

**STATUS OF THE BOBOLINK
IN BRITISH COLUMBIA**

by
Linda M. Van Damme



BIODIVERSITY

Wildlife Working Report No. WR-93

March 1999

British Columbia, Canada's most westerly province, has a bounty of biological diversity. British Columbia's snowclad peaks, rain-drenched forests, arid grasslands, all sizes of rivers, lakes, and wetlands, and a long and rugged coast provide habitats for more species of living organisms than are found anywhere else in Canada. However, this very diversity means that there is much to be discovered about these organisms — their distribution, abundance, habitat requirements, and interrelationships with their environment. Increasing our knowledge of this biodiversity will help us with the complex task of sustainably managing our land and waters.

In 1992, the Provincial Government initiated a co-operative biodiversity research program with funding from the Corporate Resource Inventory Initiative, the British Columbia Ministries of Forests (Research Branch), Environment, Lands, and Parks (Wildlife and Habitat Protection Branches), and Tourism and Culture (Royal B.C. Museum); and the Forest Resource Development Agreement (FRDA II).

In 1995, the Ministry of Forests Research Branch and the Ministry of Environment, Lands and Parks developed a biodiversity research and extension strategy, with the assistance of the provincial research community. This strategy was presented to Forest Renewal BC (FRBC), who provided funding for a program beginning in 1995. The goal of the extension component of this program is to extend information to scientists, resource managers, and the public through biodiversity publications. These publications are intended to increase awareness and understanding of biodiversity, promote the concepts and importance of conserving biodiversity, and communicate provincial government initiatives related to biodiversity. We hope that they will be used as tools for the conservation of British Columbia's rich, living legacy.

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“Wildlife Working Reports frequently contain preliminary data, so conclusions based on these may be subject to change. Working Reports receive little review. They may be cited in publications, but their manuscript status should be noted. Copies may be obtained, depending upon supply, from the Ministry of Environment, Lands and Parks, Wildlife Branch, PO Box 9374, Stn. Prov. Govt., Victoria, BC V8W 9M4.”

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FOREWORD

In cases where a Wildlife Working Report or Bulletin is also a species' status report, it may contain a status recommended by the author for the species. This recommended status is the opinion of the author and may not necessarily reflect that of the Wildlife Branch. Official status designation will be made by the Wildlife Branch in consultation with experts, and the data contained in the status report will be considered during the evaluation process.

ABSTRACT

The Bobolink (*Dolichonyx oryzivorus*) is a regular summer visitant to southern Canada. In British Columbia, the Bobolink is a regular, but local, summer visitant and breeds in the south-central interior of the province. It inhabits open country, showing a preference for large, established, cultivated hayfields, weedy fields predominated by a mixture of tall grasses, and moist meadows. Very little is known about the breeding biology, ecology, and specific threats to Bobolinks in British Columbia. The Bobolink is known to breed at 22 sites in the province. The total provincial population is estimated to be between 500 and 1100 birds. The population appears stable, but loss of suitable habitat through changing agricultural practices and pesticide treatments do pose a threat to this grassland species. The Bobolink should be considered vulnerable in British Columbia and its current "Blue List" status should be retained.

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The production of the final report (extension project) was made possible through the financial support of Forest Renewal British Columbia (FRBC) and the B.C. Ministry of Environment, Lands and Parks, Wildlife Branch. English editing was done by Ted Wagstaff, and project management, final editing, final figure production and typesetting were done by Gail F. Harcombe.

The production of this report (extension project) was made possible through the financial support of Forest Renewal British Columbia (FRBC) and the B.C. Ministry of Environment, Lands and Parks, Wildlife Branch.

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INTRODUCTION

The Bobolink (*Dolichonyx oryzivorus*) is a songbird of the family Icteridae. In size, it is a little smaller than the European Starling. The male has a striking plumage pattern with a black head and underparts, a dull yellow buff nape, and whitish scapulars and rump. The female is less conspicuous with buffy dark streaking on the back, rump, and sides and a striped crown.

The Bobolink nests in tall and mixed-grass prairies, hayfields, and similar habitats that are dominated by a variety of tall grasses. It was first recorded in British Columbia in 1913 and found breeding in 1941 (Munro and Cowan 1947). Little is known about its nesting and foraging requirements in B.C. Because of the local disjunct distribution of the Bobolink, and its estimated low population size and the precariousness of its preferred habitat, it is considered to be a species of management concern.

This status report is part of an ongoing program of the British Columbia Ministry of Environment Lands and Parks, Wildlife Branch, designed to better manage species at risk for long-term viability. It summarizes existing information on the Bobolink and provides recommendations for management, research, and conservation.

This report was funded by the Habitat Conservation Trust Fund (locally administered by the Okanagan Region Wildlife Heritage Society), with additional support from the Ministry of Environment, Lands and Parks, Wildlife Branch, and the Coordinated Resources Inventory Initiatives (CRII), in association with the South Okanagan Conservation Strategy.

GENERAL BIOLOGY

Reproductive Capability

The male establishes a territory, performs a courtship song flight, and pursues the female who is often less visible in the tall vegetation. Studies done on mating behaviour indicate that the male Bobolink may be monogamous or polygamous, with some males remaining unmated (Bent 1958; Wittenburger 1978). However, in Wisconsin, Bobolinks were often trigamous (Martin 1971, 1974). No studies have been conducted in British Columbia. Wittenburger (1978) determined that males consistently secured one mate before obtaining a second one. Bobolinks are single-brooded and raise one brood per year; polygynous males not only feed nestlings of their first (primary) female, but regularly feed offspring of subsequent (secondary) mates (Martin 1974; Wittenburger 1982).

The female Bobolink builds a loosely constructed, well-concealed cup nest in a ground hollow, frequently at the base of tall, weedy plants (Wittenburger 1978). The nest is difficult to find as the female seldom flies directly from the nest, but runs through the grass before flushing. Bobolinks lay between 2 and 6 eggs (average of 4 eggs) in British Columbia (Campbell *et al.* in prep.). Eggs have been found in nests in the province from 8 June to 10 July (Campbell *et al.* in prep.). The incubation period is 10 to 13 days with the young leaving the nest in 10 to 14 days (Ehrlich *et al.* 1988). Fledged young have been recorded in the province from 29 June to 22 July with most found in the first half of July (Campbell *et al.* in prep.). The fledging success of nests in B.C. is unknown.

Personal observations by the author suggest that Bobolinks, in some situations, can be considered semi-colonial on their breeding grounds as several males have been observed defending territories in restricted, optimal habitats. Males frequently perch on plants and structures higher than their nesting substrate and may be within 50 to 100 metres of one another.

Species Movement

The Bobolink is a nocturnal, trans-equatorial migrant whose annual migratory cycle can cover over 19,000 km. This movement surpasses all other Western Hemisphere passerines (Hamilton 1962). Most males arrive on the breeding grounds in North America and quickly establish territories in mid to late May. Females arrive later, in late May and early June.

In British Columbia, the earliest arrival date is 21 April, when a male was seen on a fence post in fields north of Osoyoos (Campbell *et al.* in prep.).

In late July, adults and fledged young congregate in loose, post-breeding flocks. The adults complete a partial moult (Hamilton 1962) and in early August autumn migration is initiated. Few birds remain in British Columbia by the end of the month (Campbell *et al.* in prep.).

In autumn, populations in western North America migrate eastward rather than southward, and in August until mid-September form large concentrations along the Atlantic Seaboard from New Jersey to Florida (Howell 1932; Stone 1937) before they begin their arduous journey to wintering grounds in South America. Bobolinks remain in loose flocks on the wintering grounds.

Behaviour/Adaptability

The Bobolink has adapted to a loss of former habitat in undisturbed fields, meadows, and drier portions of marshes by establishing itself during the breeding season in cultivated fields of alfalfa, timothy, and grain crops. Bobolinks are sensitive to early mowing. The males seek perch sites of tall vegetation and shrubs within the landscape, but have adapted to fence posts, electric wires, farm implements, and sprinkler systems.

Food

Bobolinks feed primarily on insects in summer, changing to a diet of wild plant seeds during migration and on their wintering grounds. Beal (1900) reports that from May to September, insects comprise 57.1% of Bobolink stomach contents, with the remaining 42.9% being vegetable matter. Caterpillars, grasshoppers, and beetles are the main component of the summer diet augmented with grain or weed seeds. Bobolinks exploit the rich food source of weevil-infested alfalfa fields (Kalmbach 1914).

In Oregon, dandelions (*Taraxacum officinale*) were the most important source of seeds eaten by adult male Bobolinks in early spring (May). They also infrequently ate cutworms and other insects (Wittenberger 1978). In June, Wittenberger (1978) also saw Bobolinks feed on the seeds of cinquefoil (*Potentilla glomerata*), yarrow (*Achillea millefolium*), Canadian thistle (*Cirsium arvense*), false lupine (*Thermopsis montana*), dock (*Rumex crispus*) and mallow (*Malva moschata*), although these were not an important component of the bird's diet.

Nestlings are fed mostly caterpillars, which are found on the leaves of sweet clover (*Melilotus officinalis*), bur clover (*Medicago lupulina*), red clover (*Vicia americana*), groundsel (*Senecio hydrophilus* and *S. hydrophobus*), false Solomon's seal (*Smilacina stellata*), and pepper grass (*Lepidium perfoliatum*) (Tietz 1972).

In South America, Bobolinks forage in rice fields and are considered local pests (Orians 1985).

HABITAT

Habitat Preferences

The American Ornithologists' Union (1983) summarizes the habitat preferences of the Bobolink as follows:

Tall grass areas, flooded meadows, prairie, deep cultivated grains, and alfalfa and clover fields; in migration and winter also in rice fields, marshes, and open woody areas.

Bollinger and Gavin (1989a) list contiguous hayfields, pasture, and meadows as habitat for breeding Bobolinks in New York. In Wisconsin, Martin (1974) studied Bobolinks breeding in meadows and fields where maximum land relief was 0.6 m and the patchwork or mosaic of vegetation types included sedges (*Carex* spp.), Kentucky blue grass (*Poa pratensis*), and meadow rue (*Thalictrum dasycarpum*). In Minnesota, Johnson and Temple (1990) found Bobolinks in remnant patches of tall grass prairie interspersed with shelterbelts and clumps of invading trees. Wittenberger (1978) lists breeding habitat in Oregon to include grassy meadows intermixed with sedges (*Carex* spp.) and numerous forbs. He also mentioned that cow parsnip, willows, and fence posts along irrigation ditches were used as song perches.

Large habitat patches that resemble old hayfields were the most important breeding habitat for Bobolinks in an intensive study by Bollinger and Gavin (1989). Their results showed that Bobolink abundance in old hayfields (> 8 years since planting) in the northeastern United States was at least 67% greater than in any midwestern prairies. Also, Bobolink abundance increased exponentially with hayfield size, and was highest in fields with the least alfalfa cover.

Although no quantitative studies are available for British Columbia, habitat requirements for nesting Bobolinks are similar. They breed in the Cultivated Field (CF) and Meadow (MR) Broad Habitat Classes of wildlife habitats described by Lea and Harcombe (1992). Although no detailed analysis of vegetation was carried out, during 1994 field work the following plant species were common to all sites: tall grass (*Poa* spp.), sedge (*Carex* spp.), horsetail (*Equisetum* spp.), buttercups (*Ranunculus* spp.), daisies (*Erigeron* spp.), red and white clover (*Trifolium* spp.), thistle (*Cirsium* spp.), dandelions (*Taraxacum officinale*), purple vetch (*Vicia* spp.), and alfalfa or timothy hay crop.

Distribution of Habitat

In British Columbia, agricultural habitat suitable for breeding Bobolinks within their known range is distributed locally in the following Ecosections as defined by Demarchi (1988): Nechako Lowlands (NEL), Cariboo Plateau (CAP), Cariboo Basin (CAB), Northern Thompson Upland (NTU), Thompson Basin (THB), Northern Okanagan Basin (NOB), Southern Okanagan Basin (SOB), Central Columbia Mountains (CCM), Southern Columbia Mountains (SCM), and Eastern Purcell Mountains (EPM). These Ecosections fall within the Bunchgrass, Ponderosa Pine, Interior Douglas-Fir, and Interior Cedar-Hemlock biogeoclimatic zones.

Currently, the Bobolink in British Columbia appears to be dependent on artificially cultivated habitats.

Trends in Habitat Quantity and Quality

The amount of habitat in British Columbia available to Bobolinks has gone through significant changes since the turn of the century. The dyking of the Kootenay Flats in the Creston Valley during the mid-1940s created agricultural fields suitable for breeding (Butler et al. 1986). However, in the South Okanagan, habitat has been affected by pressures of urbanization (see LIMITING FACTORS — Habitat Loss).

The quality of habitat throughout the Bobolink's range fluctuates with crop rotation, prescribed burning, and agricultural practices.

Habitat Protection

No legal protection has been established for Bobolink habitat in British Columbia. Most known locations are on privately owned land, therefore a vigorous education program involving land stewardship may be necessary to secure optimal breeding sites. Where Bobolink habitat occurs on Crown (e.g., Castlegar) or leased Crown land, the *Forest Practices Code of British Columbia Act* may address some of the habitat requirements of this species (e.g., creation of a Bobolink Wildlife Habitat Area).

DISTRIBUTION

World

The Bobolink is found only in North and South America. In North America, the northern boundary of the breeding range extends from south-central British Columbia to Nova Scotia and the southern boundary from Nevada to North Carolina (American Ornithologists' Union 1983; Figure 1). It winters in South America east of the Andes Mountains from Brazil, south to northern Argentina (American Ornithologists' Union 1983; Dobkin 1992).

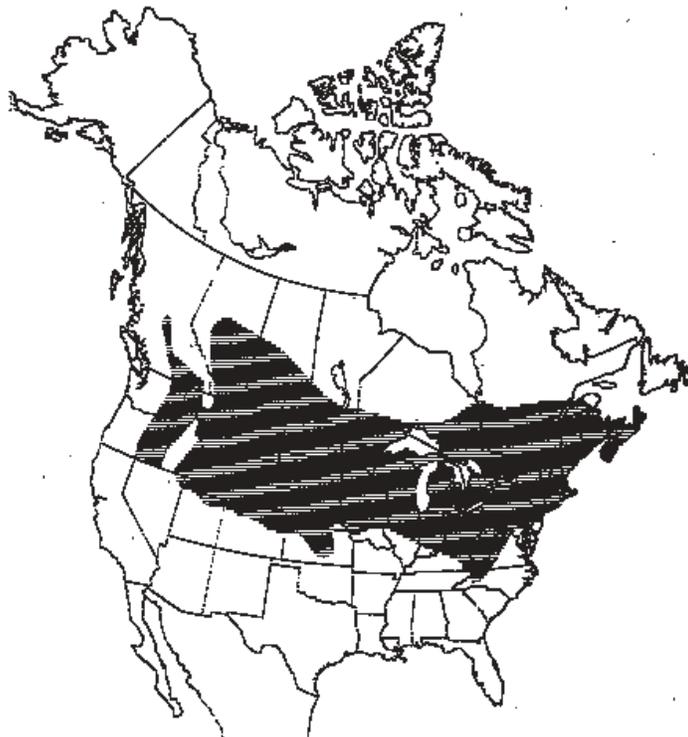


Figure 1. Breeding range of the Bobolink in North America.

Canada

The Bobolink breeds from the south-central interior of British Columbia, central Alberta, central Saskatchewan, southern Manitoba, central Ontario, southern Quebec, New Brunswick, Prince Edward Island, and Nova Scotia.

British Columbia

This species extended its breeding range into the north-west during the late 1800s and into British Columbia in the early 1900s. During the summer the Bobolink is

locally distributed in the Sub-Boreal Interior, Central Interior, Southern Interior Mountains, and Southern Interior Ecoregions. It breeds at lower elevations from the extreme southern Okanagan Valley, north through a narrow corridor of the south-eastern Chilcotin–Cariboo region to about 30 km north-east of Prince George, and locally, in southern areas of the East and West Kootenays (Figure 2).

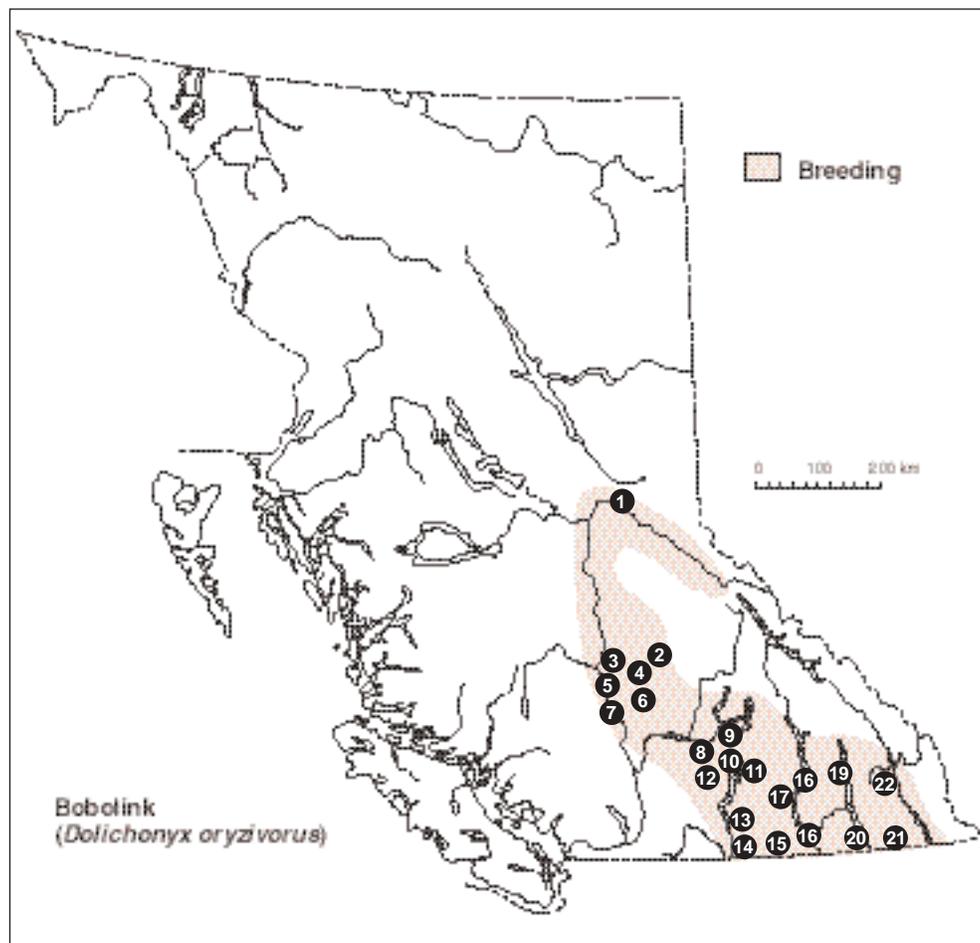


Figure 2. Known breeding locations for the Bobolink in British Columbia (Campbell et al. in prep).

(1) Gusicome, (2) Horsefly, (3) Williams Lake, (4) 150 Mile House, (5) Alkali Lake, (6) Lac la Hache, (7) 115 Mile House, (8) North Kamloops, (9) Celista, (10) Enderby, (11) Vernon, (12) Chapperon Lake, (13) Penticton, (14) North Osoyoos, (15)

Grand Forks, (16) Castlegar, (17) Edgewood, (18) Nakusp, (19) Meadow Creek, (20) Creston, (21) Waldo, (22) Ta Ta Creek. Shaded area represents breeding range in British Columbia

In the Okanagan Valley, the main breeding population is located north of Osoyoos (Cannings et al. 1987). Northward, breeding occurs on a much smaller scale near Penticton, Vernon, Chapperon Lake, Celista, Kamloops, 115 Mile House, Lac la Hache, 150 Mile House, Alkali Lake, Horsefly, and Guiscome. In the East Kootenays, small numbers of breeding Bobolinks are found at Waldo and in the Ta Ta Creek area. The highest numbers of Bobolinks in the province occur in the West Kootenays in the vicinity of Grand Forks, Creston, Edgewood, and Nakusp with smaller populations near Castlegar and Meadow Creek.

The Bobolink has been recorded as a vagrant on Triangle Island off the north-western tip of Vancouver Island, in extreme southern Vancouver Island, the Fraser River delta, and in scattered locations in the lower Fraser River valley, Wells Gray Provincial Park, the northern Columbia Valley, and in the vicinity of Fort St. John in the Peace River region.

POPULATION SIZE AND TRENDS

With the clearing of the north-eastern forests of North America in the last century, new habitat was created for many grassland birds. The Bobolink underwent a noticeable population increase and range extension into this area as agricultural fields began to dominate the once forested landscape (Andrle and Carroll 1988; Brewer et al. 1991; Peterjohn and Rice 1991). After 1940, agricultural practices changed, rendering much of the habitat unsuitable for the Bobolink, and its population began to decline.

Historically, the population in the north-eastern United States has largely disappeared (Bent 1958). The results of the North American Breeding Bird Surveys, for the period between 1965 and 1979, showed that numbers of Bobolinks actually increased in some areas across the continent, especially in Saskatchewan, Ontario, New Brunswick, and Nova Scotia, but declined significantly in the central region of the continent in North Dakota, Iowa, Illinois, and Ohio (Robbins et al. 1986; Droege and Sauer 1989). By the 1990s Bobolink populations in the western part of its range appeared to be stable, or even increasing locally, but across the continent there was a consistent, declining trend with scattered, significant declines in many eastern portions of its range (Dobkin 1992). In Montana, numbers declined significantly while they remained stable in North Dakota (Dobkin 1992). Changing agricultural practices were cited as the reason for declines.

The Bobolink arrived in British Columbia, probably in the Okanagan Valley, about the beginning of the twentieth

century (Bent 1958). Cannings et al. (1987) mention "Spreadborough did not see them on his visits in 1903 and 1905, but Anderson (1914) found them common at Penticton in 1913, where he collected ten specimens in one day."

About the same time, or perhaps a little later, Bobolinks became established in the southern Kootenays near Waldo and Kitchener. Johnstone (1949) considered them a "scarce summer visitant" and mentioned that they had increased their range northward in the 1940s. He says, "From 1937 to 1945, they were not recorded north of Waldo and Kitchener, being localities close to the United States boundary, but since 1946 they have been seen as far north as Ta Ta Creek." In the Creston Valley, several Bobolinks were sighted in 1928 by Mailliard, while conducting field work on birds and mammals of the Kootenay Valley (Mailliard 1932). Kelso (1930), in documenting birds of the Arrow Lakes, first reports the Bobolink in 1926, for the Edgewood area. By the late 1950s the Bobolink had extended its breeding range northward to Celista, 115 Mile House, and Alkali Lake (Erskine and Stein 1964). By the mid-1970s breeding birds were found at Horsefly and in 1989 a pair raised two young at Guiscome, north-east of Prince George. Bobolinks occurred north in the Rocky Mountain Trench to Parson, south of Golden, until the mid-1970s. They seem to have declined there, but still occur north to Brisco, but again, numbers are variable from year to year (R. Howie, pers. comm.).

Population estimates for the 22 known breeding locations in the province (Fig. 2) are difficult to ascertain. For this status report, the author visited 11 traditional and potential nesting sites (Appendix 1) soon after territorial males arrived in late May through early June. Due to distances between sites, surveys were conducted between 0600 and 1700 hours. Each site was systematically searched for visible males using binoculars and a spotting scope. This was repeated several times to obtain the maximum number of males. Females were not as conspicuous. Each known and potential breeding location was surveyed, as well as sites in the immediate vicinity, to delineate the exact breeding location.

Males may remain unmated on territory or may be monogamous or polygynous, usually with only two females (Wittenberger 1978). Extrapolation from the survey data to all known sites including the possibility of polygamous males results in a population estimate ranging from a minimum of perhaps 500 birds to a maximum approaching 1100 birds. However, the relationship between marginal and optimal breeding habitats has not been determined and was not figured into the extrapolation.

British Columbia trends are not reported by Erskine et al. (1992) in their Canadian summary of Breeding Bird Surveys. The local distribution of the Bobolink may be part of the reason. S. Droege (pers. comm.), however, lists trends in British Columbia as increasing through 1994. Much of this trend may be reports of large numbers locally (e.g., Grand Forks), not necessarily representative of the entire provincial distribution.

PROTECTION

The Bobolink, its nests and eggs, are protected nationally and in the United States under the *Migratory Birds Convention Act* of 1994. It is similarly protected in British Columbia under the *British Columbia Wildlife Act* of 1982. Provisions under the *Forest Practices Code of British Columbia Act* may address some of the habitat requirements of this species.

LIMITING FACTORS

The primary causes of Bobolink population declines are loss of habitat and changing agricultural practices. Grassland habitat has been disappearing from the eastern and midwestern landscape since the early 1900s.

Habitat Loss

Hayfields in the early 1900s were mainly composed of native prairie grasses, but were gradually converted into agricultural grasslands (Bent 1958; Herkert 1991). Today, especially in the South Okanagan, grassland habitats have been altered or diminished in size due to increased pressure of residential/urban developments, conversion to rangeland, agricultural development of tree nurseries, orchards, vineyards, and crops other than hay. Redpath (1990) determined that over 90% of the land in the South Okanagan and lower Similkameen valleys had been altered from its original state. The small population of Bobolinks in the Castlegar area of the West Kootenays could face habitat loss with future development of the Murphy Dam project, causing flooding to the current breeding fields.

Agricultural Practices

The shift to alfalfa-dominated fields with faster regrowth and the mechanization of modern hay-cropping equipment has resulted in earlier and repeated mowing that has had a direct negative impact on the reproductive success of the Bobolink (Bollinger 1989). Haycropping kills essentially all nestlings and at least fifty percent of recently fledged young (Bollinger and Gavin 1989).

As well, primary tillage, disking, cultivation, and rotary hoeing are agricultural practices that can destroy nests, fledglings, or adults (Rodenhouse et al. 1992). Adult birds attending nests or roosting in hayfields are affected by nighttime mowing (Rodenhouse et al. 1992).

Bobolinks in hayfields that were not cut until after the breeding season had a much higher reproductive rate than those in fields that were mowed in early summer (Ellis 1995). The drier climate in the South Okanagan is conducive to earlier mowing. However, in the Kootenay region, heavy spring precipitation can delay the first hay cropping.

Grazing

It is well known that native grasslands are being rapidly destroyed in North America (Bock et al. 1992). Since the Bobolink requires intermediate levels of ground cover for nesting, it responds positively to moderate grazing in taller grasslands and is negatively affected by heavier grazing in shorter grasslands (Bock et al. 1992).

Kantrud (1981) showed that in lightly, moderately, and heavily grazed grasslands in North Dakota, bird densities were highest in habitats with high heterogeneity, and avian species richness decreased with increased grazing intensity. As well, Martin (1971) reported that Bobolink males that attracted the most females inhabited fields with increased vegetation density and horizontal heterogeneity. As grazing occurs within the range of the Bobolink in British Columbia, there is a potential for grazing impacts where Bobolinks use uncultivated fields.

Insecticides

The application of long-life and short-life insecticides could have a detrimental effect on both adult and young Bobolinks. When adults arrive on the breeding grounds in May they feed primarily on seeds, but as the young begin to hatch the diet changes to insects, especially caterpillars and grasshoppers. Contaminated food can result in reproductive failure (Gard et al. 1992). There is potential for similar impacts in B.C., so the use of insecticides must be carefully monitored and regulated.

Herbicides

Herbicides produce extensive habitat modification by reducing plant species diversity, which can have a severe impact on avian populations (Gard et al. 1992). There is potential for impacts on Bobolink habitat in B.C., and the use of herbicides must also be carefully monitored and regulated.

Cowbird Nest Parasitism

Few instances of Brown-headed Cowbird parasitism on Bobolinks have been recorded in North America. Part of the reason may be the difficulty in finding Bobolink nests. The skulking and secretive behaviour of the adult female leaving the nest and the domed structure of the nest itself make it difficult to locate in tall, grassy fields. Through the mid-1980s only 24 records have been noted, all from Connecticut, New York, Ohio, Michigan, Wisconsin, Iowa, Minnesota, Montana, and Manitoba (Friedmann 1963; Friedmann et al. 1977; Friedmann and Kiff 1985). To date there are no instances of the Bobolink being used as a host for the Brown-headed Cowbird in British Columbia (R. W. Campbell, pers. comm.).

It should be noted, however, that because of the increased abundance of cowbirds in North America and the recent addition of wooded edges (used by cowbirds for perches) to prairie habitats, nest productivity of prairie-nesting birds, such as the Bobolink, may be declining because of cowbird parasitism (Johnson and Temple 1990).

Predation

Several studies (e.g., Gates and Gysel 1978) found that both the rate of nest predation and the density of nests decrease with increasing distances from a wooded edge for ground-nesting species. But predation can seriously affect the success of grassland-nesting birds. For example, many animals that depredate grassland-nesting birds have recently increased in abundance due to changes in agricultural practices. In British Columbia these include the coyote and raccoon.

Avian predators, such as the Short-eared Owl (Wittenberger 1978), Northern Harrier, Prairie Falcon, Common Raven, American Crow, and Black-billed Magpie probably feed on adults, fledglings, or eggs of the Bobolink. A potentially more serious problem concerns feral cats, which have been seen prowling fields and hunting in Bobolink habitats throughout British Columbia. Although most studies on cats show a preponderance of small mammals in their diet, birds can be a seasonally important component (Hubbs 1951; Jaroff 1989; Toner 1956).

Flooding

Nests built in low meadows are vulnerable to flooding by heavy rains (Bent 1958) or changing water levels in fields adjacent to a river system. The effects of irrigation activity on nesting birds has not been determined.

Fires

Natural fires in North America were once a common occurrence in the tallgrass prairies and grasslands where Bobolinks lived (Daubenmire 1968). Today, prescribed and often annual burning is now a major management activity in these habitats. The vegetation that regrows after burning is usually taller and denser than the original habitat and has been shown to have a higher production of seeds and insects (Risser et al. 1981). Burning can therefore be beneficial for Bobolinks. It is recommended that if burning is necessary, it should occur every three years in grassland and prairie habitats (Johnson and Temple 1990). As many landowners use burning as a habitat management strategy, this recommendation is relevant for Bobolink habitat in British Columbia.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Bobolink is not listed by Ehrlich et al. (1992) in their summary of birds threatened, or imperilled in the United States and Canada through the early 1990s. The Bobolink is not considered to be at risk by the Committee on the Status of Endangered Wildlife in Canada (COSEWIC), which determines the national status of native bird species. In British Columbia, it is on the Ministry of Environment, Lands and Parks, Wildlife Branch, 1996 Blue List as a species whose status is considered vulnerable. The Bobolink is beneficial to the farmer as a large percentage of its summer diet is comprised of crop-damaging insects such as caterpillars and grasshoppers (Beal 1900). The cultivated hayfields and meadows that the Bobolink occupies are also home to the Long-billed Curlew (*Numenius americanus*), which also occurs on the provincial Blue List as a vulnerable species.

Due to their local, disjunct distribution and secretive habits, Bobolinks are highly valued by birders and naturalists. Best viewing times are in late May and early June when males are displaying to establish territories.

RECOMMENDATIONS AND MANAGEMENT OPTIONS

Bobolinks, in general, have been negatively affected by modern forage crop agriculture. Thus, if trends continue, agricultural habitats, especially hayfields, will become less than optimum for breeding habitat. To manage this species, known breeding sites should be left undisturbed until the young have successfully fledged. Haying operations such as early spring and night-mowing should be

eliminated. Chemical-application programs should be discouraged or eliminated. Domestic livestock grazing should be discouraged or eliminated from June, when the birds arrive, through August. Uncultivated fields should be mowed every two to three years to prevent encroachment of woody vegetation. Bollinger and Gavin (1989a) suggests the creation of large patches (10 to 15 ha) of grass-dominated vegetation that resemble old hayfields to attract breeding Bobolinks. In British Columbia, establishing conservation agreements with private landowners will be necessary for management to be successful as nearly 100% of known Bobolink breeding habitat occurs on privately owned land. Provisions to create Wildlife Habitat Areas and other habitat protection measures under the Forest Practices Code may allow for the protection of breeding sites where they occur on Crown land.

Information regarding the breeding biology of the Bobolink in British Columbia is virtually unknown, therefore more research is required to define the breeding range and specific breeding sites within the province, determine the vegetative structure of these known sites and collecting data on territory size, nesting requirements, breeding success, diet, and post-breeding dispersal. Standardized census techniques should be developed for the Bobolink to accurately determine populations, summer use of breeding locations, specific habitat requirements, population trends and dispersal of birds breeding in the province, and site tenacity of local populations. Bollinger et al. (1988) provide some insight into the difficulty of estimating Bobolink densities. They used two methods, namely line transects and circular plots. Line transects consistently provided density estimates with smaller biases and higher correlations with true densities than did variable circular plots. Also, density estimates derived from afternoon counts were usually more accurate than those derived from morning counts.

Education and information development between landowner, conservation groups, and the general public should be initiated.

EVALUATION

The Bobolink is a locally common to uncommon species within the agricultural landscape of the Nechako Lowlands, Cariboo Basin and Plateau, Thompson Uplands, Okanagan, Kootenay, and Columbia valleys. The Bobolink is sensitive to habitat alteration and changing agricultural practices throughout its range. It can be considered to be semi-colonial and is only known to breed in 22 locations in the province. The provincial population is estimated to be

between 500 and 1100 birds. For these reasons it must be considered a "vulnerable" species in British Columbia and remain on the B.C. Wildlife Branch Blue List.

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Appendix 1. Direct counts of Bobolinks from 11 sites surveyed between 26 May and 8 June 1994 in south-central British Columbia*.

Figure 2 Location No.	Location	Total Birds		Habitat Remarks
		Males	Females	
4	150 mile House	6		field; pasture
N/A	Barrière	1		weedy field
8	Kamloops	3	1	large, cultivated hayfield
N/A	Cherryville	2		cultivated hayfield
14	Osoyoos	32	16	large, cultivated hayfields
15	Grand Forks including NorthFork /Granby	1	1	small, cultivated hayfield
		51	9	extensive, cultivated hayfields
16	Castlegar	7	2	weedy field, undisturbed
17	Edgewood	19	6	large, cultivated hayfields
18	Nakusp	16	3	large, cultivated hayfields
20	Creston	47	12	large, cultivated hayfields
SubTotal		185	50	
Total			235	

* Numbers, when applicable, correspond to known breeding locations shown on the map in Figure 2.

Wildlife Working Reports may be cited, but the preliminary nature of the data they contain should be noted. Working Reports 1-39 (and others) are presently out of print, but photocopies may be available through the Wildlife Branch, Ministry of Environment, Lands and Parks or other agencies. Titles of Working Reports 1-35 are available on request.

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