

**Status of the
Yellow-breasted Chat
in British Columbia**

by
R. J. Cannings

Wildlife Bulletin No. B-81

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Ministry of Environment, Lands and Parks
Wildlife Branch
Victoria, B.C.



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FOREWORD

In cases where a Wildlife Bulletin is also a Species' Status Report, it may contain a recommended status for the species by the author. This recommendation is the opinion of the author and may not necessarily reflect that of the Wildlife Branch.

Official 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 Yellow-breasted Chat (*Icteria virens*) is an insectivorous Neotropical migrant that is essentially restricted to the south Okanagan and Similkameen valleys in British Columbia. It prefers dense riparian thickets, primarily of wild rose, for breeding habitat. Almost all known territories are located along the Okanagan and Similkameen rivers rather than in side valleys. The British Columbia breeding population is almost certainly less than 50 pairs. Although very little is known about its local breeding biology, it is likely that habitat availability is the main constraint to the increase of local populations. About 10 chat breeding territories in British Columbia are on land which has some degree of protection.

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INTRODUCTION

This status report on the Yellow-breasted Chat (*Icteria virens*) is part of an ongoing program of the British Columbia Ministry of Environment, Lands and Parks, Wildlife Branch, designed to more effectively manage species-at-risk for long-term viability.

The Yellow-breasted Chat, a member of the family Emberizidae, is about 18 cm in length (very large for a warbler) with a bright yellow throat and breast and white “spectacles”. It is usually found in dense thickets or brushy areas. Until recently specific population and habitat information for this species were somewhat limited. This report was produced in order to provide some of this information, and was funded by the Habitat Conservation Fund, with additional support from the British Columbia Ministry of Environment, Lands and Parks, in association with the South Okanagan Conservation Strategy.

GENERAL BIOLOGY

Reproductive Capability

Clutch Size — Yellow-breasted Chats usually lay three or four eggs. Thompson and Nolan (1973) found only one clutch of five eggs in 37 Indiana nests; the remaining 36 nests were evenly divided between three- and four-egg clutches. Two definite full clutches in the Okanagan were of three and four eggs each (Cannings et al. 1987); if probable full clutches are considered (including those described as “fresh” on collecting slips) the mean value for British Columbia is 3.7 (8 four-egg clutches, 4 three-egg clutches; BCNRS). Bent (1953), however, states that clutches vary “from 3 to 5 to a set, commonly 5, but as many as 6.”

Second broods — Thompson and Nolan (1973) found that about 81% of the breeding pairs (31 of 39) attempted second broods in southern Indiana. The proportion in British Columbia is unknown,

but the spread of clutch initiation dates (12 May to 23 June) in the Okanagan Valley indicates that second broods are certainly possible there (Cannings et al. 1987).

Breeding success — Since only thirteen chat nests have been reported from British Columbia, breeding success data are meagre. Hatching success is known for two nests; in both of them one egg of the clutch failed to hatch. Reported fledging brood sizes range from one to two young (mean=1.75, n=4), so a very rough breeding success rate would be 48% (mean fledging brood size divided by mean clutch size). The death of one nestling in a nest at Naramata was blamed on heavy rainfall (L. A. and V. Gibbard, BCNRS). The only breeding biology study of the Yellow-breasted Chat is that of Thompson and Nolan (1973) in Indiana; all the information on breeding success below is from that publication.

Thompson and Nolan found that, although their 37 chat territories produced a mean of 5.97 eggs per territory per season, a mean of only 1.05 fledglings per territory was produced each year. Only 22.5% of nests with eggs successfully fledged at least one young. The major cause of breeding failure in their study was egg predation, primarily by snakes. Blue Jays (*Cyanocitta cristata*) also predated nests in their study, and chipmunks (*Tamias striatus*) were also suspected. Brown-headed Cowbirds (*Molothrus ater*) were implicated in the loss of 7% of eggs, and one nest was abandoned when a cowbird laid an egg in it. However, Thompson and Nolan found that “the presence in the nest of [young] cowbirds did not appear to affect the growth of young chats.” Fledging success, on the other hand, was relatively high for nests reaching the nestling stage; almost 70% of eggs which hatched produced fledglings. Nestling predation, again by snakes, was the major cause of nestling loss.

Age at first breeding — No data, but most other passerines breed as yearlings.

Species Movement

In British Columbia, Yellow-breasted Chats are migratory. They return in May, usually in the second half of the month (Cannings et al. 1987). Fall departure begins in mid-July, and very few are seen after the end of that month; the latest record is of an immature male collected at Osoyoos on 21 September 1928 (Cannings et al. 1987). Although one might expect that such an inconspicuous species may remain undetected after singing stops in early July, studies elsewhere (e.g., Dennis 1958) indicate that chats normally migrate shortly after breeding is complete, and most have left the breeding grounds by the end of July.

Behaviour/Adaptability

Food — Adults eat both insects and berries; young are fed exclusively insects (Ehrlich et al. 1988). Petrides (1938) notes that the food brought to young at a nest in Washington, D. C. consisted almost entirely of soft-bodied orthoptera and larval lepidoptera; caterpillars were the commonest food item.

Territories — Dennis (1958) found territories of 0.5 ha to 1 ha in Virginia, while Thompson and Nolan (1973) report a mean territory size of 1.24 ha ($n=28$, $SD=0.51$) in Indiana.

HABITAT

Habitat Preferences

The Yellow-breasted Chat is a bird of thickets, brushy areas and fencerows (American Ornithologists' Union 1983). What appears to be important to good chat habitat is areas of essentially impenetrable thickets with few tall trees; it is not a bird of older forests or woodlands. Godfrey (1986:495) states that the Yellow-breasted Chat prefers "Thickets and tangles of tall shrubbery beside streams or ponds, in old overgrown bushy clearings...", while Thompson and Nolan (1973) add that it is "typically associated with the early successional stages

of forest regeneration." In British Columbia, it is found in extensive thickets of wild rose (*Rosa woodsii*), hawthorn (*Crataegus* spp.) or snowberry (*Symphoricarpos alba*), usually in riparian situations (Cannings et al. 1987). Gibbard and Gibbard (1992) state that preferred chat habitat in the South Okanagan is "dense to very dense wild rose thickets exhibiting vigorous growth and in close proximity to or containing large shrubs or medium height trees." The minimum size of occupied rose thickets was 9 m². Gibbard and Gibbard (1992) also describe occupied sites as follows: Rose height averaged 1.25 m. Trees growing within or close to the thicket generally did not exceed 6 m in height, and large shrubs were usually about 3.5 m high. Trembling aspen (*Populus tremuloides*) was the most common tree species, and elderberry (*Sambucus cerulea*), hawthorn, and saskatoon (*Amelanchier alnifolia*) the most common shrub species. Birch (*Betula occidentalis*), alder (*Alnus incana*) and willow (*Salix* sp.) were less frequently represented, but still reasonably common.

Nest Sites

Nests are placed low in dense shrubbery, usually not more than a metre from the ground, in thickets of wild roses or other shrubs, often overgrown with vines (Bent 1953). Five of eight British Columbia nests were in rose bushes; one each was found in a willow, a snowberry and a "hedge" (British Columbia Nest Records Scheme: BCNRS; R. Gibbard field notes). A nest found by R. Gibbard in the Osoyoos Oxbows area was in a very dense rose bush about 0.7 m above the ground; the rose bush itself was over 2 m high and associated with willows up to 6 m high.

Habitat Protection

Yellow-breasted Chat habitat is protected in the Vaseux-Bighorn National Wildlife Area (2+ territories), Inkaneeep Provincial Park (2 territories, J. N. M. Smith, pers. comm.), and the proposed South Okanagan Wildlife Management Area (5 territories; 1 near River Road and 4 in the

Osoyoos Oxbows area). Six of 14 (43%) singing males found by Gibbard and Gibbard (1992) were on Indian Reserves; another six (43%) were on wildlife reserves and the remaining 2 (14%) were on private land. Approximately 10 chat territories therefore have some level of habitat protection in British Columbia.

DISTRIBUTION

World

The Yellow-breasted Chat breeds from southern Canada (British Columbia, Alberta, Saskatchewan, and Ontario) south to central Mexico and winters from southern Texas and Florida south to western Panama (American Ornithologists' Union 1983) (Figure 1).

British Columbia

In British Columbia, the Yellow-breasted Chat is essentially restricted to the south Okanagan and Similkameen Valleys (Figures 2 and 3). Outside that area there is only one breeding record (from Lavington, in the north Okanagan just east of Vernon) and 15 other sight records, mostly of singing males (British Columbia Vertebrate Record File). In contrast, Cannings et al. (1987) cite 242 records for the Okanagan Valley as a whole. Gibbard and Gibbard (1992) report that most chats are found in the valley bottoms of the Okanagan and Similkameen from Vaseux Lake and Cawston south. Gibbard and Gibbard (1992) provide detailed site descriptions for the 12 sites at which they found chats in the South Okanagan and Similkameen valleys; UTM coordinates for other Okanagan sites are provided in Appendix 1.

POPULATION SIZE AND TRENDS

Although Taverner (1922) stated that “The [Okanagan] valley is famous for chats...in spite of their apparent scarcity there were enough of them about to seize upon and occupy any specially desirable locality that might be vacant”, there are

very few hard data on historical populations. It seems, however, that the destruction and degradation of those “specially desirable” localities has resulted in rather low chat populations at present. Gibbard and Gibbard (1992) surveyed 119 sites in the South Okanagan but found only 14 male Yellow-breasted Chats at 12 sites. Indeed, these 12 sites are perhaps best considered seven sites, since several of them are within 100 m of each other (Figure 3).

PROTECTION

The Yellow-breasted Chat is protected under the federal *Migratory Birds Convention Act* of 1994 as well as the *British Columbia Wildlife Act* of 1982. Provisions under the *Forest Practices Code of British Columbia Act* will address habitat requirements of this species through implementation of appropriate guidelines.

LIMITING FACTORS

Availability of Habitat

Although no data are easily available, the amount of suitable habitat for chats in British Columbia has almost surely declined considerably in this century. The lowland riparian thickets favoured by chats are very vulnerable to clearing for agricultural and residential/industrial developments. There now seem to be only five sites in the province suitable for more than one chat territory (see Figure 3):

1. The south Similkameen Valley. Gibbard and Gibbard (1992) found only one singing male here, but there are likely more. Approximately five other chats were heard singing there in the same summer (K. Chapman, pers. comm.). This is probably the most extensive chat habitat left in British Columbia, almost all of it in the Lower Similkameen Indian Reserve.
2. Osoyoos Oxbows. Gibbard and Gibbard (1992) found four males here, probably near the maximum number possible. This area would be

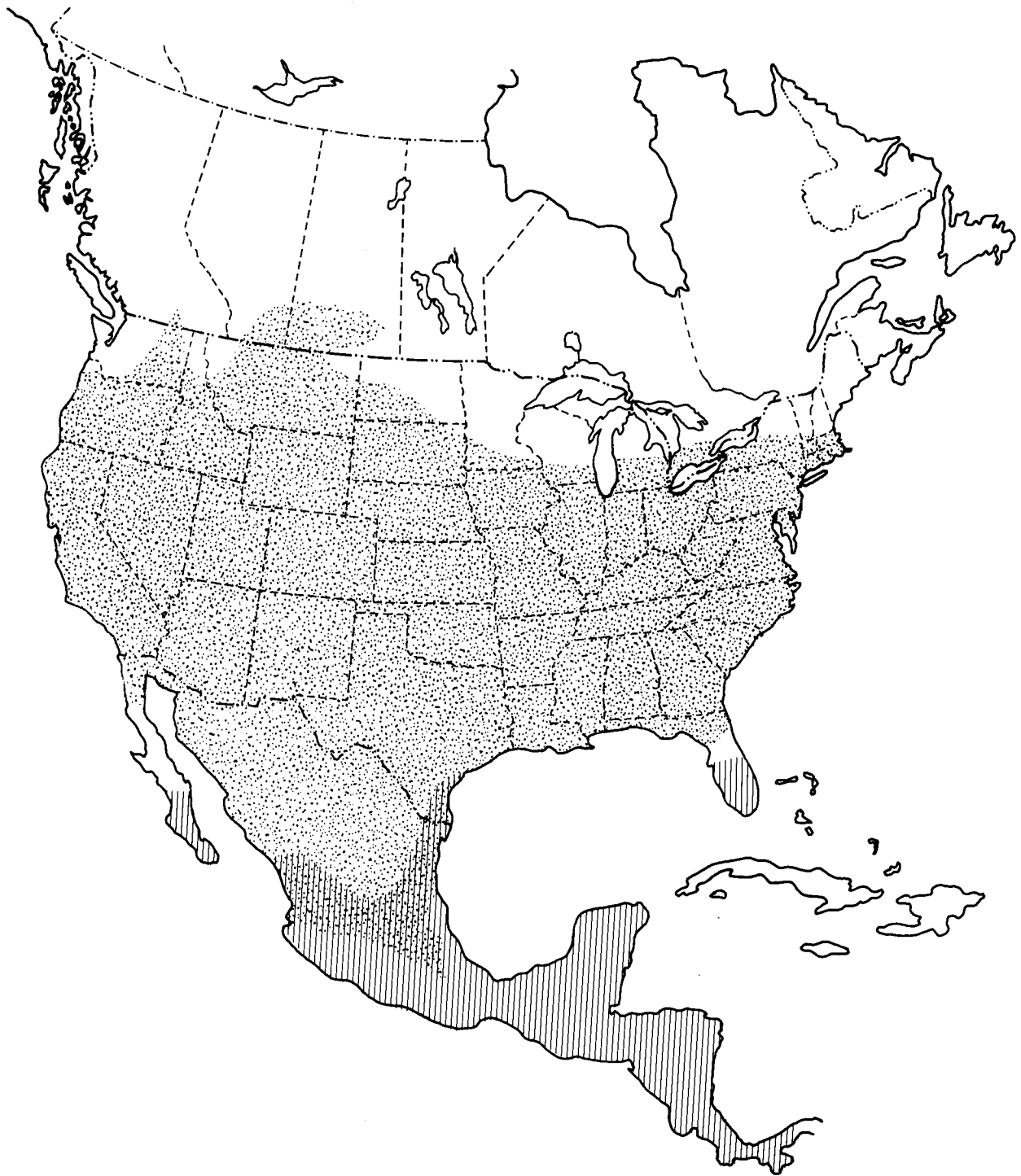


Figure 1. Range of the Yellow-breasted Chat. Stippled area indicates the breeding range, vertical lines indicate the winter range.

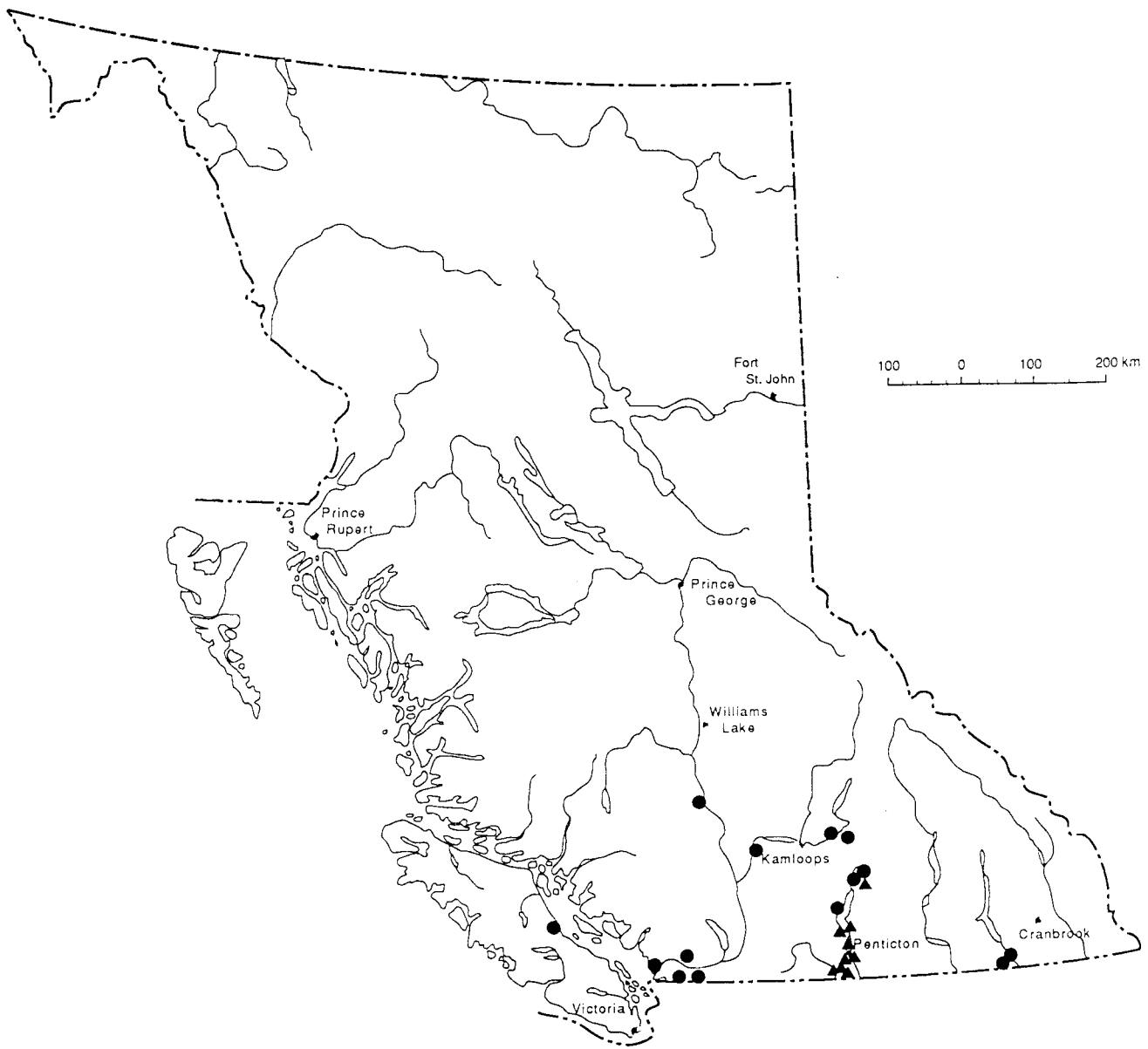


Figure 2. British Columbia range of the Yellow-breasted Chat. Triangles indicate breeding sites, dots indicate sightings.

protected in the proposed South Okanagan Wildlife Management Area.

3. Okanagan River between Inkaneep Provincial Park and McIntyre Bluff. Gibbard and Gibbard (1992) found four males here; there are often 7 to 10 present (pers. obs.). Most of the suitable habitat there is in the Inkameep Indian Reserve.
4. Vaseux Lake, primarily riparian thickets at the north end, but previously in thickets along the railway right-of-way at the south end as well. Gibbard and Gibbard (1992) found one male here; there could easily be more.
5. Woodlands along the Okanagan River on the Penticton Indian Reserve; 2 males found by Gibbard and Gibbard (1992). Sites 2, 3, and 4, at least in part, are therefore protected through provincial or federal agencies.

Pesticides

Chat territories next to farmlands, particularly orchards, might be affected by pesticide applications either indirectly (through loss of insect food) or directly (through direct contact with pesticides). There are no data on either of these possible problems.

Cowbird Parasitism

Cannings et al. (1987) report that 3 of 14 chat nests found in the Okanagan Valley contained Brown-headed Cowbird eggs (one to four cowbird eggs each; BCNRS). As mentioned above, cowbird nest parasitism may be a relatively minor source of nest failure, since chats can apparently raise most of their young successfully as well as the young cowbird (Thompson and Nolan 1973). Friedmann (1929) feels that chats usually desert nests parasitized by cowbirds, and that "the bulk of evidence goes to show that normally a cowbird's egg has little chance of ever being hatched by a Yellow-breasted Chat." Thompson and Nolan (1973), on

the other hand, encountered only one desertion in at least 11 cases of cowbird parasitism.

SPECIAL SIGNIFICANCE OF THE SPECIES

The Yellow-breasted Chat is on the British Columbia Wildlife Branch 1993 Red List of candidate species to be considered for legal designation under the *British Columbia Wildlife Act* as Endangered or Threatened (Harper et al. 1994). It is also on the American Birds' 1980 Blue List, an "early warning list" of declining, threatened or vulnerable species (Arbib 1979), citing concern in 13 of the 25 North American regions surveyed. It is considered a Priority 2 species (most of the British Columbia population found in the south Okanagan valley) by the South Okanagan Critical Areas Programme (Hlady 1990). Cannings (1990) mentioned Yellow-breasted Chat as a species of concern in British Columbia, especially considering its close ties to riparian habitats.

Yellow-breasted Chats are not listed as a species of concern in Washington, Idaho, or Montana (S. G. Cannings, pers. comm.). The Yellow-breasted Chat shares its riparian habitat with other species of concern to wildlife biologists: Painted Turtle (*Chrysemys picta*), Long-eared Owl (*Asio otus*), Lewis' Woodpecker (*Melanerpes lewis*), and Bobolink (*Dolichonyx oryzivorus*).

RECOMMENDATIONS AND MANAGEMENT OPTIONS

Habitat Management

As outlined above, habitat suitable for Yellow-breasted Chats is contained within land owned or controlled by various conservation agencies: Canadian Wildlife Service (Vaseux-Bighorn National Wildlife Area); BC Environment Wildlife Branch (Osoyoos Oxbows Wildlife Management Area, map reserves south of McIntyre Bluff); B. C. Parks Branch (Inkaneep Provincial Park). These lands

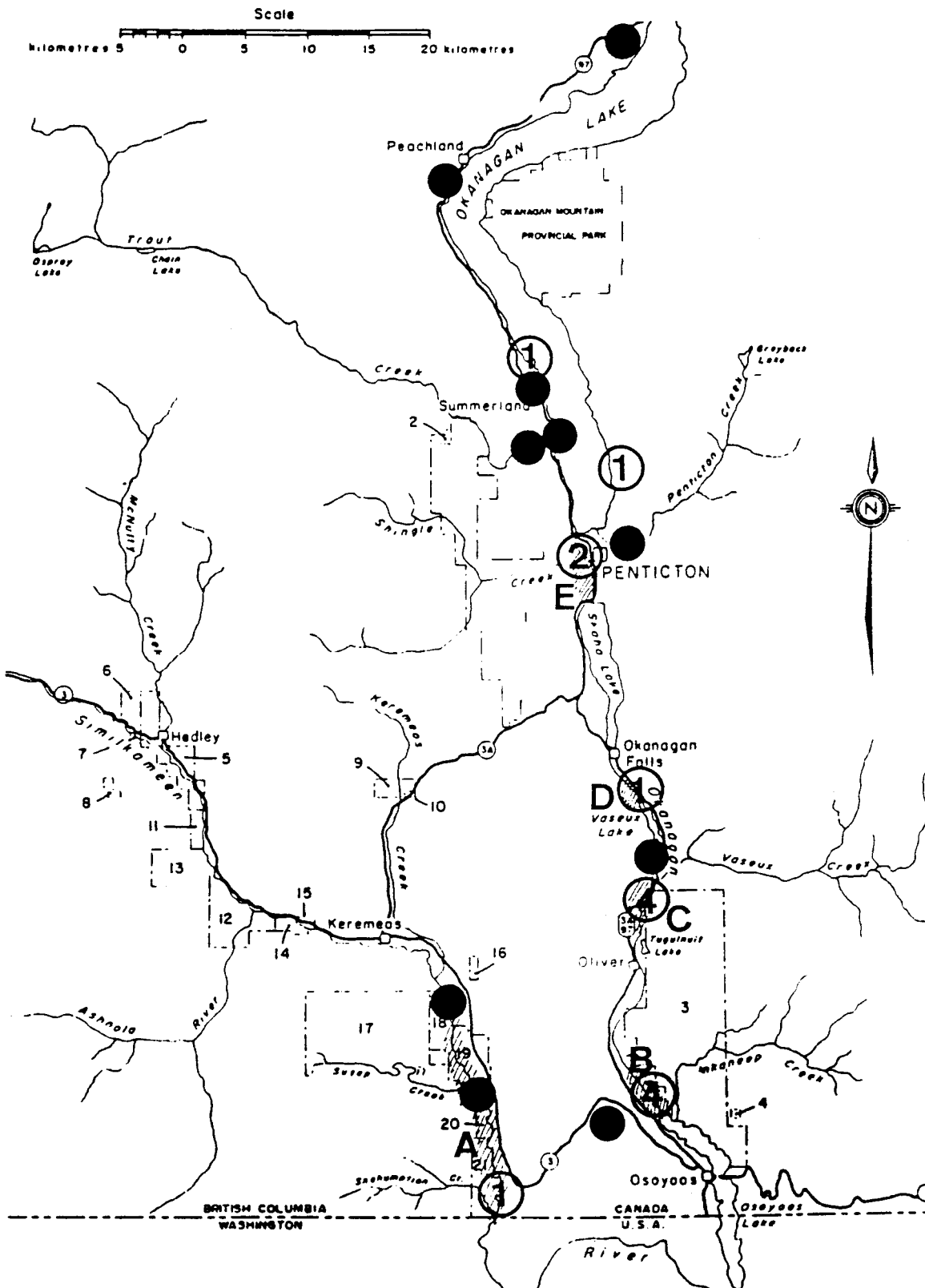


Figure 3. Yellow-breasted Chat sites in the south Okanagan. Circled numbers indicate the number of male chats found by Gibbard and Gibbard (1992) at each site; black dots indicate other known historical sites. Letters indicate areas of significant chat habitat: A, south Similkameen valley; B, Osoyoos Oxbows; C, Okanagan River between McIntyre Bluff and Inkaneep Provincial Park; D, Vaseux Lake; E, Okanagan River riparian woodland on Penticton Indian Reserve.

should be managed whenever possible to maintain or improve habitat for chats. The following measures are recommended:

- a. Planting of wild rose bushes. This would probably be effective in the Vaseux Lake and Osoyoos Oxbows area, but may be useful in the Wildlife Branch map reserves as well.
- b. Exclusion of cattle. Further exclosures should be considered for those parts of the Osoyoos Oxbows area east of the Okanagan River, especially south of Road 22. This would aid in the development of the large rose thickets favoured by chats.

Habitat Acquisition

Few private holdings in British Columbia are suitable for breeding Yellow-breasted Chats. However, those private lands that do contain chat habitat should be considered for acquisition by agencies such as the Nature Trust of British Columbia. Prime candidates would be any suitable lots along the Similkameen River south of Cawston or the Okanagan River south of McIntyre Bluff. Another possibility would be the land along the old Richter Pass road in the Elkink Ranch, where chats were "fairly common" (Campbell and Meugens 1971) in the 1960's, but has not been surveyed recently. The designation of the South Okanagan Wildlife Management Area, to include the Crown Land map reserves in favour of the Wildlife Branch in the River Road and Inkaneep Provincial Park areas and the Osoyoos Oxbows would greatly enhance chat conservation efforts in British Columbia.

Stewardship on Indian Reserves and Private Lands

Since about half of the known Yellow-breasted Chat breeding territories in British Columbia are on Indian Reserves, the Band Councils of the Penticton, Osoyoos, and Lower Similkameen Indian Reserves should be made aware that their land contains valuable habitat for Yellow-breasted Chats,

and encouraged to preserve or even allow enhancement of that habitat. Stewardship should also be encouraged where chats are found on private holdings in British Columbia.

EVALUATION

The very low population of Yellow-breasted Chats in British Columbia and the prospects for continued population decline are causes for serious concern for this species. Although three sites protect suitable nesting habitat for a few (probably less than a dozen) pairs, the species should be considered Threatened in British Columbia.

ACKNOWLEDGEMENTS

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REFERENCES

- Arbib, R. S. 1979. The Blue List for 1980. *Amer. Birds* 33:830-833.
- Bent, A. C. 1953. Life histories of North American Wood Warblers. U.S. Natl. Mus. Bull. 203. Washington, DC.
- Cannings, R. A., R. J. Cannings, and S. G. Cannings. 1987. Birds of the Okanagan Valley, British Columbia. Royal B.C. Mus., Victoria, B.C. 420pp.
- Dennis, J. V. 1958. Some aspects of the breeding ecology of the Yellow-breasted Chat (*Icteria virens*). *Bird-Banding* 29:169-183.

- Ehrlich, P. R., D. S. Dobkin, and D. Wheye. 1988. The birder's handbook. Simon and Schuster, Toronto, Ont. 785pp.
- Gibbard and Gibbard Environmental Consultants. 1992. Yellow-breasted Chat survey. Unpubl. rep. B.C. Minist. Environ., Lands and Parks, Penticton, BC.
- Godfrey, W. E. 1986. Birds of Canada. Natl. Mus. of Can., Ottawa, Ont. 595pp.
- Harper, B. S. Cannings, D. Fraser, and W.T. Munro. 1994. Provincial lists of species at risk. Pages 16-23 in L.E. Harding and E. McCullum, eds. Biodiversity in British Columbia. Can. Wildl. Serv., Delta, B.C.
- Hlady, D. A. 1990. South Okanagan Conservation Strategy: 1990-1995. B.C. Minist. Environ., Victoria, B.C.
- Ministry of Environment. 1991. Managing wildlife to 2001: a discussion paper. B.C. Minist. Environ., Wildl. Branch, Victoria, B.C. 151pp.
- Petrides, G. A. 1938. A life history study of the Yellow-breasted Chat. Wilson Bull. 50:184-189.
- Taverner, P. A. 1922. Notes on birds of the Okanagan Valley. Unpubl. field notes, Natl. Mus. of Nat. Sci., Ottawa, Ont.
- Thompson, C. F. and V. Nolan, Jr. 1973. Population biology of the Yellow-breasted Chat (*Icteria virens* L.) in southern Indiana. Ecol. Monogr. 43:145-171.

APPENDIX 1. Locations of historical sightings of Yellow-breasted Chats in the Okanagan Valley.

Site	UTM coordinates
Inkaneep Provincial Park	3150 54556
South end of Vaseux Lake	3162 54605
North end of Vaseux Lake	3156 54641
Agriculture Canada Research Stn.	3093 54939
Arawana	3142 54959
Penticton Creek intake dam	3155 54852
Trout Creek Point	3102 54935
Summerland, Fosberry Road	3075 54988
Agriculture Canada, Entomology	3099 54936
Lakeview Hts., Boucherie Mtn.	3140 55240 (approx.)
Lavington	3490 55658

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