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ROYAL BRITISH COLUMBIA MUSEUM
HANDBOOK

BATS

of British Columbia



David W. Nagorsen
and
R. Mark Brigham

ROYAL BRITISH COLUMBIA MUSEUM HANDBOOK

BATS

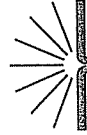
of British Columbia

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Volume 1
The Mammals of British Columbia



UBC PRESS / VANCOUVER

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 Published by UBC Press in collaboration with the Royal British Columbia
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 Columbia Museum, except by a reviewer, who may quote brief passages in a
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ISBN 0-7748-0482-3
 ISSN 1188-5114 (RBCM Handbook series)

Canadian Cataloguing in Publication Data

Nagorsen, David W.
 The Bats of British Columbia
 (Royal British Columbia Museum handbook,
 ISSN 1188-5114)
 Co-published by the Royal British Columbia
 Museum.
 Includes bibliographical references and index.
 ISBN 0-7748-0482-3

1. Bats—British Columbia. I. Brigham,
 Robert Mark, 1960— II. Royal British Columbia
 Museum. III. Title. IV. Series.
 QL737.C5N33 1993 599.4'09711 C93-091797-9

The colour map, "Biogeoclimatic Zones of British Columbia", was
 produced and supplied by the Forest Science Research Branch, Ministry of
 Forests.

Cover photographs by Merlin D. Tuttle, Bat Conservation International
 Printed in Canada on acid-free paper

Production of this book was funded, in part, by the Ministry of Environment,
 Lands and Parks and the Ministry of Forests, through the Corporate Resources
 Inventory Initiative.

UBC Press
 University of British Columbia
 6344 Memorial Road
 Vancouver, BC V6T 1Z2
 (604) 822-3259
 Fax: (604) 822-6083

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Western Red Bat *Lasiurus blossevillii*

Other Common Names: Southern Red Bat, Red Bat

Description

The Western Red Bat is one of our most distinct bats because of its fur colour, which ranges from pale orange to rusty red (see inside front cover). The dense fur on its back is long and soft. Individual hairs are black at the base, pale yellow in the middle and reddish at the tip. Faint frosting is sometimes evident on the tips of hairs around its neck and back. The bat's underside is paler, varying from yellow to orange. Adult males tend to be brighter in colour than females. There are patches of yellowish fur on the shoulder, bases of thumbs and the underside of the wing membrane. The dorsal surface of the tail membrane and hind feet are thickly furred. The ears are short and rounded with a short, blunt tragus. The hind foot is small; the calcar has a keel. The skull has a short, broad rostrum with broad molars; the brain-case is high and rounded.

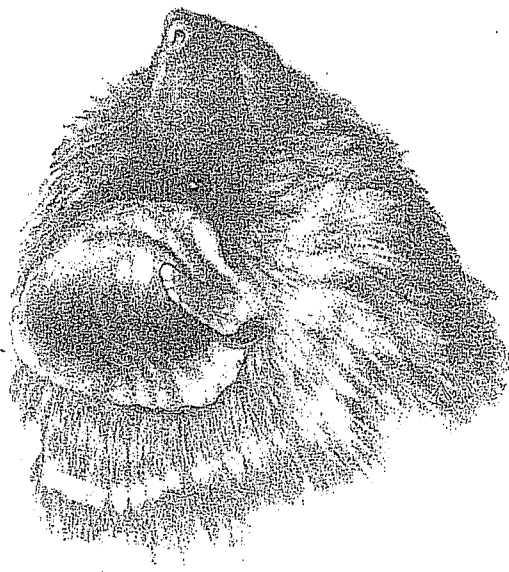
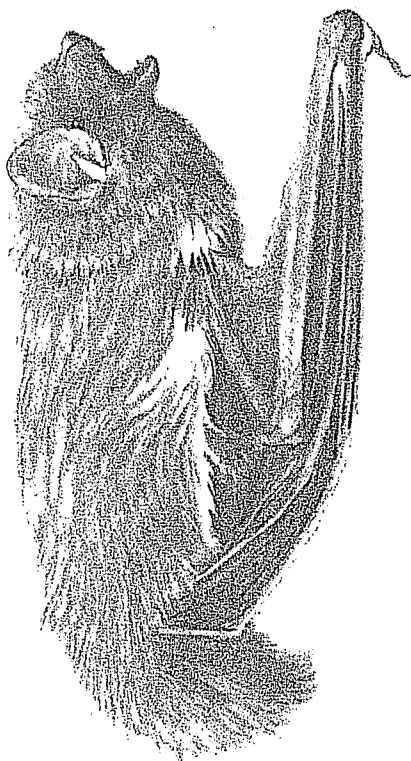
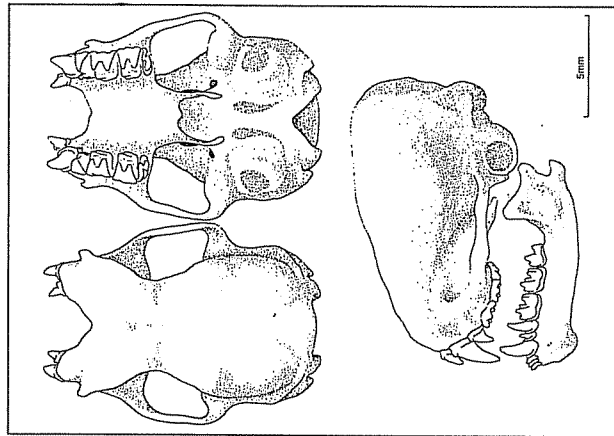
Measurements:

total length: 107 (87-120) n = 98
tail vertebrae: 50 (35-60) n = 98
hind foot: 9 (6-13) n = 97
ear: 12 (9-14) n = 81
tragus: 6 (5-7) n = 26
forearm: 38.8 (34.0-42.0) n = 19
wingspan: 278 (270-285) n = 2
weight: 10.8 (7.2-18.5) n = 73

Dental Formula:

incisors: 1/3
canines: 1/1
premolars: 2/2
molars: 3/3

The tiny first upper premolar is usually hidden between the canine and second upper premolar.



Western Red Bat
Lasiurus blossevillii

Identification:

The red fur colour of the Western Red Bat is unique among British Columbian bats. Its skull resembles that of the Hoary Bat (*Lasiurus cinereus*) in shape and dental formula, but it can be distinguished by its smaller size (skull length less than 15 mm).

Natural History*

The scanty information available for British Columbia suggests that this species is restricted to lower elevations where it is associated with forested habitats along rivers. The Western Red Bat is considered to be one of our tree bats. It is a solitary mammal that roosts in the foliage of large shrubs and trees in habitats bordering forests, rivers, cultivated fields and urban areas. Summer roosts, which are occupied by single males or females with young, are located in the branches of deciduous trees. In California the Western Red Bat often roosts in fruit orchards. In the Okanagan Valley, it has been observed flying above stands of cottonwood trees—it is likely that these trees are used for roosting. Red bats tend to roost at lower heights than the Hoary Bat with most sites one to five metres above the ground. Presumably because of the greater protection from predators and disturbance, females with young tend to select higher roosting sites than males.

Hunting begins one or two hours after sunset. Large moths (bodies longer than 10 mm) are the major prey, but the remains of beetles and grasshoppers have been recovered in the guano of the Western Red Bat. Fast flyers, red bats hunt in a straight line or great circles, changing direction suddenly when it detects an insect and attacks. An attack can last as long as five seconds and it may take three or four attacks before the prey is captured. A red bat usually catches its prey in the tail membrane, which can be curled into a pouch, and snatches it up with the mouth. Red bats vary their echolocation calls depending on the situation: long calls for hunting in open areas at long range (five to ten metres) and short calls for hunting in tight situations, such as forest clearings. Red bats seem especially attracted to lights where large numbers of insects are concentrated. Recent studies have revealed that the

* Little research has been done on the Western Red Bat; therefore, we relied extensively on the large body of literature that exists for the Eastern Red Bat for writing this section. Nevertheless, we caution the reader that the degree of similarity in the biology of these two species is unknown at present.

Eastern Red Bat will eavesdrop on the sonar calls of other red bats to locate potential insect prey. There is some evidence that individuals have distinct echolocation calls. This may be important for individual recognition in communication or it may enable red bats to discriminate their own echoes when hunting.

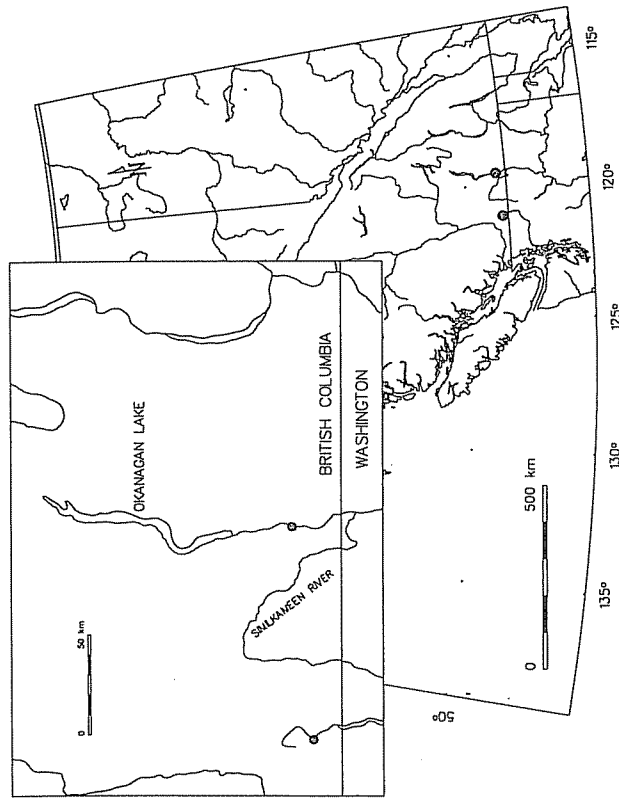
Red bats are migratory, although specific migration movements are poorly documented. No winter records exist for Canada; Canadian populations are assumed to overwinter in southern latitudes. In Canada, the autumn migration period of the Eastern Red Bat extends from late August to October; spring migrants return in May. Evidently some populations of the Eastern Red Bat migrate to southern regions of the United States where they may remain active in winter; other populations overwinter in middle latitudes where most hibernate.

Migratory movements of the Western Red Bat in British Columbia are unknown. However, this species is known to overwinter in the coastal lowlands of California where it roosts in large shrubs and fruit trees. Although the Californian populations are occasionally exposed to freezing temperatures, this species has been observed hunting in mid-winter in the San Francisco area. The Eastern Red Bat is a winter resident in a number of eastern states including regions where it would encounter freezing temperatures. In contrast to bats that hibernate in roosts where the temperature is relatively stable, red bats hibernate in trees where they are exposed to great fluctuations in temperature.

Red bats demonstrate several adaptations for hibernating in exposed situations. Their thick fur and small ears assist in minimizing heat loss, and when the temperature falls below 5°C they will cover their ventral region with the tail membrane to conserve heat. When torpid, red bats respond slowly to abrupt temperature changes. Laboratory experiments have demonstrated that individuals will arouse from torpor only when temperatures are raised to 20°C. This enables them to avoid the high energy demands of frequent arousal.

Breeding data for red bats are mostly limited to the eastern species. Mating takes place in flight during migration in late summer or early autumn. Following a gestation period of 80 to 90 days, one to four young are born, with three or four typical of most females. In eastern Canada, young are born in early or mid June. The scanty information available for the Western Red Bat suggests that three young are most common, born in June or early July. Newborns are small, naked and

underdeveloped, weighing only 0.5 grams; the eyes are closed. In three to six weeks the young are capable of flight. The female leaves the young at the roost when hunting at night, but she can carry her young when changing roost locations.



Range

The Western Red Bat is found in Central and South America and the western United States. In British Columbia, it has been found only in the Skagit and Okanagan valleys. With the nearest established populations located in northern California and Utah, these Canadian records presumably represent isolated populations at the northern edge of the summer range.

Taxonomy

It has been long known that red bats of western North America are smaller and more brightly coloured than those in eastern populations of

Lasiurus borealis. In most publications the western form has been treated as a separate race, *L. borealis teliotis*. However, recent genetic research suggests that red bats of western North America and South America warrant recognition as a distinct species, *Lasiurus blossevillii*. According to this taxonomy the British Columbia population is classified in the subspecies *L. blossevillii teliotis*, a race that inhabits Mexico and the western United States.

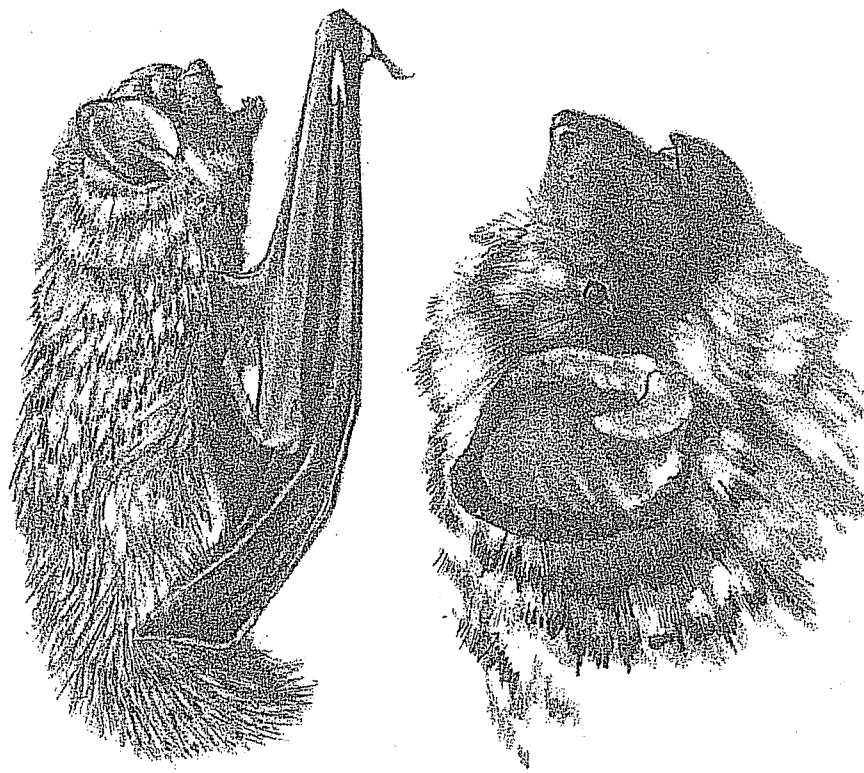
Remarks

This mammal was first discovered in the province in 1905 when William Spreadborough collected an adult female in July on the Skagit River about 23 kilometres south of Hope. This occurrence was so far north of the known range that Cowan and Guiguet, in *The Mammals of British Columbia*, considered it to be accidental. In 1982, however, Brock Fenton and colleagues detected echolocation calls of this species along the Okanagan River near Okanagan Falls. Their observations suggest that a summer population resides in the Okanagan Valley.

Despite their bright colour, red bats are well concealed when roosting in foliage because they resemble dead leaves.

The Western Red Bat is on the provincial Red List. Based on existing information, it appears to be one of the rarest bats in the province and comprehensive studies should be undertaken to delimit its range and roosting habits. Any observations of this species should be carefully documented and reported to the Royal British Columbia Museum or the Ministry of Environment.

Selected References: Baker et al. (1988), Constantine (1966), Fenton et al. (1983), Grinnell (1918), Hickey and Fenton (1990), Ross (1967), Shump and Shump (1982a).



Hoary Bat
Lasiurus cinereus

Hoary Bat

Lasiurus cinereus

Other Common Names: None.

Description

The Hoary Bat is the largest bat in British Columbia. It has a distinctive hoary colour (see inside back cover). The long, soft fur on its back is a mix of dark brown and grey hairs that are tinged with white. There are small patches of yellow or white on its shoulders and wrists. Yellow fur also appears on the throat, around the ears and on the underside of the wing membranes. The wing membranes are dark brown with paler areas on the forearm and fingers. The ears are round and short with a short, broad tragus. The outer edge of the ear is black; yellow hairs are scattered on the inside of the ear. The dorsal surface of the tail membrane is densely furred; the hind foot is relatively small with a heavy covering of fur on the upper surface. The calcar has a narrow keel. The skull has a short, broad rostrum, large molars and a high profile.

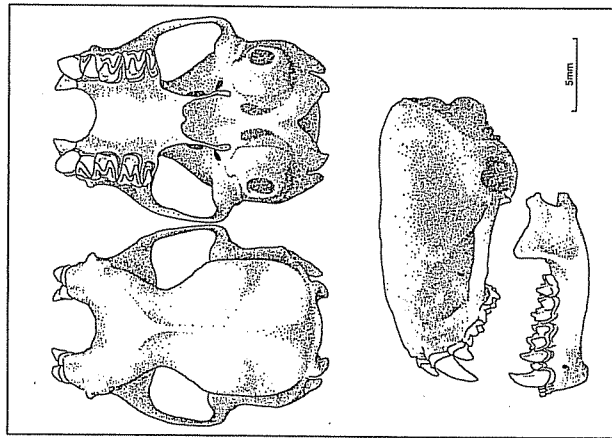
Measurements:

total length: 137 (125-144) n = 11
tail vertebrae: 60 (50-66) n = 10
hind foot: 12 (10-15) n = 12
ear: 14 (13-16) n = 4
tragus: 9 (9-10) n = 4
forearm: 54.5 (50.3-57.4) n = 24
wingspan: 392 (338-415) n = 7
weight: 28.4, (20.1-37.9) n = 43

Dental Formula:

incisors: 1/3
canines: 1/1
premolars: 2/2
molars: 3/3

The tiny first upper premolar is usually hidden between the canine and second upper premolar.



Identification:

The large size and marked colour pattern make the Hoary Bat one of our most distinct bats. The only species with remotely similar markings is the Silver-haired Bat (*Lasiorycteris noctivagans*)—see that account for diagnostic external features. Among British Columbian bats, only the Western Red Bat (*Lasiurus blossevillii*) has a similar dental formula; the skull of the Hoary Bat can be discriminated by its greater size (skull length greater than 15 mm).

Natural History

The Hoary Bat is associated with a variety of forested and grassland habitats in the province. Its elevational range is from sea level to 1250 metres.

Because of its tendency to roost in the branches of coniferous and deciduous trees, the Hoary Bat is often referred to as a tree bat. Specific details on tree roosts in British Columbia are not available—only a few individuals have been found roosting in the branches of fruit trees in the Okanagan. In Manitoba the Hoary Bat roosts some 8 to 12 metres above the ground, usually near the ends of branches of deciduous trees such as Green Ash. It seems to select sites that will conceal it from predators and yet also provide an open flight path for easy access to and from the roost. In Oregon the Hoary Bat prefers old Douglas-fir forests, presumably because of its tree-roosting habits. Although its usual day roosts are in the branches of trees, the Hoary Bat has been found roosting in tree cavities in British Columbia: one was collected from a hollow cedar tree in Garibaldi Provincial Park and another was found in a woodpecker nest in a tree cavity. The Hoary Bat rarely roosts in caves or buildings.

In summer, males are solitary and females roost with their young. Unlike most of our bats, females do not congregate in maternity colonies. Family groups will use the same roost for more than a month.

Hoary Bats emerge about 30 minutes after sunset to feed and continue to forage throughout the night. Nursing females reduce their foraging time during the first few weeks of nursing to spend more time with their young at the roost. Because their tree roosts are more exposed than the maternity roosts of other bats, females will stay with their undeveloped young for longer periods to keep them warm.

The Hoary Bat is suited to preying on large insects, with its large skull and teeth and its swift flight. It emits low-frequency echolocation calls that are most effective for detecting large prey at long range. The Hoary Bat hunts at tree-top level in open areas such as fields and forest clearings. Large moths, beetles and dragonflies form the bulk of its diet; small insects, such as midges and flies, are less common prey.

The Hoary Bat is often attracted to insect concentrations at lights outside buildings; permanent outdoor lights may even be responsible for its presence at some locations in the province. In well-lit areas where insect prey are concentrated, a Hoary Bat will establish a feeding area and chase away other bats (including other Hoaries). Loud chirping calls audible to the human ear are often emitted during these chases. Besides their role in communication, these calls may also provide some echolocation information.

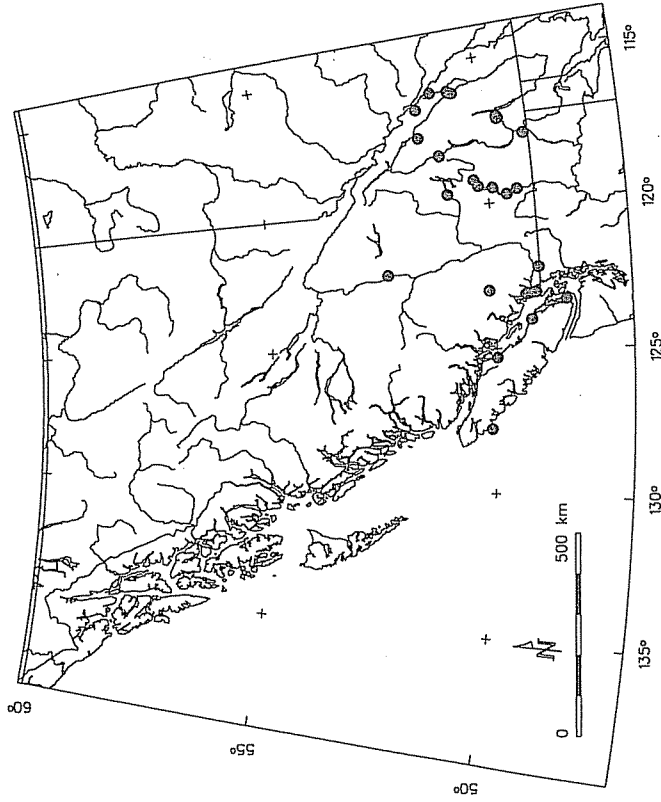
Circumstantial evidence based on seasonal occurrences in British Columbia strongly suggests that the Hoary Bat is migratory. There are records from 19 June to 15 October with most from mid August to early October, the period when the autumn migration is presumed to take place. The winter range of British Columbian populations is unknown. It appears that populations in the Pacific Northwest migrate to southern California or Mexico for the winter.

Mating likely takes place during the autumn migration or in winter; females are pregnant during the spring migration. Although there are no breeding data available for British Columbia, in other parts of Canada young are born in June and nurse from early June to the end of July. Normally females leave the young at the roost at night, but they can carry their young for about a week after birth. Females typically give birth to twins, although one, three or four young have also been observed. The newborn bats are undeveloped with closed eyes and ears. The top of the head, shoulders and tail membrane are covered with fine, silver-grey hairs and the underside is naked. Development is slow with the ears opening within three days and the eyes in around twelve days. By five weeks the young are capable of sustained flight. Even after the young are flying, family groups remain together for several more weeks. The relatively lengthy period of parental care shown by female Hoary Bats may be because this mammal does not hibernate—it has fewer energy demands than hibernating bats, which have to accumulate fat reserves for winter.

Remarks

The thick, heavy fur covering on the body and tail membrane of this bat is important for insulation. The hoary colour provides camouflage against a background of lichen-covered bark. Because of its solitary roosting habits in trees, the Hoary Bat is rarely encountered by man. There is still much to be learned about its distribution and roosting behaviour in the province. It is a bat that can be easily identified and we encourage naturalists to report any observations.

Selected References: Barclay (1984), Barclay (1985), Barclay (1986), Barclay (1989), Findley and Jones (1964), Perkins and Cross (1988), Shump and Shump (1982b).



Range

The Hoary Bat has the broadest distribution of any North American bat ranging from South America to northern Canada. It has managed to colonize a number of isolated islands including the Hawaiian Islands. In British Columbia, it is found on Vancouver Island, the coastal mainland north to Garibaldi Provincial Park, and the southern interior north to the Williams Lake region. In some regions of North America the sexes appear to occupy separate summer ranges. Based on the few available records the sexes appear to overlap extensively in British Columbia.

Taxonomy

One subspecies, *L. c. cinereus*, is recognized in North America.

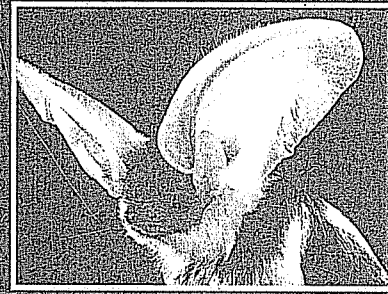
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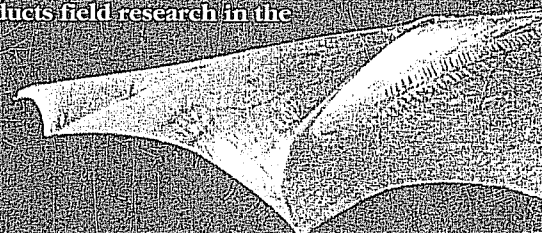
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Few mammals are as shrouded in fear and superstition as bats. In western culture, they are associated with tales of horror and darkness. Much of our fear of bats stems from our unfamiliarity with them. In fact, bats are fascinating animals: they are the only mammals capable of sustained flight; they also have a unique ability to navigate and locate airborne prey in total darkness.

British Columbia is home to more bat species than any other Canadian province: 16 in all. This handbook presents a comprehensive summary of what we know about the bats in this province, with an emphasis on identification, distribution, natural history and conservation. It includes illustrations, maps and keys.

David Nagorsen, curator of mammalogy at the Royal B.C. Museum, has done extensive research on bats in this province. Mark Brigham is a biologist at the University of Regina and regularly conducts field research in the interior of B.C.



ISBN 0-7748-0482-3



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UBC Press

Cover photographs of the Spotted Bat
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Bat Conservation International

ISBN 0-7748-0482-3