue Heron (*Ardea herodias*)
 White Ibis (*Eudocimus albus*)
 Mallard (*Anas platyrhynchos*)
 Blue-winged Teal (*Anas discors*)
 Wood Duck (*Aix sponsa*)
 Killdeer (*Charadrius vociferus*)
 Lesser Yellowlegs (*Tringa flavipes*)
 Solitary Sandpiper (*Tringa solitaria*)
 Spotted Sandpiper (*Actitis macularia*)
 Short-billed Dowitcher (*Limnodromus griseus*)
 Red-shouldered Hawk (*Buteo lineatus*)
 Broad-winged Hawk (*Buteo platypterus*)
 Red-tailed Hawk (*Buteo jamaicensis*)
 Northern Bobwhite (*Colinus virginianus*)
 Mourning Dove (*Zenaida macroura*)
 Yellow-billed Cuckoo (*Coccyzus americanus*)
 Barred Owl (*Strix varia*)
 Common Nighthawk (*Chordeiles minor*)
 Chimney Swift (*Chaetura pelagica*)
 Ruby-throated hummingbird (*Archilochus colubris*)
 Belted Kingfisher (*Megacerlye alcyon*)
 Red-bellied Woodpecker (*Melanerpes carolinus*)
 Northern Flicker (*Colaptes auratus*)
 Yellow-bellied Sapsucker (*Sphyrapicus varius*)
 Downy Woodpecker (*Picoides pubescens*)
 Pileated Woodpecker (*Dryocopus pileatus*)
 Eastern Kingbird (*Tyrannus tyrannus*)
 Eastern Wood Pewee (*Contopus virens*)
 Eastern Phoebe (*Sayornis phoebe*)
 Acadian Flycatcher (*Empidonax virens*)
 Tree Swallow (*Tachycineta bicolor*)
 Northern Rough-winged Swallow (*Steigodopteryx serripennis*)
 Barn Swallow (*Hirundo rustica*)
 Blue Jay (*Cyanocitta cristata*)
 American Crow (*Corvus brachyrhynchos*)

Fish Crow (*Corvus ossifragus*)
 Tufted Titmouse (*Parus bicolor*)
 Carolina Chickadee (*Parus carolinensis*)
 Carolina Wren (*Thryothorus ludovicianus*)
 Blue-gray Gnatcatcher (*Polioptila caerulea*)
 Eastern Bluebird (*Sialia sialis*)
 Wood Thrush (*Hylocichla mustelina*)
 American Robin (*Turdus migratorius*)
 Loggerhead Shrike (*Lanius ludovicianus*)
 Gray Catbird (*Dumetella carolinensis*)
 Northern Mockingbird (*Mimus polyglottos*)
 Brown Thrasher (*Toxostoma rufum*)
 European Starling (*Sturnus vulgaris*)
 White-eyed Vireo (*Vireo griseus*)
 Yellow-throated Vireo (*Vireo flavifrons*)
 Red-eyed Vireo (*Vireo olivaceus*)
 Prothonotary Warbler (*Prothonotaria citrea*)
 Northern Parula (*Parula americana*)
 Yellow-rumped Warbler (*Dendroica magnolia*)
 Yellow-throated Warbler (*Dendroica dominica*)
 Pine Warbler (*Dendroica pinus*)
 Yellow Warbler (*Dendroica petechia*)
 Kentucky Warbler (*Oporornis formosus*)
 Hooded Warbler (*Wilsonia citrina*)
 Swainson's Warbler (*Limnethlypis swainsonii*)
 Common Yellowthroat (*Gleothlypis trichas*)
 American Redstart (*Setophaga ruticilla*)
 Northern Cardinal (*Cardinalis cardinalis*)
 Indigo Bunting (*Passerina cyanea*)
 Rufous-sided Towhee (*Pipilo erythrophthalmus*)
 Song Sparrow (*Melospiza melodia*)
 Eastern Meadowlark (*Sturnella magna*)
 Red-winged Blackbird (*Agelaius phoeniceus*)
 Brown-headed Cowbird (*Molothrus ater*)
 Common Grackle (*Quiscalus quiscula*)
 Orchard Oriole (*Icterus spurius*)
 Scarlet Tanager (*Piranga olivacea*)
 Summer Tanager (*Piranga rubra*)
 House Finch (*Carpodacus mexicanus*)

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