STATUS REVIEW AND CONSERVATION PLAN FOR THE RUSTY BLACKBIRD (*Euphagus carolinus*) IN ALASKA.

D. Menke/USFWS photo

30 March 2004
(revised 24 January 2005)

By: Kevin C. Hannah
Alaska Bird Observatory
P.O. Box 80505
Fairbanks, Alaska 99708

EXECUTIVE SUMMARY

The Rusty Blackbird (*Euphagus carolinus*) has shown precipitous range-wide population declines in recent decades. Breeding Bird Survey, Christmas Bird Count, and Quebec Checklists Program data indicate a 90% decrease in numbers over the past 40 years. Assessment of this species' status is made difficult by the relative inaccessibility of breeding habitat and confusion with similar species. To date, the Rusty Blackbird remains one of the least studied birds in North America, with most aspects of its natural history and breeding biology unknown. Despite the awareness of chronic population declines in this species, it has received surprisingly little attention or recognition on species conservation priority lists.

This 21-25 cm blackbird has a narrow, slightly decurved bill and is best identified in fall, when all plumages are characterized by distinct rusty brown feathering on the crown, nape, and back. In summer, the diet consists primarily of aquatic invertebrates and other animal food, becoming more granivorous (seeds), gramnivorous (grass), or frugivorous (fruits) in the non-breeding season.

The breeding range of the Rusty Blackbird includes most of the boreal forest region of North America, extending from the west coast of Alaska to the east coast of Canada. During the breeding season, the Rusty Blackbird is generally found throughout most of mainland Alaska. The wetland complexes of western and Interior Alaska are important breeding areas for this species and may be the last stronghold for this declining population. In winter, the species is known to occur in coastal southeast Alaska.

During the breeding season, the Rusty Blackbird is known to associate with moist woodland (primarily coniferous), bushy bogs, and the wooded edges of watercourses in Alaska. There is some evidence that Rusty Blackbird breeding habitat selection is based on ground cover attributes and not forest structure characteristics, making broad-scale habitat associations difficult. Future habitat studies need to place less emphasis on the structural components of habitat selection and more on the actual wetlands themselves (i.e wetland size, wetland classification, water quality, invertebrate biomass, etc.). The apparent use of thermokarst ponds by this species in Interior Alaska also warrants further investigation.

To date, there has been no specific management for the Rusty Blackbird in any part of its range. More intensive management is warranted given the dramatic population declines, the relative isolation of northern breeding habitat, and the loss of southern wintering habitat. While recent evidence suggests that Rusty Blackbirds have declined precipitously across most of their range in the past century, populations in Alaska have declined at a slower rate. Concurrently, other birds also breeding in these boreal wetland complexes (Lesser Yellowlegs (*Tringa flavipes*), Solitary Sandpiper (*T. solitaria*), Horned Grebe (*Podiceps auritus*), Short-eared Owl (*Asio flammeus*), and various seas ducks) have also shown recent population declines. Portions of Alaska may contain some of the largest remaining intact habitat and may be a desirable location to study the breeding ecology and life history characteristics of these poorly known species

ACKNOWLEDGEMENTS

The U. S. Fish and Wildlife Service Region 7 funded the preparation of this document. In particular, Ted Swem (USFWS) provided valuable input and assistance in the development, editing, and production of this report. Daniel D. Gibson (University of Alaska Museum, Fairbanks) provided access to unpublished reports, status documents, and shared his extensive personal experience. Philip Martin (USFWS) kindly provided unpublished data and results from an unpublished study of palustrine wetlands near Fairbanks. Steve Matsuoka (USFWS) offered suggestions on possible monitoring and conservation strategies for this species. Nancy DeWitt (Alaska Bird Observatory) provided editorial comments on an earlier version of this report. Finally, I wish to thank Theresa Hannah for providing editorial comments and formatting assistance.

TABLE OF CONTENTS

STATUS REVIEW AND CONSERVATION PLAN

TAXONOMY

Class: *Aves*; Order: *Passeriformes*; Family: *Icteridae*; Genus: *Euphagus*

In North America, two subspecies are recognized: *Euphagus carolinus carolinus*, which occupies most of the species' range, and the darker *E. c. nigrans*, which breeds in Newfoundland, Nova Scotia, Magdalen Island, and possibly eastern New Brunswick (American Ornithologists' Union 1957).

Despite the cosmopolitan nature of the family, few comprehensive molecular or morphological studies have been conducted on the relationships between Rusty Blackbirds and other members of the family *Icteridae*. The similar Brewer's Blackbird (*Euphagus cyanocephalus*) is probably the Rusty Blackbird's closest relative (Avery 1995). Species in the genus *Euphagus* are probably more closely allied with the grackles (*Quiscalus*) than to *Agelaius* blackbirds (Lanyon 1994).

LEGAL STATUS – Despite the awareness of chronic population declines in this species, it has received surprisingly little attention or recognition on species conservation priority lists (Greenberg and Droege 1999). The following is a list of international, national, state, and regional status rankings for the Rusty Blackbird:

Global Heritage Status Rank: G5 (Demonstrably secure) (NatureServe 2003).

United States National Heritage Status Rank: N5B, N5N (Demonstrably secure in breeding and non-breeding seasons) (NatureServe 2003).

Canada National Heritage Status Rank: N5B, NZN (Demonstrably secure) (NatureServe 2003).

Alaska S4B (not rare, long-term concern, apparently secure) (NatureServe 2003)

The American Bird Conservancy (ABC) Green List ranked the status of this species as having moderate abundance, with detected declines, and a high degree of threat (American Bird Conservancy 2003). The Rusty Blackbird was not included on the National Audubon Society's Blue List (Erlich et al. 1992). The U.S. Fish and Wildlife Service (2002) considered the Rusty Blackbird a species of conservation concern in the following regions:

BCR 22 – Eastern Tallgrass Prairie
BCR 24 – Central Hardwoods
BCR 26 – Mississippi Alluvial Valley
BCR 29 – Piedmont
USFWS Region 3 – Great Lakes-Big Rivers Region

In Canada, the Committee on the Status of Endangered Wildlife in Canada (COSEWIC) has not reviewed the status of this species (COSEWIC 2003). Partners in Flight-Canada identified the Rusty Blackbird as one of 22 priority species of high conservation concern and responsibility based on high monitoring responsibility and decreasing population trend (Downes et al. 2000).

In Alaska, Boreal Partners in Flight identified the Rusty Blackbird as a priority species in two biogeographic regions of the state (central and western/southwestern), based on high global monitoring responsibility and decreasing population trend (Andres 1999).

DESCRIPTION

Where both species occur, the Rusty Blackbird is often confused with its congener, the Brewer's Blackbird. This 21-25 cm blackbird has a narrow, slightly decurved bill that is shorter than the length of the bird's head. In all plumages, the wings appear long, narrow, and pointed. The tail is nearly as long as the wing and is slightly rounded. In breeding plumage, adult males are uniformly black above with a blue-green to greenish gloss (Avery 1995). Adult females are slate gray, often darker above with a bluish green gloss. In fall, all plumages have distinct rusty brown feathering on the crown, nape, and back (Avery 1995). Male Brewer's Blackbirds are distinguished from Rusty Blackbirds by a purplish, not green, gloss on the head, and shorter, thicker bills (Avery 1995). The female Rusty Blackbird is easily distinguished from female Brewer's Blackbirds by the presence of a yellow iris (Avery 1995). In fall, Brewer's Blackbirds can have some rust-colored feather edging, though this never extends on to the tertials as in the Rusty Blackbird (Avery 1995).

Males of the eastern subspecies (*Euphagus carolinus nigrans*) are more intensely black, with bluish, rather than greenish, head gloss than the more common *E. c. carolinus* (American Ornithologists' Union 1957).

It has been suggested that the song of the Rusty Blackbird resembles a rusty hinge (Peters and Burleigh 1951), though others have suggested that the song is more musical than in other blackbirds (Bendire 1895). Male Rusty Blackbirds possess two song types: one is described as a rhythmic song with 2-3 musical introductory notes, ending with a high, squeaky note; the second is described as a less rhythmic, rapidly repeated 3-note phrase that rises in pitch (Saunders 1935). Although poorly described, females are also known to sing from the nest in response to male song, or after being flushed from the nest (Avery 1995).

RANGE

Breeding - The breeding range of the Rusty Blackbird extends from the west coast of Alaska to the east coast of Canada (Avery 1995). More specifically, the northern extent of the breeding range is delineated by Kotzebue Sound and the Brooks Range in Alaska, the Mackenzie Delta, Great Bear Lake, Great Slave Lake, and Nueltin Lake in the Northwest Territories, the southern coasts of Hudson Bay from Churchill, Manitoba to northern Quebec, and across Quebec to the coast of central Labrador (Avery 1995, NatureServe 2003). The southern extent of the breeding range extends from southern Alaska, through central Canada from interior British Columbia, central Saskatchewan, to the northern shores of Lake Superior and Lake Huron, through

southeastern Ontario to Vermont, New Hampshire, and Maine (Avery 1995, NatureServe 2003). The Rusty Blackbird is also known to breed in Michigan's Upper Peninsula and the Adirondack Mountains of New York state and western Massachusetts (Avery 1995).

Non-breeding - The primary winter range is from southern Massachusetts, southeastern New York, southeastern Pennsylvania, southern West Virginia, northern Ohio, extreme southern Michigan, southeast Wisconsin, central Iowa, eastern New Brunswick, south throughout portions of Kansas, Oklahoma, Texas, to the Gulf Coast and northern Florida (Avery 1995). Rusty Blackbirds also winter locally from the northern United States and southern Canada from Maine to coastal British Columbia and coastal southeastern Alaska (Avery 1995, NatureServe 2003). The species is considered a rare winter visitor in eastern Colorado, in the extreme western and southwestern United States, and in south Florida (Avery 1995). Based on analysis of North American Christmas Bird Count data, the majority of the overwintering population occurs east of the 100th meridian, between the 32nd and 38th parallels (Root 1988).

Alaska – During the breeding season, the Rusty Blackbird is generally found throughout most of mainland Alaska (Kessel and Gibson 1978, Table 1 References). In winter, the species is known to occur in coastal southeast Alaska (Gabrielson and Lincoln 1959, Avery 1995). The species is a very rare winter visitor in interior Alaska, surviving only until the first extreme cold in November of early-December (Kessel and Gibson 1978, University of Alaska Museum (UAM), unpubl. data). In the Copper River Delta-Prince William Sound region, overwintering occurs more frequently in years when marshes remain unfrozen (Manuwal 1974).

The Rusty Blackbird occurs as an uncommon migrant and breeder in southeastern Alaska along mainland and coastal river systems (Kessel and Gibson 1978). The Rusty Blackbird is a rare spring migrant and summer visitant, or potentially a casual breeder in the Brooks Range (UAM unpubl. data). The species is a very rare spring migrant and casual fall visitor on the coastal plain to the Beaufort Sea. The species is a casual summer and fall visitant to the Chukchi Sea coast. On St. Lawrence Island the species is a casual spring and fall migrant, and is a casual or very rare fall migrant in the Pribilof Islands between late August and early November (UAM unpubl. data).

NATURAL HISTORY

Nests and nest spacing - The mating system of the Rusty Blackbird is monogamous, though observations of an apparent loose colonial social structure in the eastern portion of the range may lead to occasional extra-pair fertilizations (Orians 1985, Ellison 1990). In Fairbanks, Alaska, a report of small clustered groups of breeding birds suggests that loose colonial or semi-colonial social structure may also occur in the western portion of the range (P. Martin, pers. comm.). An historical record suggested that nest spacing was never closer than 400 m (Kennard 1920). However, observations of small aggregations of breeding birds include a record of three pairs nesting within a 300 m radius near Fairbanks, Alaska (Spindler 1976).

Nests are relatively large, bulky, and well-built structures with an outer framework constructed of twigs, dried grasses or sedges, and lichens (Avery 1995) with a well-formed cup composed of fine graminoid material, decaying plant matter, moss, and fine grasses (UAM unpubl. data).

Nests are often placed against the trunk or main stem of a tree or shrub, typically in dense layers of small branches (Avery 1995). Although considered to be an arboreal nester, the species will occasionally nest on the ground in sedge at the base of a shrub (Spindler 1976), or in cattails (McGuire 1983). The nest is generally open from above but concealed by dense overhead foliage (Avery 1995). Nests are generally not reused by Rusty Blackbirds, though they may be used by Solitary Sandpipers (*Tringa solitaria*), which use abandoned arboreal passerine nests (Henderson 1937, Oring 1968).

Reproductive phenology - Spring migrants arrive in the upper Tanana River Valley as early as the first week of April, though peak passage generally occurs in the first two weeks in May (Kessel and Gibson 1978). Post-breeding movements begin as soon as fledglings are independent, with flocking beginning in early July (Kessel and Gibson 1978). Evidence of a noticeable increase in the passage of small groups of southbound migrants begins in late July or early August (Kessel and Gibson 1978). The peak of fall migratory passage occurs from the third week of August through the third week of September in interior Alaska (Kessel and Gibson 1978). At Creamer's Refuge in Fairbanks, Alaska, mean passage dates, based on capture data from 1992 - 2003, occur in a relatively narrow range in both spring and fall (18 May ± 7 days in spring, n = 35; 11 September ± 9 days in fall, n = 77; Alaska Bird Observatory, unpubl. data; Figure 1).

In Alaska, nesting begins in mid-May, reaching a peak in the last third of May (UAM unpubl. data). Egg dates in Alaska range from 12 May to 28 July; clutch size averages 4.9 ± 0.7 eggs (n=12) (UAM unpubl. data). Clutch size ranges from 4-6 eggs, with a tendency for larger clutches early in the season and smaller clutches, probably representing renesting attempts, more prevalent later in the season. The incubation period for the Rusty Blackbird is stated to be 14 days (Kennard 1920), though it is likely 12-13 days as in its congener the Brewer's Blackbird (Williams 1952). Fledging is thought to occur at 13 days (UAM unpubl. data). Fledglings have been observed in the western Brooks Range (Noatak River Basin) as early as 18 June (Manuwal 1974).

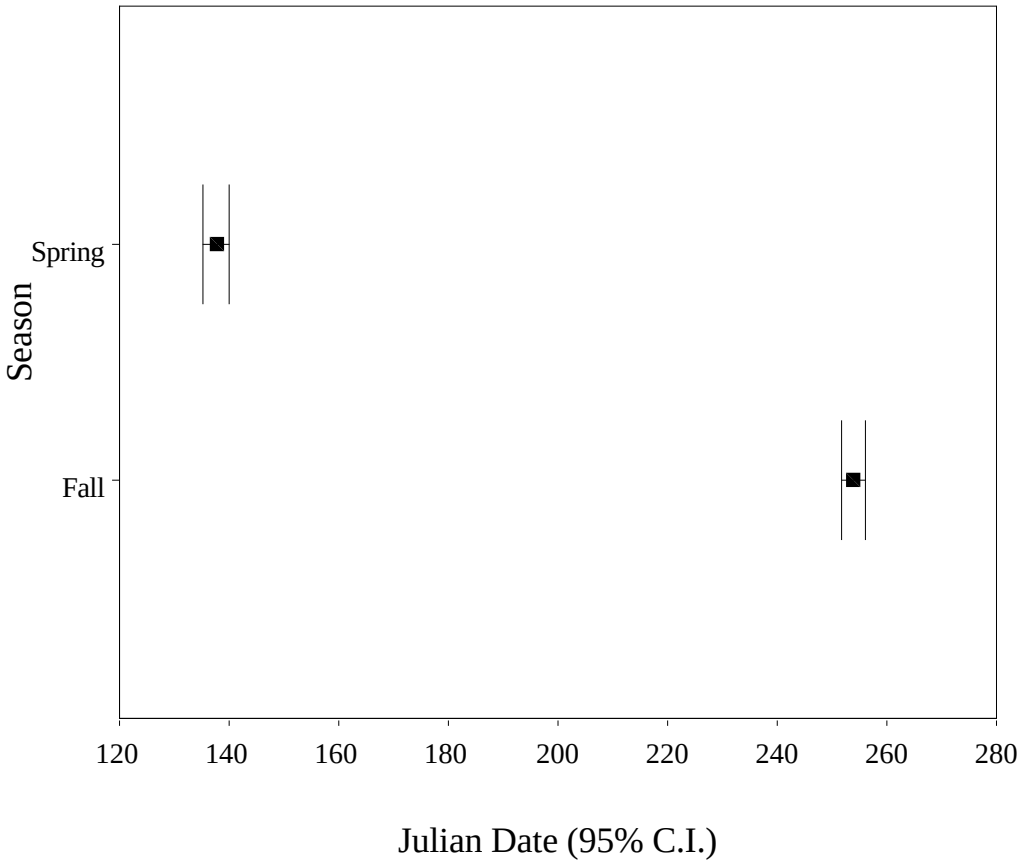

Figure 1 – Mean date of capture of migrant Rusty Blackbirds (*n* = 115) at Creamer's Refuge Migration Station, Fairbanks, Alaska, between 1992-2003.

Demography - Little is known about the demography of Rusty Blackbird populations in North America and the effects of production, survival, recruitment, and dispersal as limiting factors in the species (Avery 1995). Based on a limited sample (n=14), nest success appears to be high in this species (Kennard 1920), though no recent data exist. Renesting following nest failure is suspected in this species, though it is probable that only one successful brood is reared per season (Avery 1995). Failure of nests or eggs is thought to be low, though recent fledglings may be highly susceptible to predation (Avery 1995; see Predators). Birds wintering at higher latitudes may be susceptible to starvation and increased mortality due to food shortages during severe weather conditions (Avery 1995). Local populations may be susceptible to increased mortality at mixed-species winter roosts that are subject to blackbird control (Stickley et al. 1986), though Greenberg and Droege (1999) refute the claim of increased mortality as a cause of population decline on the basis that the target species of these control programs (Red-Winged Blackbird (*Agelaius phoenicus*), Brown-headed Cowbird (*Molothrus ater*), and Common Grackle (*Quiscalus quiscula*)) show more modest population declines over the same time period.

Predation and parasitism - During the breeding season, aggressive and agitated behavior observed in response to the presence of Gray Jays (*Perisoreus canadensis*) near nests suggests

that this species is a potential nest predator (Hoffman and Hoffman 1982). In winter, large flocks of Rusty Blackbirds are susceptible to predation by accipiters, falcons, and owls (Lewis 1931, Cade 1951, Fritzell and Thorne 1984).

Given this species' high latitude nesting range and breeding habitat, parasitism by Brown-headed Cowbirds is likely not a limiting factor (Avery 1995). Several reports of potential nest parasitism by cowbirds on Rusty Blackbird have been reported, though both lacked sufficient details (Henderson 1937, Friedmann 1963).

Diet - As their Latin name implies (*Euphagus* means "eats everything" or "good eater"), Rusty Blackbirds are foraging generalists, consuming insects, spiders, seeds, crustaceans, snails, salamanders, fish and occasionally even fruits. As ground gleaners, they forage by picking prey and food from the ground and vegetation as they walk along the forest floor (Avery 1995).

The Rusty Blackbird is a highly opportunistic feeder, taking a wide array of plant and animal matter throughout the year (Beecher 1951). In summer, the diet consists primarily of aquatic insects and other animal food (Martin et al. 1951). In Vermont, aquatic invertebrate prey and adult insects emerging from water after metamorphosis were the dominant prey items selected (Ellison 1990). Greenberg and Droege (1999) suggest that snails and mollusks may constitute a significant proportion of the diet during the breeding season. In the non-breeding season the diet is much less specialized, becoming more granivorous (seeds), gramnivorous (grass), or frugivorous (fruits) (Martin et al. 1951, Meanley 1995).

During harsh, cold weather, numerous accounts of Rusty Blackbirds attacking, killing, and consuming other passerine birds have been documented (Deane 1895, Campbell 1974, Messerly 1979, Woodruff and Woodruff 1991).

POPULATION SIZE AND TREND

Range-wide – Breeding density is consistently low, even at the center of the breeding range (Flood 1987). This, coupled with the relative inaccessibility of most of the species' breeding range has made estimating population size difficult. However, Blancher (2003) estimated the post-breeding global abundance of Rusty Blackbirds at 4,900,000 individuals.

Based on multiple sources of data, Rusty Blackbird populations appear to have been in decline for the past century (Greenberg and Droege 1999, Sauer et al. 2004). Using data from the Breeding Bird Survey (BBS; Sauer et al. 1997), Christmas Bird Counts (CBC; Sauer et al. 1996), and the Quebec Checklists Program (ÉPOQ; Cyr and Larivée 1995), Greenberg and Droege (1999) estimated the population had declined by ~ 90% recently (approximately 1960-1990). Historically, it is believed that Rusty Blackbirds were most abundant in the eastern portion of their breeding range, particularly in Canada's maritime provinces (Erskine 1977, 1992). Coincidentally, based on BBS data, the most dramatic recent declines occurred in Newfoundland and New Brunswick (Newfoundland: -14.3%/yr, $p = 0.00$, $n = 16$; New Brunswick: -8.9%/yr, $p = 0.02$, $n = 17$; Sauer et al. 2004). BBS data also show significant declines Canada-wide (-10.3%/yr, $p = 0.02$, $n = 73$) and survey-wide (-9.9%/yr, $p = 0.02$, $n = 96$) (Sauer et al. 2004).

The population decline in the Yukon Territory has also been steep (-9.1%/yr, $p = 0.20$, $n = 6$) (Sauer et al. 2004) but may be statistically non-significant due to low sample size.

Alaska - The Rusty Blackbird is described as a fairly common and conspicuous spring migrant, breeder, and fall migrant throughout much of central, western, and southwestern Alaska, and in the upper Cook Inlet area of southcoastal Alaska (Kessel and Gibson 1978). The species becomes uncommon at the periphery of the taiga in southwestern and western Alaska, and in the upper river valleys on the south slope of the Brooks Range (UAM unpubl. data).

On the Tanana Flats, only 22 Rusty Blackbirds were detected (on 256 counts) from 26 May-26 June 1998 (none were detected on Yukon Maneuver Area during same timeframe) (Benson 1999). In the Upper Tanana River Valley, breeding territory densities reach one per 10 ha in appropriate habitat and three per 10 ha at high quality sites (Spindler and Kessel 1980). Based on a total of 1,415 sample points conducted in Yukon-Charley Rivers National Preserve, Alaska (1999-2000), only six Rusty Blackbirds were detected in the water-rich, coniferous forests along the Yukon River Valley (YV) ecological unit (Swanson and Nigro 2003). Rusty Blackbirds ranked 13th in abundance in a study of bird use of palustrine wetlands near Fairbanks, Alaska (P. Martin, pers. comm.).

A relatively stable breeding density of approximately 0.2-0.4 pairs per linear km was detected each year along a 48 km transect survey of the major streams in the Tuluksak River drainage (Petersen et al. 1991). A total of 14 birds were detected along a 39 km transect of the Unuk River in southeast Alaska from 23 June to 1 July 1974 (Gibson and MacDonald 1975). On the Seward Peninsula in western Alaska, a total of 13 birds were detected along an 18 km transect on the Pilgrim River on the 6 July 1971 (Kessel 1989). Thirteen birds were also detected along a 10 km transect at McCarthy's Marsh on 16 July 1973.

The density of Rusty Blackbirds appears to be relatively low across much of Alaska, though several regions in the interior may contain denser breeding populations (Andres and Brann 1997). Based on Alaska-wide BBS data, abundance appears to increase from east to west with a pronounced peak in abundance between 156° and 162° longitude (Sauer et al. 2004; Figure 2). This area corresponds with the wetland complexes in western and Interior Alaska between the Nulato and Kuskukwim Mountains. In Alaska, BBS data suggest a consistent long-term decline (-5.8%/yr, $p = 0.03$, $n = 25$) (Sauer et al. 2004; see Monitoring below).

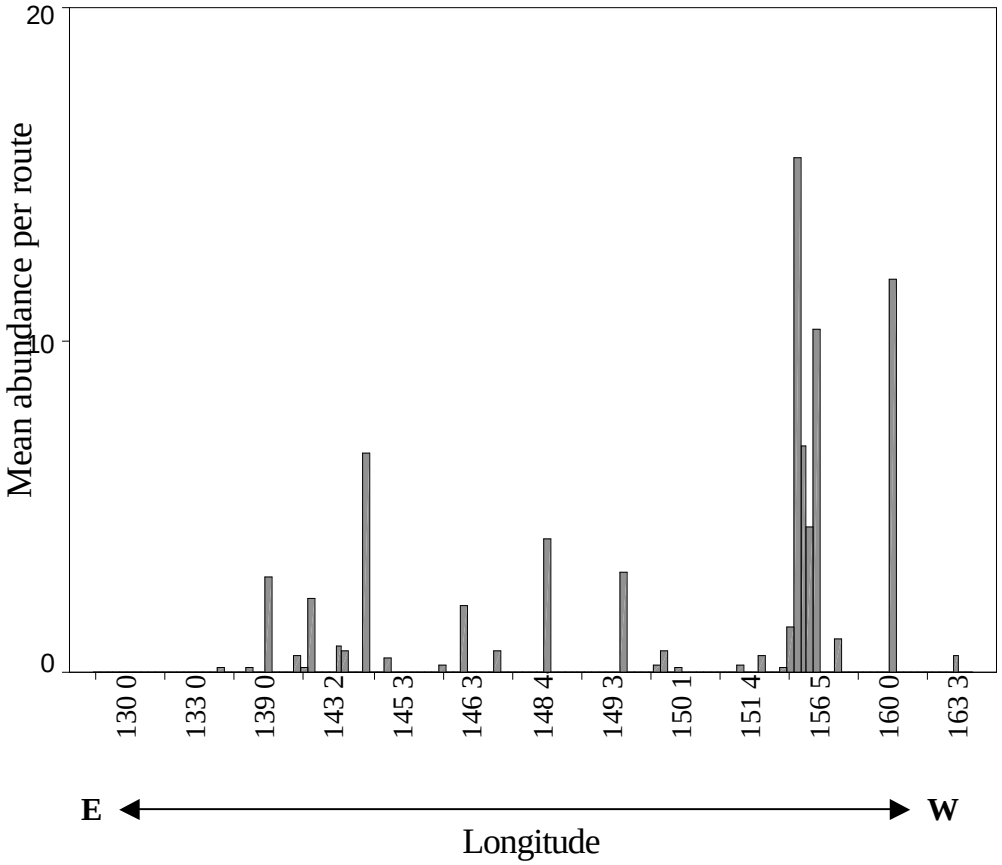

Figure 2 – Mean annual abundance (per BBS route) of Rusty Blackbirds in Alaska by longitude (adapted from Sauer et al. 2004).

MONITORING

Breeding – There are currently no large-scale monitoring methods other than BBS that can potentially monitor breeding population changes in this species. Except for a few regions, BBS coverage is also poor, making interpretation of data difficult (Sauer et al. 2004). Given the relative isolation of the breeding habitat and relatively low breeding density of this species, financial and logistical constraints limit most conventional monitoring techniques.

Non-breeding – The Rusty Blackbird does not appear to be effectively monitored using standardized migration counts at migration monitoring stations across North America. Of 21 migration monitoring stations operating across Canada, only two sample sufficient numbers to detect trends (Mackenzie Nature Observatory, BC: -24.3%/yr, $p < 0.05$; Thunder Cape Bird Observatory, ON: -3.8%/yr, $p > 0.05$; Bird Studies Canada 2004). On the wintering grounds, CBC data has proved useful in detecting overall population declines (Sauer et al. 1996), though variation in wintering location and abundance make regional interpretation of data difficult.

Alaska – Current estimates for Alaska BBS show significant declines of approximately 5.8%/yr from 1980-2003 ($p = 0.03$, $n = 25$; Sauer et al. 2004). These numbers emphasize the decline

because post hoc power analysis of BBS route level data suggests that power to detect differences is low in both the short- and long-term. Based on current variation in abundance, power (set at 90%) to detect a –5.0%/yr change in the population over a 10-, 30-, and 50-year time period was 6%, 13%, and 57% respectively. In Alaska, preliminary analysis suggests that the number of routes would need to be substantially increased to effectively monitor this species (*n* = 147, based on 90% power to detect a 5% change; using STPLAN 4.1, Barry W. Brown, Dept. of Biomathematics, Univ. of Texas, Houston, TX). At present, this sample size exceeds the current number of BBS routes surveyed in Alaska (n = 133), with Rusty Blackbirds being detected on only 22 of these routes.

The Off-Road Breeding Bird Survey is a relatively new initiative aimed at monitoring long-term trends in breeding populations of landbirds in Alaska (Handel 2003). Initial results, however, suggest that the Rusty Blackbird is not detected in sufficient numbers for this survey method to function as an effective monitoring tool for this species (C. Handel, pers. comm.). Data from migration monitoring stations in Alaska suggest that this species is not effectively monitored using this technique given the present intensity of migration monitoring stations. At Creamer's Refuge, Fairbanks, Alaska, capture rates of Rusty Blackbirds during spring (Figure 3) and fall (Figure 4) migration are extremely low with considerable inter-annual variation (Alaska Bird Observatory, unpubl. data). The Rusty Blackbird is not sampled by the Monitoring Avian Productivity and Survivorship (MAPS) Program in Alaska (DeSante et al. 2003).

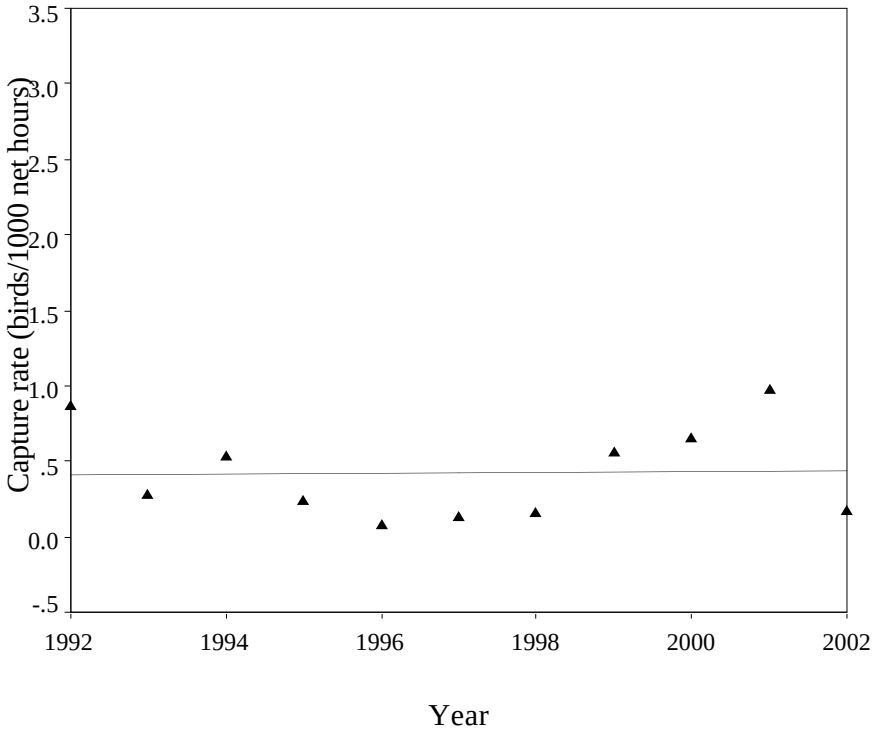

Figure 3 – Capture rate (birds/1000 net hours) of Rusty Blackbirds at Creamer's Field Migration Station, Fairbanks, Alaska (1992-2003) in spring.

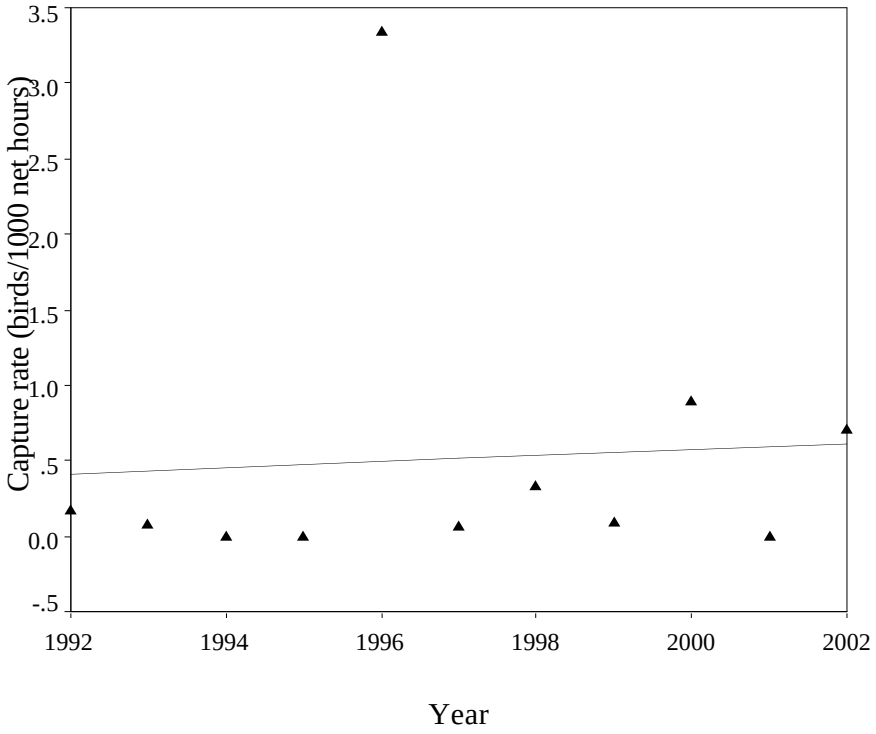

Figure 4 - Capture rate (birds/1000 net hours) of Rusty Blackbirds at Creamer's Field Migration Station, Fairbanks, Alaska (1992-2003) in fall.

HABITAT

Breeding – Rusty Blackbirds frequent wet forests, bogs, fens, muskeg, beaver ponds, and wet forest openings across the boreal region (Flood 1987, Semenchuk 1992). In the Yukon Territory, the species is described as occurring in wetland habitats, usually along the edges of ponds or lakes with dense marsh grasses, shrubs, and usually scattered dead trees (Sinclair et al. 2003). Ellison (1990) suggests that this species may be disturbance dependent, selecting habitats at early to mid-succession that have been influenced by processes such as fire, windthrow, and beaver activity.

According to Bent (1958), nests of the Rusty Blackbird are located in black spruce and other stunted muskeg trees at heights of 1-3 m. More recently, the species is described as nesting in trees or shrubs, usually over or near water, and frequently in conifers up to 6 m in height (American Ornithologists' Union 1983).

Non-breeding – Rusty Blackbirds frequent open woodland, scrub, pastures, and cultivated lands in migration (American Ornithologists' Union 1983). During fall migration, they appear to be highly opportunistic, with large flocks frequenting grassy margins and shrub habitats of large wetlands (Avery 1995). Large flocks also congregate at open landfills during migration (Gabrielson and Lincoln 1959, Kessel 1967, Sinclair et al. 2003)

In winter, the species associates with swamps, moist woodlands, and pond edges, generally using habitats that are not associated with other wintering blackbirds (Rosenberg et al. 1991, Sibley 1993). Rusty Blackbirds associate with several wetland habitat types throughout the winter range, generally in proximity to stream and ponds borders or open fields (Burleigh 1958, Sprunt and Chamberlain 1970).

Alaska – In general, Rusty Blackbirds favor open habitat near water, with a preference for nesting in tall shrubs (Spindler and Kessel 1980). Moist woodland (primarily coniferous), bushy bogs, wooded edges of water courses are preferred habitats (Spindler and Kessel 1980). The species can also be found along streams and rivers and at associated sloughs and wetlands, about the margins of taiga ponds, beaver ponds, lakes and adjacent marshes, and in brackish estuarine meadows (UAM unpubl. data).

On the Tanana Flats in central Alaska, Rusty Blackbirds selected fen meadows (containing little or no woody vegetation) - this stratum includes lowland herb bog meadow and sedge wet meadow (Benson 1999). Rusty Blackbirds were also present in, but did not select for, lowland low scrub (usually open to closed canopy of shrubs, dominated by dwarf birch and ericaceous shrubs, although black spruce and tamarack often present; 50 pts., 2 detections), lowland forest-thermokarst complex (forest types ranging from closed paper birch to closed black spruce with vegetation in thermokarst depressions ranging from sedge wet meadow to sphagnum bog; 32 pts., 1 detection), and lowland scrub-thermokarst complex (shrub-dominated communities; 38 pts., 5 detections) (Benson 1999). In this study, Rusty Blackbirds avoided lowland needleleaf forest (Benson 1999). Spindler (1976) suggests the species may prefer nesting on thermokarst ponds in interior Alaska. In this region, thermokarst ponds are largely attributed to past forest fires, and occupied sites had substantial evidence of past fire and abundant grass cover (Spindler 1976).

In interior Alaska, the Rusty Blackbird is thought to select habitat on the basis of ground cover characteristics, rather than forest characteristics (Spindler 1976). Birds selected areas with high grass cover and low tussock ground cover, avoiding sites with high herb, moss, lichen, and forest litter ground cover (Spindler 1976). In the Upper Tanana River valley, the Rusty Blackbird favored open habitats with water (6% ± 13% ground cover) and showed a strong preference for tall shrubs (Spindler and Kessel 1980). White spruce (36%) was the most commonly selected tree species for nesting, with willow (30%), and each of alder, poplar, and dead snags (10-12% each) being selected less frequently (Spindler and Kessel 1980). Vegetation surrounding nesting ponds was composed of 38.7% birch and 22.6% alder (Spindler 1976). In a study of bird use of palustrine (lack flowing water) wetlands near Fairbanks, Alaska, three detections were of birds in open canopy spruce (with considerable shrub component), three were in open, tall deciduous shrub, one was in dwarf black spruce woodland, and one was in closed mixed-forest. (P. Martin, pers. comm.). The Rusty Blackbird was described as a common breeding species in open muskeg near Fairbanks, with each pond and stream having a nesting pair (Spindler 1976).

In the Noatak River basin, Rusty Blackbird was common in spruce forests and adjacent willow thickets (Manuwal 1974). In this region, the species nested in spruce forest and foraged in adjacent *Carex* meadows and pond edges. On the Seward Peninsula, the species is generally

found in tall shrub habitat adjacent to lakes (Kessel and Gibson 1978). The species becomes uncommon to rare in tall shrub habitats beyond treeline (UAM unpubl. data).

In interior Alaska, perching birds were most frequently detected in the tree layer (62%), the tall shrub layer (21%), and the medium shrub layer (12%) (Spindler and Kessel 1980). Earlier work shows perching birds were most frequently detected in birch (51%) and in willow (21%) (Spindler 1976). Other described perches include dead snags, spruce tops, power lines and other elevated sites (UAM unpubl. data). Perching birds generally used sites that were higher than surrounding vegetation, averaging a height of 4.9 m, with an average vegetation height of 4.3 m (Spindler 1976).

EXISTING MANAGEMENT

To date, there has been no specific management for the Rusty Blackbird in any part of its range (Avery 1995, Greenberg and Droege 1999). More intensive management is warranted given the dramatic population declines, relative isolation of the northern breeding grounds, and the loss of southern wintering habitat (Avery 1995). Despite being identified as a species of conservation priority in Alaska (Andres 1999), no specific management has been initiated.Given the remoteness of its breeding habitat, relatively low breeding density, broad geographic distribution, and inconspicuous behavior, determining management objectives and priorities for this species may prove difficult (Avery 1995; see Research Priorities below).

THREATS

Land-use practices that degrade or eliminate wetlands are detrimental to Rusty Blackbirds (Avery 1995). While a large proportion of habitat remains intact on the breeding grounds, losses of wooded wetlands on the wintering grounds have been more dramatic. In the conterminous United States, it is estimated that approximately 54% of historic wetlands have been drained and converted to other uses (Dahl et al. 1997). Since colonization, approximately 80% of the flooded bottomland forest in the lower Mississippi Valley has been drained and converted to agriculture (Hefner and Brown 1984). Between the mid-1950's and mid-1980's close to 25% of the remaining wooded wetlands of the southeastern United States, an area that represents most of the winter range for this species, was drained and converted (Hefner and Brown 1984, Hefner et al. 1994).

While it is tempting to implicate the substantial loss of habitat on the wintering grounds for declines in the Rusty Blackbird (Greenberg and Droege 1999), there is some evidence to suggest that changes on the breeding grounds may also be limiting. Based on BBS trend data, several additional species that breed in high latitude wetland habitats appear to be declining at similar rates. In particular, the Horned Grebe (*Podiceps auritus*) and Lesser Yellowlegs (*Tringa flavipes*) are experiencing significant survey-wide declines (-3.2%/yr, $p = 0.03$; -9.3%/yr, $p = 0.00$, respectively; Sauer et al. 2004). The Solitary Sandpiper (*T. solitaria*), while not demonstrating significant range-wide declines, appears to be declining significantly on Alaska BBS routes (-4.2%/yr, $p = 0.00$; Sauer et al. 2004). While not sufficiently monitored by the BBS, the Arctic Tern (*Sterna paradisaea*), which also breeds in high latitude wetlands, was identified as a species of high conservation concern nationally, based on a declining population trend and

significant threats to breeding habitat (Kushlan et al. 2002). These wetland complexes occur throughout the boreal forest, this presents a unique opportunity for U.S. and Canadian land managers to work together closely to identify the cause of these declines and work towards a continent-wide management plan.

Although the impacts of increased acidification of boreal wetlands has been studied for decades (Schindler 1988), the effects on boreal bird communities have yet to be demonstrated (Greenberg and Droege 1999). It has been suggested, however, that because Rusty Blackbirds inhabit areas with naturally high soil acidity, they may be less susceptible to the effects of increased acidification (Darveau et al. 1989). Wetlands in eastern North America, where breeding season abundance of Rusty Blackbirds may have historically been the highest (Erskine 1977), have been most heavily impacted by wetland acidification (Schindler 1988). Given the large proportion of snails, mollusks, and other calcium-rich invertebrates in the Rusty Blackbird diet, the impacts of acidification on food resources may be substantial (Greenberg and Droege 1999), especially considering the declines observed in these organisms on acidified soils in the Netherlands (Graveland et al. 1994).

It is estimated that approximately 14% of Canada's landbase, some 1,270,000 km^2, consists of wetlands, representing the world's second largest peatlands resource base, and forming one of the principal water storage reservoirs in the northern hemisphere (National Wetlands Working Group 1988). Though generally localized, industrial peat extraction for horticultural use is another activity that may destroy Rusty Blackbird breeding habitat (Greenberg and Droege 1999).

Habitat modification on the breeding grounds, such as clearcut logging, may remove habitat and also encourage the settlement of more dominant Common Grackles (*Quiscalus quiscula*) and Red-winged Blackbirds (*Agelaius phoeniceus*), which may outcompete Rusty Blackbirds (Ellison 1990, Erskine 1992). Habitat modification may also encourage invasion by Brown-headed Cowbirds (*Molothrus ater*), a common and potentially problematic nest parasite (Avery 1995). However, Ellison (1990) found several nests and fledglings in recent clearcuts in Vermont, suggesting that this habitat, when saturated with water, may provide breeding habitat for this species.While recent clearcuts may satisfy the structural and successional habitat requirements for this species, no data exists on the relative quality of these sites (Hannah 2000).

Rusty Blackbirds often nest near the margins of beaver (*Castor canadensis*) ponds. The near extirpation of the beaver in the 1890's in New York State may have negatively impacted Rusty Blackbird populations (Peterson 1988). If so, the recent recovery of beavers may have benefited populations in the northeastern United States.

Winter roost control programs in the southern United States have led to declines in the Common Grackle, though the effects of roost management on Rusty Blackbird populations are unknown (Avery 1995). While these control programs may impact local populations, they likely do not represent a significant source of decline as Rusty Blackbird proportional attendance in these large winter roosts is thought to be <1% (Dolbeer et al. 1995).

RESEARCH PRIORITIES

General – The Rusty Blackbird remains one of the least studied birds in North America, most aspects of the species' natural history and breeding biology are unknown. Quantitative information on the foraging behavior, nest success, breeding season diet, flocking habits, courtship, and habitat associations is needed (Greenberg and Droege 1999).The status of breeding populations needs further clarification, as BBS and other traditional large-scale monitoring programs are clearly insufficient for this species (Avery 1995). Despite these substantial knowledge gaps, investigation into the sources of chronic declines in this species is of paramount importance and should be a priority for future research.

Alaska – While recent evidence suggests that Rusty Blackbirds have declined precipitously across most of their range in the past century, the populations in Alaska have declined at a slower rate. Financial and logistical constraints have limited the implementation of management efforts or experimental research on this species in Alaska. Given the current status and population trajectory of this species, the following is a description of priority information needs for this species in Alaska.

Improving current knowledge on the distribution and abundance of the Rusty Blackbird in Alaska should be the first priority for research. Clearly BBS is insufficient for providing meaningful distribution and abundance data for this species across the state. As the majority of breeding habitat for this species occurs in roadless areas, developing a robust, large-scale inventory method is needed. However, despite the need, a dedicated statewide population inventory at this scale would not be economically feasible. One possible alternative would be to incorporate Rusty Blackbirds into the North American Breeding Waterfowl Survey in Alaska. Conducted annually from mid-May to mid-June, these surveys use fixed-wing aircraft to fly established transect lines (400 m wide) at 100 mph, from a height of 150 ft above the ground (U. S. Fish and Wildlife Service 2001). The timing of this survey overlaps the breeding chronology of the Rusty Blackbird and could provide additional distribution and abundance data in a cost-effective manner. While this method seems promising, it would need to be field tested to ensure that observers are able to locate and count Rusty Blackbirds without compromising the original intent of the survey. Another option is the Alaska Off-Road BBS, which may provide additional data on the distribution and abundance of Rusty Blackbirds, though coverage and participation would need to increase from current levels.

Information on habitat preferences or habitat quality across the state is necessary for the management of this species. However, there is some evidence that Rusty Blackbird breeding habitat selection is based on ground cover attributes and not forest structure characteristics, making broad-scale habitat associations difficult. The apparent use of thermokarst ponds by this species in Interior Alaska warrants further investigation. Future habitat studies, however, need to place less emphasis on the structural components of habitat selection and more on the actual wetlands themselves (i.e. wetland size, wetland classification, water quality, invertebrate biomass etc.).

Another need for this species in Alaska is the development of a long-term monitoring program. The current BBS route intensity does not effectively sample this species in Alaska and likely will never reach the required intensity necessary to be an effective monitoring tool. Capture rates at migration monitoring stations in Alaska, or stations at lower latitudes that sample migratory populations, are also insufficient for monitoring population trends in this species. Clearly, monitoring of this species across the entire state will not be feasible given current methodological, financial, and logistical constraints.

Finally, quantitative information on the foraging behavior, nest success, breeding season diet, courtship, and habitat associations is needed. While little is known of historic Rusty Blackbird population abundance and distribution in Alaska, much of the species' range in the state remains relatively intact. Unlike areas in more southern and eastern portions of the range, where wetland drainage and habitat conversion has been more widespread, Alaska may contain some of the largest areas of remaining intact habitat. Alaska's relatively robust breeding population provides a unique opportunity to determine whether low adult survival or low recruitment is driving the population into decline. Therefore, Alaska may be the most desirable location to study the breeding ecology and life history characteristics of this poorly known species.

LITERATURE CITED

American Ornithologists' Union. 1957. Check-list of North American Birds. 5th Ed. American Ornithologists' Union, Washington, DC.

American Ornithologists' Union (AOU), Committee on Classification and Nomenclature. 1983. Check-list of North American Birds. Sixth Edition. American Ornithologists' Union, Allen Press, Inc., Lawrence, KS.

American Bird Conservancy. 2003. American Bird Conservancy Green List. URL:http://www.abcbirds.org/greenlist.htm. Access Date [8 March 2004].

Andres, B. A. 1999. Landbird Conservation Plan for Alaska Biogeographic Regions, Version 1.0. Unpubl. rep. U. S. Fish and Wildlife Service, Anchorage, AK. 45 pp.

Andres, B. A. and D. L. Brann. 1997. Inventory of breeding birds on Alaska Army National Guard Training Areas. Nome Region. Progress report. U.S. Fish and Wildlife Service, Anchorage, AK.

Avery, M. L. 1995. Rusty Blackbird (*Euphagus carolinus*). In The Birds of North America, No. 200 (A. Poole and F. Gill, eds.). The Academy of Natural Sciences, Philadelphia, and the American Ornithologists' Union, Washington, D.C.

Beecher, W. J. 1951. Adaptations for food getting in the American blackbirds. Auk 68: 411-440.

Bendire, C. E. 1895. Life histories of North American birds. U.S. Natl. Mus. Spec. Bull. 3.

Benson, A.-M. 1999. Distribution of landbirds among habitats on the Yukon Maneuver Area and Tanana Flats, Ft. Wainwright, Alaska 1998. Unpublished report prepared for: U. S. Fish and Wildlife Service, Anchorage, AK. 41 pp.

Bent, A. C. 1958. Life histories of North American blackbirds, orioles, tanagers, and their allies. U. S. Natl. Mus. Bull. 211.

Bird Studies Canada. 2004. Canadian Migration Monitoring Network. Population Trends. URL:http://www.bsc-eoc.org/national/cmmn.html. Access date [11 March 2004].

Blancher, P. J. 2003. Importance of Canada's Boreal Forest to Landbirds. Bird Studies Canada Report for North American Bird Conservation Initiative, Canada National Council.

Burleigh, T. D. 1958. Georgia birds. Univ. of Oklahoma Press, Norman, OK.

Cade, T. 1951. Food of the Peregrine Falcon, *Falco peregrinus*, in interior Alaska. Auk 68: 373-374.

Campbell, R. W. 1974. Rusty Blackbirds prey on sparrows. Wilson Bull. 86: 291-293.

COSEWIC. 2003. Canadian Species at Risk, November 2003. Committee on the Status of Endangered Wildlife in Canada. 44 pp.

Cyr, A. and J. Larivée. 1995. Atlas saisonnier des oiseaux du Québec. Les Presses de l'Université de Sherbrooke et la Société de Loisir Ornithologique de L'Estrie. Sherbrooke, Quebec, Canada.

Dahl, T. E., R. D. Young, and M. C. Caldwell. 1997. Status and trends of wetlands in the conterminous United States. U.S. Department of Interior, Fish and Wildlife Service, Washington, D.C.

Darveau, M., B. Houde, and J.-L. DesGranges. 1989. Phyto-ecology of lacustrine bird habitats in Quebec. Pp. 42-67 in J.-L. DesGranges (ed.). Studies of the effects of acidification on aquatic wildlife in Canada: lacustrine birds and their habitat in Quebec. Occasional Paper No. 67. Canadian Wildlife Service, Ottawa, Ontario.

Deane, R. 1895. Strange habits of rusty and crow blackbirds. Auk 12: 303-304.

DeSante, D. F, D. R. Kaschube, and T. S. Sillett. 2003. Evaluation of the first ten years of the Monitoring Avian Productivity and Survivorship (MAPS) Program in Alaska and adjacent Canada. A report to Boreal Partners in Flight in two parts. Part 1. General Results. The Institute for Bird Populations, Point Reyes Station, CA. 68 pp.

Dolbeer, R. A., D. F. Mott, and J. L. Belant. 1995. Blackbirds and starlings killed at winter roosts from PA-14 applications, 1974-1992: implications for regional population management. Proc. East. Wildl. Damage Manage. Conf. 7.

Downes, C. M., E. H. Dunn, and C. M. Francis. 2000. Canadian Landbird Monitoring Strategy: monitoring needs and priorities into the new millennium. Partners in Flight-Canada, Ottawa.

Ellison, W. G. 1990. The status and habitat of the Rusty Blackbird in Caledonia and Essex counties. Vermont Fish Wildl. Dep., Woodstock, VT.

Erlich, P., D. Dobkin, and D. Wheye. 1992. Birds in jeopardy. Stanford University Press, Stanford, CA.

Erskine, A. J. 1977. Birds in boreal Canada. Report 41. Canadian Wildlife Service, Ottawa, Ontario.

Erskine, A. J. 1992. Atlas of breeding birds of the Maritime Provinces. Nimbus Publ. Ltd. and Nova Scotia Mus., Halifax, NS.

Flood, N. 1987. Rusty Blackbird. Pp. 476-477 *in* Atlas of the breeding birds of Ontario (M. D. Cadman, P. F. J. Eagles, and F. M. Helleiner, eds.). Univ. of Waterloo Press, Waterloo, ON.

Friedmann, H. 1963. Host relations of the parasitic cowbirds. U.S. Natl. Mus. Bull. 233.

Fritzell, E. K. and D. H. Thorne. 1984. Birds predominate in the winter diet of a Barn Owl. Wilson Bull. 96: 321.

Gabrielson, I. N. and F. C. Lincoln. 1959. The Birds of Alaska. The Tackpole Co., Harrisburg, PA, and the Wildlife Management Institute, Washington, DC. 922 pp.

Gibson, D. D. and S. O. MacDonald. 1975. Bird species and habitat inventory, mainland southeast Alaska, summer 1974. Univ. Alaska Museum rep. to U.S. Forest Service. 73 pp.

Graveland, J., R. van der Wal, J. H. van Balen, and A. J. van Noordwijk. 1994. Poor reproduction in forest passerines from decline of snail abundance on acidified soils. Nature 368: 446-448.

Greenberg, R. and S. Droege. 1999. On the decline of the Rusty Blackbird and the use of ornithological literature to document long-term population trends. Conservation Biology 13(3):553-559

Handel, C. M. 2003 Alaska Landbird Monitoring System. Protocol for Setting up and Conducting Point Count Surveys. Alaska Science Center. U.S. Geological Survey. Anchorage, AK. 24 pp.

Hannah, K. C. 2000. Patterns in habitat quality for the White-throated Sparrow (Zonotrichia albicollis) in a recently logged landscape.. M.Sc. Thesis, Department of Renewable Resources, University of Alberta, Edmonton, AB.

Hefner, J. M. and J. P. Brown. 1984. Wetland trends in southeastern U.S. Wetlands 4: 1-11.

Hefner, J. M., B. O. Wilen, T. E. Dahl, and W. E. Frayer. 1994. Southeast wetlands: status and trends, mid-1970's to mid-1980's. U.S. Fish and Wildlife Service and U.S. Environmental Protection Agency. Atlanta, Georgia.

Henderson, A. D. 1937. Concerning blackbirds, Rusty and Brewers. Oologist 54:46-48.

Hoffman, K. and M. Hoffman. 1982. Minnesota's first Rusty Blackbird nest. Loon 54: 141-143.

Kennard, F. H. 1920. Notes on the breeding habits of the Rusty Blackbird in northern New England. Auk 37: 412-422.

Kessel, B. 1967. Late-autumn and winter bird records from interior Alaska. Condor 69:313-316.

Kessel, B. 1989. Birds of Seward peninsula, Alaska. Univ. of Alaska Press, Fairbanks, AK.

Kessell, B. and D. D. Gibson. 1978. Status and Distribution of Alaska Birds. Studies in Avian Biology No. 1. 100 pp.

Kushlan, J. A., M. J. Steinkamp, K. C. Parsons, J. Capp, M. A. Cruz, M. Coulter, I. Davidson, L. Dickson, N. Edelson, R. Elliot, R. M. Erwin, S. Hatch, S. Kress, R. Milko, S. Miller, K. Mills, R. Paul, R. Phillips, J. E. Saliva, W. Sydeman, J. Trapp, J. Wheeler, and K. Wohl. 2002. Waterbird Conservation for the Americas: The North American Waterbird Conservation Plan, Version 1. Waterbird Conservation for the Americas. Washington, DC, U.S.A.

Lanyon, S. M. 1994. Polyphyly of the blackbird genus *Agelaius* and the importance of assumptions of monophyly in comparative studies. Evolution 48: 679-693.

Lewis, J. B. 1931. Behavior of Rusty Blackbird. Auk 48: 125-126.

Manuwal, D. A. 1974. Avifaunal investigations in the Noatak River Valley. Pp. 252-325. *In* S. B. Young (ed.), The environment of the Noatak River Basin, Alaska. Contrib. Center for Northern Studies No. 1. 584 pp.

Martin, A. C., H. S. Zim, and A. L. Nelson. 1951. American wildlife and plants. McGraw-Hill Book Co., New York, NY.

McGuire, A. D. 1983. The breeding ecology of the Red-winged Blackbird (*Agelaius phoeniceus*) in eastern interior Alaska. M.S. Thesis. University of Alaska, Fairbanks, AK. 77 pp.

Meanley, B. 1995. Some foods of the Rusty Blackbird in the Great Dismal Swamp region. Raven 66: 9-10.

Messerly, E. H. 1979. Rusty Blackbird feeds on American Goldfinch. Bull. Okla. Ornithol. Soc. 12: 6-7.

National Wetlands Working Group. 1988. Wetlands of Canada. Ecological Land Classification Series No. 24. Sustainable Development Brach, Environment Canada, Ottawa, Ontario, and Polyscience Publications Inc., Montreal, Quebec. 452 p.

NatureServe. 2003. NatureServe Explorer: An online encyclopedia of life [web application]. Version 1.8. NatureServe, Arlington, Virginia. Available http://www.natureserve.org/explorer. Access date [August 16, 2003].

Orians, G. H. 1985. Blackbirds of the Americas. Univ. of Washington Press, Seattle, WA.

Oring, L. W. 1968. Vocalizations of the Green and Solitary sandpipers. Wilson Bull. 80: 395-420.

Peters, H. S. and T. D. Burleigh. 1951. The birds of Newfoundland. Houghton Mifflin Co., Boston, MA.

Petersen, M. R., D. M. Weir, and M. H. Dick. 1991. Birds of the Kilbuck and Ahklun Mountain region, Alaska. U.S. Fish and Wildl. Serv. North Am. Fauna, No. 76. 158 pp.

Peterson, J. M. C. 1988. Rusty Blackbird *Euphagus carolinus*. Pp. 474-475 *in* The Atlas of Breeding Birds in New York State. (R. F. Andrle and J. R. Carroll, eds.) Cornell Univ. Press, Ithaca, NY.

Root, T. 1988. Atlas of wintering North American birds: an analysis of Christmas Bird Count data. Univ. of Chicago Press, Chicago, IL. 312 pp.

Rosenberg, K. V., R. D. Ohmart, W. C. Hunter, and B. W. Anderson. 1991. Birds of the lower Colorado River valley. Univ. of Arizona Press, Tucson, AZ.

Sauer, J. R., S. Schwartz, and B. Hoover. 1996. The Christmas Bird Count home page. Version 95.1. Patuxent Wildlife Research Center, Laurel, MD.

Sauer, J. R., J. E. Hines, G. Gough, I. Thomas, and B. G. Peterjohn. 1997. The North American Breeding Bird Survey results and analysis. Version 96.3. Patuxent Wildlife Research Center, Laurel, MD.

Sauer, J. R., J. E. Hines, and J. Fallon. 2004. The North American Breeding Bird Survey, Results and Analysis 1966 - 2003. Version 2004.1, USGS Patuxent Wildlife Research Center, Laurel, MD.

Saunders, A. A. 1935. A guide to bird songs. Doubleday and Co., Garden City, NY.

Schindler, D. W. 1988. Effects of acid rain on freshwater ecosystems. Science 239: 149-239.

Semenchuk, G. P. 1992. The atlas of breeding birds of Alberta. Fed. Alberta Nat., Edmonton, Alberta.

Sibley, D. 1993. Birds of Cape May. New Jersey Audubon Soc., Cape May Point, NJ.

Sinclair, P. H., W. A. Nixon, C. D. Eckert, and N. L. Hughes. 2003. Birds of the Yukon Territory. University of British Columbia Press, Vancouver, BC. 595 pp.

Spindler, M. A. 1976. Ecological survey of the birds, mammals, and vegetation of Fairbanks Wildlife Management Area. M.S. Thesis, Univ. Alaska, Fairbanks. 258 pp.

Spindler, M. A. and B. Kessel. 1980. Avian populations and habitat use in interior Alaska taiga. Syesis 13:61-104.

Sprunt, A., Jr. and E. B. Chamberlain. 1970. South Carolina bird life. Rev. ed. Univ. of South Carolina Press, Charleston, SC.

Stickley, A. R.,Jr., D. J. Twedt, J. F. Heisterberg, D. F. Mott, and J. F. Glahn. 1986. Surfactant spray system for controlling blackbirds and starlings in urban roosts. Wildl. Soc. Bull. 14: 412 – 418.

Swanson, S. A. and D. A. Nigro. 2003. A breeding landbird inventory of Yukon-Charlie Rivers National Preserve, Alaska, June 1999 and 2000. National Park Service Report No. YUCH-03-001. Fairbanks, AK.

U. S. Fish and Wildlife Service. 2001. Migratory Birds: Surveying Waterfowl. North American Breeding Waterfowl Survey in Alaska. .S. Fish & Wildlife Service, Region 7, Division of Migratory Bird Management. URL:http://www.r7.fws.gov/mbm/waterfowl/surveys/akbpsfl.html [Updated January 2001]

U. S. Fish and Wildlife Service. 2002. Birds of conservation concern 2002. Division of Migratory Bird Management, Arlington, VA. 99 pp. [Online version available at <http://migratorybirds.fws.gov/reports/bcc2002.pdf>]

Williams, L. 1952. Breeding behavior of the Brewer Blackbird. Condor 54:3-47.

Woodruff, C. and A. Woodruff. 1991. Predation by Rusty Blackbirds on songbirds at a winter feeder. Chat 55: 54-55.

Location	Spring	Summer	Fall	Winter	Breeding	Present	Reference
ADF&G Game Management Unit 12	C	C	C	R	Y	Y	1
Alaska Maritime Refuge - Bering Sea Unit					N	Y	2
Alaska Maritime Refuge - Gulf of Alaska Unit					N	Y	2
Alaska Peninsula, Cape Douglas to Port Moller					U	Y	3
Anaktuvuk Pass Alaska					U	Y	4
Anchorage Area Military Reservations - (Elmendorf AFB, Ft. Richardson)	U	C	U	R	U	Y	5
Arctic National Wildlife Refuge - South Slope					Y	Y	6
Arctic National Wildlife Refuge - Brooks Range					Y	Y	6
Arctic National Wildlife Refuge - North Slope					N	Y	6
Bering Land Bridge National Preserve	U	R	R		N	Y	7
Chugach National Forest	U	U	FC	R	Y	Y	8
Copper River Basin and Surrounding Areas		C			Y	Y	9
Dalton Highway - North Slope		R			U	Y	10
Dalton Highway - South Slope		FC			U	Y	10
Glacier Bay National Park and Preserve		R	VR	VR	U	Y	11
Innoko National Wildlife Refuge		C			Y	Y	12
Interior Alaska					U	Y	13
Izembek National Wildlife Refuge					N	Y	14
Juneau					U	Y	15
Kachemak Bay	U	U	U	R	U	Y	16
Kanuti National Wildlife Refuge	U	U	U		Y	Y	17
Kenai National Wildlife Refuge	U	U	U	X	Y	Y	18
Kenai Fjords National Park	U	U	U	R	Y	Y	19
Klondike Gold Rush National Historical Park						Y	20
Knik River to Turnagain Pass - Anchorage, Alaska	C	C	C	R	Y	Y	21
Kodiak National Wildlife Refuge and Kodiak Island Archipelago	R		R	R	U	Y	22
Koyukuk National Wildlife Refuge					U	U	23
Koyukuk/Nowitna Complex National Wildlife Refuge					U	U	24
Northwest Alaska - Cape Krusenstern National Monument		R			U	Y	25
Northwest Alaska - Kobuk Valley National Park		U			U	Y	25
Northwest Alaska - Noatak National Preserve		R			U	Y	25
Palmer Area		C			U	U	26
Selawik National Wildlife Refuge		C			U	U	27
Seward, Alaska	U	U	U	R	Y	Y	28
Tetlin National Wildlife Refuge	C	C	U		Y	Y	29
Togiak National Wildlife Refuge	U	U	U		Y	Y	30
Walrus Islands State Game Sanctuary		X			N	Y	31
Wrangell-St. Elias National Park and Preserve					N	N	32
Yukon Delta National Wildlife Refuge		U			Y	Y	33, 34, 35
Yukon Flats National Wildlife Refuge		C			Y	Y	36

Table 1 – Checklist of distribution and abundance of Rusty Blackbirds on state and federal lands in Alaska. Status codes: C = common, FC = fairly common, U = uncommon, R = rare, VR = very rare, and X = incidental. Breeding and present codes: Y = yes, N = no, and U = undetermined.

Table 1 References

1. U.S. Fish and Wildlife Service. No Date. Bird Checklist for Alaska Department of Game and Fish, Game Management Unit 12. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/unit12.htm (Version 30 DEC 2002).

2. U.S. Fish and Wildlife Service. No date. Breeding status and distribution of birds on Alaska Maritime Refuge. U.S. Fish and Wildlife Refuge. 4 pages. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page.

3. U.S. Fish and Wildlife Service and National Park Service. No Date. Birds of the Alaska Peninsula, Cape Douglas to Port Moller. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/akpenin.htm (Version 30 DEC 2002).

4. Hall, S. 1995. Birds of Anaktuvuk Pass Alaska. Gates of the Arctic National Park and Preserve. Unpaginated. Jamestown, ND:Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/anapass.htm (Version 22 MAY 1998).

5. Department of Defense. No date. Bird Checklist, Anchorage Area Military Reservations. Department of Defense. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r1/elmendor.htm (Version 26 JUN 2000).

6. Williams, M.A. 1992. Checklist to the birds of the Arctic National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service. 13 pages. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/arcticwr.htm (Version 22 MAY 1998).

7. Harris, R. 1996. Bering Land Bridge National Preserve, Birding on the Seward Peninsula. United States Department of the Interior and National Park Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/bering.htm.htm (Version 10 JUL 2001).

8. Isleib, M. E. 1984. Birds of the Chugach National Forest. U.S. Forest Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/chugach.htm (Version 22 MAY 1998).

9. The Bureau of Land Management, Glennallen District in association with the Alaska Department of Fish and Game; Glennallen, Alaska; Wrangell-St. Elias National Park; Glennallen, Alaska. 1989. The Birds of the Copper River Basin and Surrounding Areas. The Bureau of Land Management, Glennallen District in association with the Alaska Department of Fish and Game; Glennallen, Alaska; Wrangell-St. Elias National Park; Glennallen, Alaska. Unpaginated.. Jamestown, ND:Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/copper.htm (Version 23 FEB 2001).

10. Schauer, A. No date. Birds along the Dalton Highway. Bureau of Land Management. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/dalton.htm (Version 1 SEPT 1998).

11. Paige, B. 1983. Birds of Glacier Bay National Park and Preserve, Gustavus, Alaska. Alaska Natural History Association in Gustavus, Alaska. Alaska Natural History Association in cooperation with the National Park Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/glacier.htm (Version 2 DEC 1999).

12. U.S. Fish and Wildlife Service. 1991. Birds of the Innoko National Wildlife Refuge. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/innoko.htm (Version 22 MAY 98).

13. Kessel, B. 1986. Birds of Interior Alaska. University of Alaska Museum. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/intalask.htm (Version 3 MAR 2000).

14. U.S. Fish and Wildlife Service. No date. Birds of the Izembek National Wildlife Refuge. U.S. Fish and Wildlife Refuge. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/izembek.htm (Version 22 MAY 1998).

15. U.S. Forest Service. 1995. Finding birds in Juneau. U.S. Forest Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/juneau.htm (Version 22 MAY 1998).

16. Erikson, D., M. Davidson, and J. Klein. 1983. "Birds of Kachemak Bay". Kachemak Bay, Alaska. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/kachem.htm. (Version 1983).

17. U.S. Fish and Wildlife Service. No date. Kanuti National Wildlife Refuge bird list. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/kanuti.htm (Version 22 MAY 1998).

18. U.S. Fish and Wildlife Service. No date. Birds of the Kenai National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/kenai.htm (Version 22 MAY 1998).

19. National Park Service. 1997. Birds of Kenai Fjords National Park, Seward, Alaska. Alaska Natural History Association, National Park Service, Challenge Cost Share Program, with association by Kenai Fjord National Park and Chugach National Forest. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/kena.htm (Version 02 DEC1999).

20. National Park Service. 1998. Birds of Klondike Gold Rush National Historical Park, Skagway, Alaska . National Park Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/skag.htm (Version 02 DEC 1999).

21. DeLap, D., J. Pritcher, R. L. Scher, H. S. Scott, G. Tans, T. Tobish, S. Wulkowicz. Winter 1983. "Birds of Anchorage, Alaska." Alaska. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/anchor.htm (Version 02 MAR 2000).

22. MacIntosh, R. 1998. Kodiak National Wildlife Refuge and Kodiak Island Archipelago bird list. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/kodiak.htm (Version 01 FEB 2000).

23. U.S. Fish and Wildlife Service. No date. Birds of Koyukuk and Northern Unit of the Innoko National Wildlife Refuges, Alaska. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/koyukuk.htm (Version 22 MAY 1998).

24. U.S. Department of the Interior. 1997. Bird Checklist of Koyukuk National Wildlife Refuge. U.S. Department of the Interior. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/koynow.htm (Version 23 FEB 2001).

25. Schroeder, M. 1996. Birds of the Northwest Alaska areas. National Park Service. Unpaginated. Jamestown, ND:Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/noalaska.htm (Version 01 SEPT 1998).

26. Bronson, M. T. 1988. "Birds of the Palmer Area. Palmer, Alaska. Media North Printing. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/palmer.htm. (Version 1988).

27. U.S. Fish and Wildlife Service. No date. Birds of the Selawik National Wildlife Refuge. U.S. Fish and Wildlife Service. 1 page. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/selawik.htm (Version 22 MAY 1998).

28. Andrew, J., R. McHenry, R. Scher, D. Sonneborn, and T. Tobish. 1997. Birds of Seward, Alaska. Seward Chamber of Commerce. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/seward.htm (Version 03 MAR 2000).

29. U.S. Fish and Wildlife Service. No date. Birds of the Tetlin National Wildlife Refuge, Alaska. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/tetlin.htm (Version 22 MAY 1998).

30. U.S. Fish and Wildlife Service. 2002. Togiak National Wildlife Refuge bird checklist. U.S. Fish and Wildlife Service. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/togiak.htm (Version 21 FEB 2003).

31. Sinnott, R. and P. Hessing. Spring 1991. Birds of Round Island, Alaska, Walrus Islands State Game Sanctuary. Alaska Department of Fish and Game. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page.

http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/roundmam.htm (Version 13 MAR 2000).

32. Alaska Natural History Association. 1993. Checklist of the birds in Wrangell-St. Elias National Park and Preserve. Alaska Natural History Association. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/wrangell.htm (Version 22 MAY 1998).

33. Harwood, C.M. 2000. 1999 Lower Kuskokwim River Watershed Breeding Bird Survey. Unpubl. Report, U.S. Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, Bethel, AK 8pp.

34. Harwood, C.M. 2002. 2001 Lower Kuskokwim River Watershed Breeding Bird Survey. Unpubl. Report, U.S. Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, Bethel, AK 7pp.

35. Harwood, C.M. 2002. 2002 Lower Yukon River Watershed Breeding Bird Survey. Unpubl. Report, U.S. Fish and Wildlife Service, Yukon Delta National Wildlife Refuge, Bethel, AK 7pp.

36. Sowl, K.M. 1998. Birds of the Yukon Flats National Wildlife Refuge Checklist. U.S. Fish and Wildlife Service. Unpaginated. Jamestown, ND: Northern Prairie Wildlife Research Center Home Page. http://www.npwrc.usgs.gov/resource/othrdata/chekbird/r7/yukflats.htm (Version 26 OCT 1998).