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## BIRDS OF THE OAK RIDGE RESERVATION

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**Abstract.** For more than 50 years, the security buffer land for the Department of Energy (DOE) nuclear and research facilities at Oak Ridge, Tennessee, has provided long-term habitat conservation for many bird species, including some which are protected because of their rarity. The Oak Ridge Reservation (ORR) is rich in important bird habitats that are being lost throughout the United States. These include large blocks of mature interior forest; extensive areas of undisturbed wetlands, open water, and riparian vegetation; and several hundred hectares of grass meadow. Numerous surveys have been conducted of the birds of the ORR since 1954. This paper summarizes the findings of those surveys and also reports in detail the results of breeding bird point counts conducted in 1995 and 1996 by the Partners in Flight (PIF) program of Tennessee. Nearly 200 species of birds are known to use the ORR, with more than 100 species present during the nesting season. Seventeen of these have state or federal protection. Seventeen of the 20 breeding birds identified by the PIF Program as preliminary priorities for conservation in the Ridge and Valley Province also use the ORR, and some are abundant. Fifteen of these are present during the breeding season. This richness of protected and conservation priority species is an indication of the value of the ORR both regionally and nationally in conserving bird diversity.

## INTRODUCTION

The Oak Ridge Reservation (ORR), consisting of the Oak Ridge National Environmental Research Park and associated lands surrounding Department of Energy (DOE) facilities at Oak Ridge, Tennessee, is about 15,000 ha of mostly native contiguous forest in Roane and Anderson Counties in east Tennessee. Relatively protected from urbanization and intensive agriculture for more than 50 years, the ORR has become an important site for conservation of many plant and animal species, including birds, especially those species that require large blocks of contiguous habitat (Mann et al. 1996, Mitchell et al. 1996). Although researchers have published species lists from projects and ecological studies on the ORR for many years (Krumholz 1954, Howell 1958, Anderson and Shugart 1974, Anderson et al. 1977, PMC 1977, Kroodsma 1982, Kroodsma 1984a, Kroodsma 1984b, Smith and Shugart 1987, Hardy 1991, Minser et al. 1992, Buehler 1994,

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Mitchell 1998), a comprehensive inventory has not been completed.

The earliest documentation of birds on the ORR was a species list compiled during a three-year intensive field study in and around White Oak Lake and White Oak Creek (Krumholz 1954). This study was followed a few years later by a June grid-point survey of birds at 157 points in about 3400 acres in the White Oak Creek and Melton Branch Watersheds (Howell 1958). These two study areas partially overlapped, but the Krumholz study focussed on the vicinity of White Oak Creek, which was primarily wetlands, abandoned farm fields, and small wood lots, and included species seen throughout the year. The Howell study covered only breeding birds but also included upland forest. Howell also documented species occurring in other areas of the ORR during June and July. Additional quantitative surveys for birds were conducted during the breeding season in the proposed Breeder Reactor Site on a large peninsula on the southwestern ORR, no longer part of the ORR (PMC 1977); on Walker Branch Research Watershed, a 100 ha area of mostly mature hardwood forest (Anderson and Shugart 1974, Smith and Shugart 1987); on several power line rights-of-way and adjacent forest (Anderson et al. 1977, Kroodsma 1982, Kroodsma 1984a, Kroodsma 1984b); and in white pine (*Pinus strobus*) and loblolly pine (*P. taeda*) plantations < 20 ha in size adjacent to hardwood forest (Hardy 1991). Kroodsma's studies spanned several years and were located throughout the Reservation on Haw and Chestnut Ridges, including part of Haw Ridge Park, no longer part of the ORR. The Breeder Reactor Site surveys included quantitative surveys in late May and mid-December as well as qualitative surveys in March, May, August, and November. Data were also collected between 1986 and 1991 as part of the Breeding Bird Atlas project (Nicholson 1997). Mitchell et al. (1996) conducted an intensive survey for threatened and endangered vertebrates on the entire ORR from 1994 to 1996 and documented seasonal occurrences of all birds seen. Through the Tennessee Wildlife Resources Agency, the ORR joined the Partners in Flight (PIF) Initiative in 1995, providing an additional impetus for compiling data about abundances and habitat use of birds on the ORR. Available data in electronic form from PIF breeding bird surveys in 1995 and 1996 are summarized herein. This paper combines these sources of information to document what is known of the birds of the ORR, their habitats, seasonal occurrence, and abundance.

### THE OAK RIDGE RESERVATION

The ORR was originally formed in 1942 from about 1000 individual farmsteads as a security buffer for military activities. Of the nearly 24,000 ha originally included in the ORR in 1942, about 15,000 ha remain mostly undeveloped - less than 3,000 ha contain developed sites for the three DOE facilities and less than 1,400 ha are in waste sites or remediation areas. The ORR is a large and nearly contiguous island of forest within a larger landscape that is fragmented by urban development and agriculture (Mann et al. 1996). Undeveloped areas of the ORR are managed as a National Environmental Research Park (NERP) Biosphere Reserve and a management unit in the Southern Appalachian Man and the Biosphere (SAMAB) regional biosphere reserve. Currently, all

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of the ORR is a wildlife management area, managed by the Tennessee Wildlife Resources Agency (TWRA) (Parr and Evans 1992).

The ORR provides three major important habitat types for birds: 1) large blocks of mature forest, which are especially important for nesting and foraging of neotropical migrants; 2) extensive areas of open water, undisturbed wetlands, streams, and riparian vegetation, which are used by wading birds, shorebirds, and waterfowl; and 3) an extensive area of grassland. All three habitat types were once common in the region but are increasingly threatened throughout the United States (Noss et al. 1995). Other important bird habitats of the ORR are early successional growth following the clearcut harvesting of pine forest land and brushy power line rights-of-way. A preliminary report on biodiversity of the ORR by The Nature Conservancy (1995) recognized 69 distinct conservation sites and three large landscape complexes that are important because of their concentrations of rare species, rare plant communities, and large blocks of relatively undisturbed native vegetation. One of these large landscape complexes includes part of areas inventoried by Krumholz (1954) and Howell (1958) more than 50 years ago and another includes Walker Branch Watershed.

Currently, about 70% of the ORR is in forest cover and about 20% is transitional, consisting of old fields, agricultural areas, recently clearcut forest lands, roadsides, and utility corridors, with the remainder in urbanized or regulated areas (Washington-Allen et al. 1995). The open agricultural fields currently make up less than 2% of the area (Mann et al. 1996). Forests are mostly oak-hickory, pine-hardwood, or pine (including plantations) with minor areas of northern hardwoods, hemlock or white pine, and floodplain forests. A major pine beetle outbreak in 1993 killed about 450 ha of loblolly pine. Most of this 450 ha is now primarily native early successional vegetation, providing important habitat for several bird species whose populations are declining throughout the region (Roedel et al. 1996).

Non-forested areas include power line rights-of-way, mowed areas near laboratory facilities, and a few grass meadows which were previously used as pasture and are now maintained by annual mowing. Some of these fields have been in continuous pasture or hayfield for more than 40 years. Most of the grass is meadow fescue (*Festuca* sp.). Some of these grassy areas are only a few hectares in size, but the Freel's Bend peninsula contains hundreds of hectares of hayfields. The Freel's Bend area is high quality habitat for grassland birds because it is extensive; is isolated from human disturbance except for annual hay harvest; and is surrounded by forest land, riparian vegetation, and open water.

Extensive wetlands and riparian vegetation are present along the Melton Hill and Watts Bar Reservoir system of the Clinch River, which forms the southwestern, southern, and southeastern boundaries of the ORR. This combination of protected natural ecosystems, river reservoirs and embayments bordering the ORR, and headwater streams of high water quality provide good foraging habitat for shorebirds, wading birds, and waterfowl. Several open water ponds near the laboratory facilities and throughout the ORR also provide habitat for waterfowl.

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### DATA SOURCES

Data in this report are from 1) available electronic files of the first two years of the PIF Breeding Bird Survey, 2) the published threatened and endangered species survey (Mitchell et al. 1996), 3) the Breeding Bird Atlas (data sheets for ORR survey blocks, see Nicholson 1997), 4) off-plot observations during the PIF Breeding Bird Survey, and 5) ongoing field surveys, especially the bimonthly environmental survey that includes incidental observations of land birds (K. Roy, 1998, personal communication). For species of conservation concern, historical data from published reports and unpublished observations are also presented.

In June 1995, the PIF Program surveyed birds during the breeding season on the ORR along 10 routes. Nine of these routes were resurveyed in 1996, and 6 routes comprised of 91 points were available in electronic form for this report. The survey was repeated during June 1996, with one route comprised of 18 points added. All ten routes comprised of 159 points surveyed in 1996 were available for this report. The added data from 1996 represent a higher percentage of early successional habitats than the data from 1995, thus favoring birds using those habitats in comparisons of the data from the two years (Table 1). A severe winter period in 1995-1996 may have caused other differences between the data from 1995 and 1996 for some year-round resident species, such as the Carolina Wren, which exhibited a dramatic decline in numbers in 1996.

Routes were placed either off-road or along little used gravel or dirt access roads. Each route was surveyed in early morning, tallying all birds heard or seen both in and outside of each 50-m radius plot during a five minute time period. Relative abundance was determined by tallying all birds heard during the survey. In 1996, about one quarter of the points were in openings or fields, with the remainder equally split between mature forest and pole-sized or younger forest.

### RESULTS AND DISCUSSION

Table 1 lists all birds observed during recent surveys and includes the majority of birds which currently use the ORR. A total of 186 species of terrestrial birds, waterfowl, wading birds, and shorebirds have been documented. In the 1995 and 1996 PIF surveys, of more than 100 bird species known to occur on the ORR during the breeding season, 76 were observed at one or more PIF points (Table 1). About half of these species are neotropical migrants. The most abundant bird observed in both 1995 and 1996 was the Red-eyed Vireo (in 1996 accounting for 12% of all birds counted and occurring at 76% of the points). In 1996, about half of all species were observed at fewer than 10 points, but 16 species were found at more than 30 points. The American Crow and Indigo Bunting were the second and third most common and abundant species, accounting for 7% and 6% of all birds counted, respectively, and occurring at 51% and 44% of the points, respectively. The other most commonly recorded species during the 1996 PIF

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counts were the Northern Cardinal, Carolina Chickadee, Wood Thrush, Yellow-breasted Chat, Tufted Titmouse, Scarlet Tanager, Blue-gray Gnatcatcher, and Yellow-billed Cuckoo. Each of these species was heard on at least 40 points and totaled over 50 individuals across all points in 1996.

The threatened and endangered species survey documented nearly twenty additional species during the breeding season, more than 30 winter resident species, more than 30 migrants, and at least one transient species (Table 1). The survey also documented the abundance and locations of 17 species with either state or federal status (Table 1). Additional species have been documented in ongoing field surveys by the authors and Tennessee Ornithological Society volunteers.

Populations of some neotropical migrants, such as the Wood Thrush and Cerulean Warbler, have declined rapidly in the last ten years (Hunter et al. 1993a, Robinson et al. 1995, Askins 1995), and Tennessee has been described as the state with the highest percentage of declining breeding birds (Walker 1997). PIF has developed a ranking system of species of conservation concern in which each species in each geographic region is ranked between 7 (low concern) and 35 (extremely high concern) based on a combination of factors. These factors are 1) global abundance, 2) global breeding distribution, 3) global wintering distribution, 4) threats during breeding season, 5) threats during non-breeding migration and wintering season, 6) local population trend, and 7) importance of the area where the species is being ranked relative to the rest of the species' range (Hunter et al. 1993a, Hunter et al. 1993b, Roedel et al. 1996, Hunter 1998). These ranks are subject to continual revision as more data becomes available. Ranks reported here for the Ridge and Valley were current in January 1998. Similar rankings for migrants and wintering birds are not yet available (Hunter 1998).

Roedel et al. (1996) discuss the twenty bird species whose populations are considered to be of "high concern, vulnerable, and likely in need of management and/or monitoring" with scores of 24 or higher in the Ridge and Valley Region of Tennessee. Of these twenty species, all but the Red-cockaded Woodpecker have been documented to occur on the ORR. All but two of the species with high PIF concern scores for the Ridge and Valley (Swainson's Warbler and Bewick's Wren) have been observed on the ORR in the current surveys and some were abundant (Table 1). In fact, four species of high concern were among the top 20 species in the 1996 ORR PIF survey in terms of percentage of points with at least one observation: Wood Thrush (8th, 33%); Field Sparrow (17th, 16%); Prairie Warbler (18th, 15%); and Hooded Warbler (20th, 13%).

In addition, among the top 10 species in percentage of points in 1996 were two other species of moderate concern (PIF scores of 19-23, of average vulnerability), both with PIF scores of 23: Yellow-breasted Chat (7th, 35%) and Yellow Billed Cuckoo (10th, 31%). Furthermore, there were six species with PIF scores of 23 or higher that were not rare during the 1996 survey. These species were observed at 3% or more of the points: Summer Tanager (Score 24; 9% of points); Acadian Flycatcher (Score 24; 6%); Kentucky Warbler (Score 23, 4%); Yellow-throated Warbler (Score 23, 4%); Worm-eating Warbler (Score 24; 3%); and Yellow-throated Vireo (Score

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26; 3%). The Black-and-white Warbler (Score 22) was only observed on one plot during the PIF surveys, but was previously reported by Howell (1954) as uncommon but widespread in upland forests and as somewhat abundant in Kroodsma's studies (1984b) with densities of 10 pairs/40 ha in some locations.

### SELECTED SPECIES ACCOUNTS

The following species found on the ORR are 1) of conservation concern in the Ridge and Valley Region (PIF concern scores greater than 23, state or federal status), 2) game birds, or 3) somewhat uncommon in the Ridge and Valley Region. Protected birds include seven raptors, six migrant waterfowl, and two grassland birds.

***Double-crested Cormorant.*** This cormorant is a migrant seen in spring, summer, and fall. It was documented in June 1994; May, July, August, and October 1995; and April 1996, at six locations along Melton Hill and Watt's Bar Reservoirs of the Clinch River, an ORNL facility pond, and East Fork Poplar Creek (Mitchell et al. 1996). It had not been previously reported from the ORR.

***Anhinga.*** A transient Anhinga was documented on 20 June 1994, at the ORNL Swan Pond (Mitchell et al. 1996). It had not been previously reported from the ORR.

***Great Blue Heron.*** This heron was reported by Krumholz (1954) and Howell (1958) who documented five occurrences in the White Oak Creek study area. At that time, it was not thought to breed on the ORR. Currently, there are two active colonies on East Fork Poplar Creek and its embayment on Watt's Bar Reservoir. These herons are commonly seen along Watt's Bar and Melton Hill reservoirs and along major streams.

***Great Egret.*** Krumholz (1954) reported this egret in the White Oak Creek study area. Recently it was documented at seven locations, including White Oak Lake, in June 1994; June through Oct 1995; and in April 1996 (Mitchell et al. 1996).

***Snowy Egret.*** This migrant was documented at beaver ponds near the K-25 facility 16 April 1996 (Mitchell et al. 1996). It had not been previously reported from the ORR.

***Little Blue Heron.*** This heron was first documented on the ORR by Krumholz (1954) in the White Oak Creek study area. It has recently been documented at two locations near the K-25 complex on the western part of the ORR and at White Oak Lake, July through September 1996, presumably during migration and post-breeding dispersal (Mitchell et al. 1996).

***Canada Goose.*** Krumholz (1954) reported Canada Goose in the White Oak Lake area prior to establishment of the nonmigratory populations in east Tennessee. Abundant man-made foraging and nesting areas on the ORR have resulted in an extremely successful non-migratory population which has been used to stock other locations (Parr and Evans 1992).

***Osprey.*** The Osprey was documented by Krumholz (1954) in the White Oak Lake study area and Kroodsma (1987) mentions their occurrence near the ORR, but not the presence of a breeding population. There are now active nest platforms on Poplar Creek, Melton Hill Reservoir, and

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Watt's Bar Reservoir that contribute to a successful breeding population of Osprey on the ORR. Mitchell et al. (1996) documented their presence in June 1994; May, June, and July 1995; March and April 1996.

**Bald Eagle.** Krumholz (1954) noted the presence of this eagle near White Oak Lake. It is known to winter on the ORR and may also be a summer resident (Mitchell et al. 1996). Seen regularly along Watt's Bar and Melton Hill Reservoirs and at Freel's Bend, it currently nests near the ORR on Watt's Bar Reservoir in Roane County (W. Yambert, 1998, personal communication). Documentation includes August 1994 and January 1996 at six locations along the reservoirs, including Freel's Bend (Mitchell et al. 1996).

**Northern Harrier.** Krumholz (1954) first documented the Northern Harrier on the ORR in the White Oak Lake study area. It was recently documented in September and November 1995 at Freel's Bend, Hembree Marsh, and at two additional locations near Watt's Bar Reservoir (Mitchell et al. 1996). It is a migrant but is also a possible winter resident in wetland openings and fields.

**Sharp-shinned Hawk.** This resident hawk was documented by Krumholz (1954) and Howell (1958) in the White Oak Creek area. Howell (1958) also documented a nest with young near the confluence of Poplar Creek with the Clinch River (currently Watt's Bar Reservoir) and Hardy (1991) documented a nesting pair in a mature white pine plantation in 1989. The most recent nesting record is 1994 on the western part of the ORR near the area of the Breeder Reactor Survey (Mitchell et al. 1996). It has recently been documented at eight locations throughout the ORR, including Freel's Bend and Walker Branch Watershed, in May, June, August, and September 1995 and January 1996 (Mitchell et al. 1996).

**Cooper's Hawk.** Krumholz (1958) documented the presence of this year-round resident hawk in the White Oak Creek area, but it was not reported in Howell's (1958) survey in the same general area. It has recently been documented at nine locations throughout the ORR during every season of the year (Mitchell et al. 1996).

**Peregrine Falcon.** This uncommon migrant falcon has recently been documented on 15 May 1995, and 25 April 1996 in the eastern ORR and near the Walker Branch Watershed (Mitchell et al. 1996).

**Wild Turkey.** Wild Turkey was restored to the ORR in 1986 and 1987 (Minser et al. 1992). The population has been so successful that turkeys are now hunted, as well as trapped and relocated to other areas by TWRA to establish breeding flocks.

**Sandhill Crane.** This crane is an occasional migrant. One was documented on 5 March 1995 at Poplar Creek (Mitchell et al. 1996).

**Yellow-bellied Sapsucker.** The Yellow-bellied Sapsucker probably winters in most forest types of the ORR. It was reported by Krumholz (1954), by the Breeder Reactor Environmental Report (PMC 1977), and was recently documented in forested locations from November through March (Mitchell et al. 1996). Hardy (1991) reported two Yellow-bellied Sapsuckers in loblolly pine sawtimber plantations during the breeding season in 1989. This species is not known to breed in

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Tennessee except at high elevations (Nicholson 1997); therefore, these were probably late migrants.

***Olive-sided Flycatcher.*** This flycatcher was recently documented on 12 and 15 May 1995 in forested areas of Freel's Bend (Mitchell et al. 1996). It had not previously been reported on the ORR.

***Eastern Wood-pewee.*** The Eastern Wood-pewee was listed by Krumholz (1954) in the White Oak Creek study area, but it may not have been common as only three were reported in same general area in the Howell survey (1958). About fifteen years later, in the Anderson and Shugart (1974) study, 90 individuals were noted on the Walker Branch Watershed. It was not reported in Kroodsma's 1977 to 1981 study (Kroodsma 1984b), but Hardy (1991) reported one in loblolly pine with extensive hardwood understory. Large, tall trees in open woodland and along forest edges provide habitat preferred by Eastern Wood Pewee, and this habitat is not currently common on the ORR. Wood-pewees were not observed during the 1995 PIF surveys, and only two were documented at two points in 1996.

***Acadian Flycatcher.*** This flycatcher was not reported by Krumholz (1954), but Howell (1958) reported 14 individuals at 13 points (8%), only occurring in the fringe of bushes and small trees along the reservoir and near small streams. The Breeder Reactor Environmental Report (PMC 1977) reported its occurrence during the breeding season in upland hardwoods, and Anderson and Shugart (1974) reported seven individuals on Walker Branch Watershed during the breeding season. It occurred at relatively low densities (4 to 7 pairs /40 ha) in interior forest in Kroodsma's 1977 through 1981 studies (Kroodsma 1984b) and Hardy (1991) reported one in mature white pine plantation transects during the breeding season. It is currently widespread in mature forest of the ORR and is one of eight PIF species of concern in the Ridge and Valley that require interior (unfragmented) mid- to late- successional forest habitat for successful nesting (Roedel et al. 1996).

***Willow Flycatcher.*** This flycatcher has been expanding into Tennessee from the Midwestern prairie states since 1958 and is still uncommon, though not of high conservation concern, in the Ridge and Valley (PIF Score 20) (Nicholson 1997). Kroodsma (1998, personal communication) observed birds calling on territory during the breeding season in the 1980s in two locations near Bethel Valley Road, and two were observed near willows growing along a stream embayment of Melton Hill Reservoir at Freel's Bend in the 1996 PIF survey (Table 1).

***Brown-headed Nuthatch.*** This nuthatch was reported during the summer of 1996 in the western part of the ORR in mature loblolly pine plantations near the Watt's Bar reservoir at the K-25 facility. This is its northernmost reported occurrence in the Ridge and Valley and its first reported occurrence on the ORR (K. Roy, 1998, personal communication). It has also been observed near the TVA Melton Hill Dam picnic area, across the river from the ORR.

***Bewick's Wren.*** This wren was formerly reported from the Freel's Bend area and the White Oak Creek valley (Krumholz 1954, Howell 1958). Abundant nesting habitat was present on abandoned farmlands and homesteads following establishment of the ORR. This species has been declining

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dramatically throughout Tennessee for the last few decades (Nicholson, 1997), and it was last documented on the ORR in the 1970s (PMC 1977).

**Wood Thrush.** This thrush, which requires interior (unfragmented) mid- to late-successional forest habitat for successful nesting, has been abundant in all bird surveys in hardwood forest on the ORR. Krumholz (1954) listed it and Howell's 1957 survey documented 16 individuals at 13 points (8%) in the White Oak Creek/Melton Valley study area. He estimated that about 55% of the study area was in mature forest at that time. This species was also documented in mixed hardwood forest in the Breeder Reactor Environmental Report (PMC 1977) and 15 were documented in the Walker Branch Watershed study (Anderson and Shugart 1977). It occurred at relatively high densities (10 to 20 pairs/40 ha) in mixed forests in Kroodsma's 1977 through 1981 studies (Kroodsma 1984b). Of species with high PIF concern scores, the Wood Thrush was the most abundant during the PIF survey accounting for 6% percent of all individual birds and occurring at 41% of the points (6<sup>th</sup> most common species) in 1995, and 4% of all individuals at 33% of the points (8<sup>th</sup> most common) in 1996.

**Loggerhead Shrike.** Krumholz (1954) documented the Loggerhead Shrike in the White Oak Creek area, and Howell (1958) reported two birds in July, 1957, in the vicinity of ORNL facilities. All recent sightings of the shrike have been near Freel's Bend. Although one individual was documented there in August 1994, November 1995, and 24 April 1996, no evidence of nesting was discovered (Mitchell et al. 1996).

**Yellow-throated Vireo.** This vireo was reported by Krumholz (1954), and Howell (1958) reported 12 individuals at 11 stations in the White Oak Creek/Melton Branch area where large trees were near forest openings. At the time of the Anderson and Shugart (1974) study, forests in some areas of Walker Branch Watershed were more open than at present, and four yellow-throated vireos were observed. Kroodsma (1982) reported these vireos in his power line corridor studies from 1975 to 1978 at low densities (less than 5 pairs/km<sup>2</sup>). At present, the combination of large, tall trees with open understory, openings, or woodland edges preferred by these vireos (Nicholson 1997) are not as common on the ORR as they were historically, and none were observed in the 1995 PIF survey. Five were observed at four points in 1996.

**Blue-winged Warbler.** Kroodsma (1998, personal communication) observed this warbler calling on territory near the intersection of Bear Creek Road and Highway 95 in the 1980s. It was recently documented in June 1995 and 1996 near East Fork Poplar Creek in an area currently leased for industrial development about 2 to 3 miles from the previous known location (Knight 1997). It was present in 3 to 5 year old successional vegetation in areas of clear-cut loblolly pine stands previously killed by southern pine beetles. The site has scattered saplings, tree seedlings, grasses, and forbs. These warblers have not been reported from other areas of the ORR.

**Prairie Warbler.** This warbler has been common on the ORR in all quantitative surveys that have been conducted in suitable habitat (Howell 1958, PMC 1977, Anderson et al. 1977, Kroodsma 1982 Kroodsma 1984a). In Howell's 1957 survey, it was the sixth most common species with 99 individuals at 68 points (43%), though he considered only about a third of his survey area to be

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suitable habitat. Hardy (1991) also reported a Prairie Warbler in a mature loblolly pine plantation during the breeding season. About 20% of the ORR is currently suitable habitat, and in the recent PIF surveys, 28 birds (3%) were reported at 17 points (19%) in 1995 and 32 birds (2%) at 23 points (15%) in 1996.

***Cerulean Warbler.*** This warbler was not reported by Krumholz, but two singing males were tentatively reported by Howell (1958) in the White Oak Creek/Melton Branch study area. They formerly nested on the Walker Branch Watershed, where nine were observed from May through July (Anderson and Shugart 1974). No evidence of nesting has been recorded for the ORR since the Walker Branch study. It was not observed at PIF points in 1995 or 1996, but five were observed on Walker Branch Watershed on 4 April 1996. It was not heard later in the breeding season on the Walker Branch site, so it is presumed that these were migrants. Two additional observations of this warbler were on 24 April 1996 in a 3 to 5 year-old regenerating clearcut loblolly pine forest near the floodplain of Poplar Creek.

***Prothonotary Warbler.*** This warbler was first reported for the ORR in Krumholz (1954) in the White Oak Lake study area. It has been reported in small numbers in subsequent surveys of suitable habitat. Howell (1958) reported two near a pond in the Freel's bend area in early June, and one near the present location of Melton Hill Dam in early July. It was also reported during the breeding season in the Breeder Reactor Environmental Report (PMC 1977), and Kroodsma (1998, personal communication) observed nesting in the 1980s along East Fork Poplar Creek. Although it was not observed at PIF points in 1995 or 1996, birds were observed nesting on the ORR in three locations in 1996--near the mouth of White Oak Creek; in a beaver pond/embayment of Watt's Bar Reservoir near the K-25 facility (Knight 1997); and adjacent to a beaver pond near East Fork Poplar Creek.

***Worm-eating Warbler.*** This warbler is somewhat uncommon on the ORR. It was first reported during the breeding season by Howell (1958), who observed two in the White Oak Creek/Melton Branch study area and three from additional locations along the ORR boundary road along the Clinch River, now mostly flooded by the Melton Hill Reservoir. One was noted on a transect in the Breeder Reactor Environmental Report (PMC 1977) and four were reported in the Walker Branch Watershed study (Anderson and Shugart 1977) during the breeding season. Kroodsma (1984b) reporting seeing only 2 pairs and several transients in interior forest during his 1977 to 1981 mid-May to mid-June surveys. None were noted during the 1995 PIF survey, but five were observed during the breeding season at five points in mature hardwood forest near Hembree Marsh in 1996.

***Louisiana Waterthrush.*** This species was observed by Krumholz (1954) in the White Oak Creek study area. Howell documented five in the same general area in 1957 (Howell 1958). The Louisiana Waterthrush was not observed in the Walker Branch Watershed study (Anderson and Shugart 1977) or at PIF points in 1995 or 1996. A pair was observed on Bear Creek in June 1996 and in June 1997.

***Hooded Warbler.*** This warbler was not reported by Krumholz (1954), but Howell documented 24

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birds at 23 of 157 sample points (15%) in both the valley and surrounding ridges of the White Oak Creek/Melton Valley study area. It was abundant in the Walker Branch study where 39 individuals were observed during the breeding season and five were documented during fall migration (Anderson and Shugart 1974). Kroodsma (1984b) reported it at fairly low densities (less than 1 to about 5 pairs/40 ha). Hardy (1991) found it to be one of the 10 most abundant breeding birds in mature loblolly pine plantations and one of the 8 most abundant in white pine plantations. In 1995, 11 birds (1%) were documented at eight points (9%), and in 1996, 22 birds (1%) were documented at 20 points (13%).

**Summer Tanager.** Krumholz (1954) first documented this tanager on the ORR in the White Oak Lake study area, and Howell (1958) reported 24 birds at 23 points (15%) throughout his study area. It was one of the more abundant birds documented in the Breeder Reactor Environmental Report (PMC 1977) and 15 individuals were reported in the Walker Branch survey (Anderson and Shugart 1974). Kroodsma (1984b) reported it at very high densities (about 23 pairs/40 ha) along power line edges through forest, but at much lower densities (less than 5 pairs/40 ha) in interior forest. During the current surveys, five tanagers (< 1%) were documented at three points (3%) in 1995, and in 1996, sixteen (< 1%) were observed at ten points (6%).

**Dickcissel.** The Dickcissel is rare in east Tennessee. It is more common in west and central Tennessee where it is found in crop stubble, crop fields that have been abandoned for one- to six-years, or briery thickets adjacent to fields (Nicholson 1997). Several birds have been seen at Freel's Bend and one was documented in the 1996 survey. It had not previously been reported from the ORR.

**Bachman's Sparrow.** Bachman's Sparrow was reported by Krumholz (1954) in the White Oak Lake study area, and Howell (1955) documented nine birds at various locations on the ORR, including the vicinity of Freel's Bend. It was formerly present on the ORR in open grassy fields with young eastern red-cedars or pines, young pine plantations, and eastern red-cedar barrens, but has not been seen since two singing territorial males were documented in 1982 (Kroodsma 1987).

**Field Sparrow.** This sparrow has been abundant on the ORR in active and abandoned agricultural areas, right-of-way clearings, and timber salvage areas. It was first reported by Krumholz (1954) in the White Oak Lake study area, and Howell reported 95 birds at 56 sample points (36%) in the same general area. The Breeder Reactor Survey (PMC 1977) reported it to be among the 24 most common migrants, but only reported one each on transects during the breeding season and during winter. Anderson et al. (1977) reported that 35% of the birds observed on 61-m wide transmission-line corridors were Field Sparrows. Kroodsma (1982, 1984a) found it to be one of the five most commonly observed species on utility corridors during the breeding season, occurring at densities of more than 60 pairs/km<sup>2</sup>. Hardy (1991) found it to be the 6<sup>th</sup> most common wintering species in white pine plantations, but found none wintering in loblolly plantations and none during the breeding season. During the current surveys, six birds (< 1%) were observed in 1995 at five points (5%), and 34 birds (2%) were observed at 25 points (16%) in 1996.

**Grasshopper Sparrow.** All sightings of this sparrow have been in the vicinity of Freel's Bend. It

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was first reported by Howell (1958), who observed six in fields that were part of the agricultural complex containing Freel ' s Bend. Recently identified nesting areas at Freel ' s Bend are in active hayfields where the mowing schedule has been modified to enhance nesting success (Mitchell 1996). Although Grasshopper Sparrows were observed near PIF points in 1995 and 1996, none were observed at the sample points included here.

**Orchard Oriole.** This oriole was first reported by Krumholz (1954) in the White Oak Lake study area, and Howell (1958) documented five at five points (3%) in his study area and one near the old boundary road now under waters of Melton Hill Reservoir east of Highway 95. Howell reported it nesting in trees along the river adjacent to fields, but not near smaller streams. The open orchards, pasture trees, and fence rows preferred by Orchard Oriole are not presently common on the ORR. It occurs at Freel ' s Bend, but none were reported in the 1995 data and only one was reported at one point (Freel ' s Bend) in 1996.

**Additional historic records.** The Krumholz (1954) list includes a number of species not currently reported from the ORR that we include here, but cannot verify. Two of these species are not uncommon in the Ridge and Valley in recent years, according to Spring Counts, Christmas Counts, and Season Reports in *The Migrant*; however, neither has been recorded on the ORR in recent years: Herring Gull and Virginia Rail. Other species that they reported are quite rare in this part of the Ridge and Valley, and there are no other reported sightings on the ORR: King Rail, Common Moorhen, Semipalmated Plover, Short-eared Owl, Saw-whet Owl, Bank Swallow, Black-capped Chickadee, Kirtland's Warbler, Tree Sparrow, and Vesper Sparrow. A Snow Goose was also observed in the Krumholz study area (W. Yambert, 1998, personal communication).

Additional species or summer occurrences of spring/fall migrants reported by Howell (1958) include the Horned Lark, a calling individual flying overhead in the study area in June; a juvenile Redstart in mid-July at the mouth of Poplar Creek; and on two occasions in June, Henslow ' s Sparrow, a singing male at one of the survey points in the White Oak Creek/Melton Branch study area.

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studies. Research was conducted on the Oak Ridge National Environmental Research Park. Publication No. \_\_\_\_\_, Environmental Sciences Division, Oak Ridge National Laboratory.

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**Table 1. Birds of the Oak Ridge Reservation, showing abundance figures from 1995 and 1996 Partners in Flight breeding season point counts, season(s) of observed occurrence, and conservation status.**

COMMON NAME	ABUNDANCE <sup>1</sup>				SEASON <sup>2</sup>	CONS STATUS <sup>3</sup>
	PERCENT OF POINTS		PERCENT OF BIRDS			
	1995	1996	1995	1996		
<b>LOONS</b>						
Common Loon	0	0	0	0	S/F	
<b>GREBES</b>						
Pied-billed Grebe	0	0	0	0	W	
Horned Grebe	0	0	0	0	W	
Eared Grebe	0	0	0	0	T	
<b>CORMORANTS</b>						
Double-crested Cormorant	0	0	0	0	S/F	SNM
<b>DARTERS</b>						
Anhinga	0	0	0	0	T	SNM
<b>BITTERNES AND HERONS</b>						
Great Blue Heron	7	8	0.6	0.6	Y/B	
Great Egret	0	0	0	0	B	SNM
Snowy Egret	0	0	0	0	S/F	SNM
Little Blue Heron	0	0	0	0	S/F	SNM
Green Heron	0	1	0	<0.1	B	
Black-crowned Night-heron	1	2	0.1	0.1	B	
<b>SWANS, GEESE, AND DUCKS</b>						
Canada Goose	3	6	1.1	1.8	Y/B	
Wood Duck	0	0	0	0	Y/B	
Green-winged Teal	0	0	0	0	S/F	
American Black Duck	0	0	0	0	W	
Mallard	0	0	0	0	Y/B <sup>4</sup>	
Northern Pintail	0	0	0	0	W	
Blue-winged Teal	0	0	0	0	S/F	
Gadwall	0	0	0	0	W	
American Widgeon	0	0	0	0	W	
Canvasback	0	0	0	0	S/F	

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Ring-necked Duck	0	0	0	0	W, S/F	
Greater Scaup	0	0	0	0	S/F	
Bufflehead	0	0	0	0	S/F	
Hooded Merganser	0	0	0	0	W, S/F	
Red-breasted Merganser	0	0	0	0	S/F	
Ruddy Duck	0	0	0	0	W	
<b>VULTURES</b>						
Black Vulture	1	1	1.1	0.7	Y/B	
Turkey Vulture	0	1	0	0.1	Y/B	
<b>KITES, HAWKS, EAGLES, AND ALLIES</b>						
Osprey	0	1	0	0.1	B	
Bald Eagle	0	0	0	0	W	FT, ST
Northern Harrier	0	0	0	0	S/F	SNM
Sharp-shinned Hawk	0	0	0	0	Y/B	SNM
Cooper's Hawk	0	0	0	0	Y/B	SNM
Red-shouldered Hawk	0	0	0	0	Y/B	
Broad-winged Hawk	0	1	0	<0.1	B	
Red-tailed Hawk	4	3	0.5	0.2	Y/B	
<b>FALCONS</b>						
American Kestrel	0	1	0	<0.1	Y/B	
Peregrine Falcon	0	0	0	0	S/F	FT, ST
<b>GROUSE, TURKEYS, AND QUAIL</b>						
Ruffed Grouse	0	0	0	0	B <sup>4</sup>	
Wild Turkey	2	3	0.4	0.3	Y/B	
Northern Bobwhite	1	1	0	0.8	Y/B	
<b>RAILS AND COOTS</b>						
Sora	0	0	0	0	S/F	
American Coot	0	1	0	<0.1	Y/B	
<b>CRANES</b>						
Sandhill Crane	0	0	0	0	S/F	SNM
<b>PLOVERS</b>						
Killdeer	0	0	0	0	Y/B	
<b>SANDPIPERS AND ALLIES</b>						
Greater Yellowlegs	0	0	0	0	S/F	
Lesser Yellowlegs	0	0	0	0	S/F	
Solitary Sandpiper	0	0	0	0	S/F	

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Spotted Sandpiper	0	0	0	0	S/F	
Pectoral Sandpiper	0	0	0	0	S/F	
Common Snipe	0	0	0	0	S/F	
American Woodcock	0	2	0	0.1	Y/B	
<b>GULLS AND TERNS</b>						
Bonaparte's Gull	0	0	0	0	T	
Ring-billed Gull	0	0	0	0	W	
Caspian Tern	0	0	0	0	T	
<b>PIGEONS AND DOVES</b>						
Rock Dove	0	0	0	0	Y/B	
Mourning Dove	11	11	1.4	1.5	Y/B	
<b>CUCKOOS</b>						
Yellow-billed Cuckoo	21	31	2.3	2.8	B	
<b>OWLS</b>						
Eastern Screech-owl	0	0	0	0	Y/B	
Great Horned Owl	0	0	0	0	Y/B	
Barred Owl	0	0	0	0	Y/B	
<b>GOATSUCKERS</b>						
Common Nighthawk	0	0	0	0	B	
Chuck-will's-widow	0	0	0	0	B	
Whip-poor-will	0	2	0	0.2	B	
<b>SWIFTS</b>						
Chimney Swift	1	2	0.1	0.1	B	
<b>HUMMINGBIRDS</b>						
Ruby-throated Hummingbird	2	3	0.2	0.2	B	
<b>KINGFISHERS</b>						
Belted Kingfisher	0	0	0	0	Y/B	
<b>WOODPECKERS</b>						
Red-bellied Woodpecker	36	25	3.7	2.1	Y/B	
Yellow-bellied Sapsucker	0	0	0	0	W	SNM
Downy Woodpecker	11	8	0.8	0.6	Y/B	
Hairy Woodpecker	19	6	1.6	0.6	Y/B	
Northern Flicker	10	8	0.8	0.7	Y/B	
Pileated Woodpecker	15	10	1.9	0.7	Y/B	
<b>TYRANT FLYCATCHERS</b>						
Olive-sided Flycatcher	0	0	0	0	S/F	SNM
Eastern Wood-pewee	0	1	0	0.1	B	C

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Acadian Flycatcher	9	6	1.1	0.6	B	C
Willow Flycatcher	0	1	0	0.1	B	
Eastern Phoebe	0	4	0	0.3	Y/B	
Great Crested Flycatcher	3	4	0.3	0.4	B	
Eastern Kingbird	1	1	0.1	0.1	B	
<b>LARKS</b>						
Horned Lark	0	0	0	0	W	
<b>SWALLOWS</b>						
Purple Martin	0	0	0	0	B	
Tree Swallow	0	0	0	0	B	
Northern Rough-winged Swallow	0	1	0	0.6	B	
Cliff Swallow	0	0	0	0	B	
Barn Swallow	0	5	0	1	B	
<b>JAYS AND CROWS</b>						
Blue Jay	31	22	4	2.9	Y/B	
American Crow	62	51	9.6	7.3	Y/B	
<b>TITMICE AND CHICKADEES</b>						
Carolina Chickadee	46	33	6.2	4.7	Y/B	
Eastern Tufted Titmouse	33	37	4.8	3.6	Y/B	
<b>NUTHATCHES</b>						
Red-breasted Nuthatch	0	0	0	0	W	
White-breasted Nuthatch	16	11	1.9	0.8	Y/B	
Brown-headed Nuthatch	0	0	0	0	B	C
<b>CREEPERS</b>						
Brown Creeper	0	0	0	0	W	
<b>WRENS</b>						
Carolina Wren	49	3	6.4	0.2	Y/B	
House Wren	0	0	0	0	B	
Winter Wren	0	0	0	0	W	
Sedge Wren	0	0	0	0	S/F	
<b>KINGLETS, GNATCATCHERS, AND THRUSHES</b>						
Golden-crowned Kinglet	0	0	0	0	W	
Ruby-crowned Kinglet	0	0	0	0	W	

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Blue-gray Gnatcatcher	14	27	1.6	2.8	B	
Eastern Bluebird	3	8	0.5	1.1	Y/B	
Veery	0	0	0	0	S/F	
Swainson's Thrush	0	0	0	0	S/F	
Hermit Thrush	0	0	0	0	W	
Wood Thrush	41	33	5.6	4.3	B	C
American Robin	1	3	0.1	0.4	Y/B	
<b>THRASHERS AND MOCKINGBIRDS</b>						
Gray Catbird	0	1	0	<0.1	B	
Northern Mockingbird	0	3	0	0.3	Y/B	
Brown Thrasher	2	1	0.2	0.1	Y/B	
<b>WAXWINGS</b>						
Cedar Waxwing	1	1	0.1	0.1	Y/B	
<b>SHRIKES</b>						
Loggerhead Shrike <sup>4</sup>	0	0	0	0	B <sup>4</sup>	FS,ST
<b>STARLINGS</b>						
European Starling	0	0	0	0	Y/B	
<b>VIREOS</b>						
White-eyed Vireo	2	11	0.5	1	B	
Blue-headed Vireo	0	0	0	0	S/F	
Yellow-throated Vireo	0	3	0	0.2	B	C
Red-eyed Vireo	75	76	11.3	12	B	
<b>WOOD-WARBLEDERS</b>						
Blue-winged Warbler	0	0	0	0	B	C
Golden-winged Warbler	0	0	0	0	S/F	
Tennessee Warbler	0	0	0	0	S/F	
Nashville Warbler	0	0	0	0	S/F	
Northern Parula	1	3	0.1	0.4	B	
Yellow Warbler	0	0	0	0	B	
Chestnut-sided Warbler	0	0	0	0	S/F	
Magnolia Warbler	0	0	0	0	S/F	
Cape May Warbler	0	0	0	0	S/F	
Black-throated Blue Warbler	0	0	0	0	S/F	
Yellow-rumped Warbler	0	0	0	0	W, S/F	
Black-throated Green Warbler	0	0	0	0	S/F	
Blackburnian Warbler	0	0	0	0	S/F	
Yellow-throated Warbler	0	4	0	0.4	B	

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Pine Warbler	0	11	0	1.4	B	
Prairie Warbler	20	15	2.6	1.5	B	C
Palm Warbler	0	0	0	0	S/F	
Bay-breasted Warbler	0	0	0	0	S/F	
Blackpoll Warbler	0	0	0	0	S/F	
Cerulean Warbler	0	0	0	0	B <sup>4</sup>	FS
Black-and-white Warbler	1	0	0.1	0	B	
American Redstart	0	0	0	0	S/F	
Prothonotary Warbler	0	0	0	0	B	C
Worm-eating Warbler	0	3	0	0.2	B	C
Ovenbird	12	21	1.4	2.2	B	
Northern Waterthrush	0	0	0	0	S/F	
Louisiana Waterthrush	0	0	0	0	B	C
Kentucky Warbler	4	4	0.4	0.6	B	
Common Yellowthroat	4	18	0.4	1.7	B	
Hooded Warbler	9	13	1	1	B	C
Wilson's Warbler	0	0	0	0	S/F	
Canada Warbler	0	0	0	0	S/F	
Yellow-breasted Chat	19	35	2.6	3.8	B	
<b>TANAGERS</b>						
Summer Tanager	3	9	0.5	0.7	B	C
Scarlet Tanager	32	38	3.8	3.5	B	
<b>CARDINALS, GROSBEAKS, AND ALLIES</b>						
Northern Cardinal	44	40	4.7	4.5	Y/B	
Rose-breasted Grosbeak	0	0	0	0	S/F	
Blue Grosbeak	1	3	0.1	0.2	B	
Indigo Bunting	28	44	3/6	6	B	
Dickcissel	0	1	0	<0.1	B	
<b>TOWHEES, SPARROWS, AND ALLIES</b>						
Eastern Towhee	19	20	2	2	Y/B	
American Tree Sparrow	0	0	0	0	W	
Chipping Sparrow	1	2	0.1	0.4	Y/B	
Field Sparrow	5	16	0.6	1.6	Y/B	
Savannah Sparrow	0	0	0	0	W	
Grasshopper Sparrow	0	0	0	0	B	SNM
Fox Sparrow	0	0	0	0	W	

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Song Sparrow	4	3	0.7	0.2	Y/B	
Swamp Sparrow	0	0	0	0	W	
White-throated Sparrow	0	0	0	0	W	
White-crowned Sparrow	0	0	0	0	W	
Dark-eyed Junco	0	0	0	0	W	
<b>BLACKBIRDS AND ALLIES</b>						
Bobolink	0	0	0	0	S/F	
Red-winged Blackbird	2	11	0.3	2.6	Y/B	
Eastern Meadowlark	2	6	0.2	0.7	Y/B	
Common Grackle	3	8	1.1	1.4	Y/B	
Brown-headed Cowbird	5	10	0.6	1.1	Y/B	
Orchard Oriole	0	1	0	<0.1	B	C
Northern Oriole	0	0	0	0	B	
<b>CARDUELINE FINCHES</b>						
Purple Finch	0	0	0	0	W	
House Finch	0	3	0	0.6	Y	
Pine Siskin	0	0	0	0	W	
American Goldfinch	20	11	2.4	1.2	Y	
Evening Grosbeak	0	0	0	0	S/F	
<b>OLD WORLD SPARROWS</b>						
House Sparrow	0	0	0	0	Y/B	

<sup>1</sup> Abundance - column 1: Percent of 91 PIF permanent breeding bird survey points with at least one occurrence during 1995 survey; column 2: Percent of 159 points during 1996 survey; column 3: Percent of total 1069 birds observed at survey points in 1995; column 4: Percent of total 2141 birds observed in 1996.

<sup>2</sup> Season: season this species has been observed on the ORR: B = breeding season, S/F = spring or fall migrant, W = winter resident, T = transient, Y = year-round. Data are from Mitchell et al. (1996), Breeding Bird Atlas surveys in 1987-1991, ongoing PIF point count surveys, and personal records of J. Mitchell, J. Evans, and D. Joslin.

<sup>3</sup> National, state, and regional conservation status: FE = federally endangered, FT = federally threatened, FS = special concern at national level (previous C2 candidates for listing), SE = Tennessee state endangered, ST = Tennessee state threatened, SNM = Tennessee state in need of management, C = species identified by PIF in need of conservation attention in east Tennessee (Conservation Score > 23; see text for further explanation).

<sup>4</sup> Present during the breeding season but not known to be breeding on the OR.