Mountain Bluebird

TRAIL MONITORING GUIDE

THIRD EDITION

RDRN

MYRNA PEARMAN

NOTES ON THIRD EDITION: In honour of the many bluebird trail operators, naturalists and photographers who so generously contributed to the original edition of this book, we have kept the tributes and acknowledgements as initially printed. Sadly, many bluebird pioneers have passed since 2005.

I would like to thank the Red Deer River Naturalists for publishing this Third Edition. Thank you to Gary Ross, whose illustrations have been used in all editions, and my sincere thank you to the following bluebirders for sharing their knowledge and editing suggestions—Jane Brockway (Montana), Bob Cooper (Alberta), Lou Ann Harris (Montana), Claudia Lipski (Alberta), Susanne Maidment (Alberta), Joe Michielsen (Alberta), Lorne Scott (Saskatchewan), Harold Sellers (British Columbia) and Abbey Van Heuvel (Alberta). Thanks to the following photographers for contributing images—Russ Amy, Ron Asp, Jane Brockway, Martin Hensel, Scott Johnson III, Kathy Koenig, Jim Leitch, Steven Shumborski and Abbey Van Heuvel. Thank you to Lori Jo Jamieson (Editor, NABS' *Bluebird*), Brenda Garrett, Rhian Engel, Brenda Lissel, Gelaine Pearman and Sheridale Pearman for their editing assistance. Ron Asp's images were used by the gifted Carolyn Sandstrom to create the beautiful artwork gracing the new front cover. Carolyn also tweaked all the images that have been used in all three editions. As always, my gratitude to Judy Fushtey of Broken Arrow Solutions for so expertly adapting her original layout of this booklet to make the Third Edition even more appealing.

Although we have retained most of the original content, this Third Edition contains new images as well as updated information, online links and contact information.

I am delighted that this little booklet has stood the test of time and is still considered to be the premiere reference for Mountain Bluebird trail monitoring across the North American range of this beautiful and iconic species. I hope that it will continue to be used to encourage citizen scientists to establish and expand bluebird trails, and to inspire youth and adults alike to learn about and appreciate not only bluebirds, but also the immense beauty of our natural world. If you have any suggestions or updates for future editions, please email me (see below). M.P.

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Bluebird trail operators across the continent generously contributed their time and expertise to the production of this booklet. Erv Davis (Montana) not only donated personal funds to the

CONTINUED ON PAGE 60

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Mountain Bluebird

TRAIL MONITORING GUIDE

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ILLUSTRATED BY GARY ROSS

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RED DEER RIVER NATURALISTS

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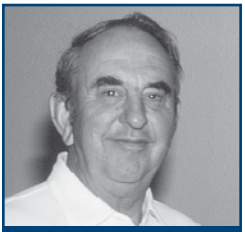
Dedicated

TO THE MEMORY OF…



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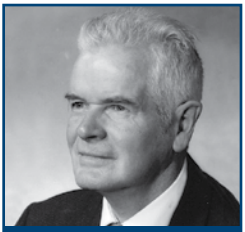

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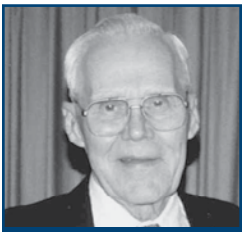

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Introduction

This booklet was produced through the cooperative effort and shared expertise of bluebird trail monitors and organizations throughout North America. It was written to assist both new bluebird trail operators who would like to establish and maintain successful nestbox trails for Mountain Bluebirds, and more experienced operators who would like to monitor their trails more efficiently, collect pertinent data, age nestlings accurately and troubleshoot more effectively.

Hopefully, this booklet will encourage more people to become interested in Mountain Bluebird conservation by establishing and monitoring a bluebird trail, and by joining or starting a bluebird group. Most bluebird research undertaken to date and much of the current bluebird literature relates to the Eastern Bluebird. There are many understandable reasons for this—population densities (of both Eastern Bluebirds and people) are higher in eastern North America, the bluebird conservation movement was initiated in Illinois by T.E. Musselman, the North American Bluebird Society (NABS) was founded by Dr. Larry Zeleny in Maryland, and the Eastern Bluebird tends to be more of a 'backyard bird' than the Mountain Bluebird. Although Eastern Bluebird information is generally applicable to the Mountain Bluebird, there are some significant differences between the two species, and there are trail management issues that are unique to the Mountain Bluebird; hence this booklet.

Although Mountain Bluebirds have been well-studied, there is so much about them, including their vocalizations, adaptations to cold, distribution peculiarities, population dynamics, migration and winter habitat use that is unknown. Ongoing observations and data collection by trail operators and researchers, combined with the widespread use of programs such as eBird, NestWatch and Breeding Bird Surveys (see page 56), are shedding light on some of the mysteries. The use of new technologies, such as light level geolocators, GPS trackers, temperature loggers, Motus systems, trail cameras and RFID (radio-frequency identification device) tracking are also helping to explain some of the less well-known details of how Mountain Bluebirds live their lives.

MYRNA PEARMAN

Breeding Bird Survey (BBS) data indicate an average annual Mountain Bluebird population decline of 1.55%, and eBird estimates a decline of 34% between 2007 and 2021. Despite this decline, *Sialia currucoides* was listed in 2018 as a species of Least Concern by *The IUCN Red List of Threatened Species* (www.iucnredlist.org/fr/species/22708556/137560639).

In 2022, the North American Bluebird Society hosted a conference to assess the status of the Mountain Bluebird. It is estimated that the population numbered four million Mountain Bluebirds in 2021, a reduction of around one million since 1970. Breeding Bird Survey (BBS) data do not indicate that Mountain Bluebirds are arriving earlier in the spring (unlike other studies, including the one summarized on page 33) and information gathered by NestWatch does not show a trend towards earlier laying dates. Conference proceedings can be found at https://nestwatch.org/blog/on-alert-mountain-bluebird-conference-reveals-concern.

Where do non-resident Mountain Bluebirds go for the period between fledging and when the birds regroup prior to migration? What are the detailed dynamics of courtship and nest site selection? Do earlier-arriving birds fare better than their later-arriving counterparts? To what extent are migration, nest initiation dates, clutch size or hatching and fledging success determined by weather, food availability or other factors? Do Mountain Bluebirds prefer certain box designs? Can there be "too many" bluebirds (i.e., does reproductive success decline at certain densities)? What impact do predators have on bluebird nesting success?

This book is intended as a guide only; what works well in one region might not work as well elsewhere. Experiment and conduct your own research—adopt what works best for the bluebirds on your trail. Feel free to share updates and insights with the author (see inside front cover).

In 2020, an updated, official species account of the Mountain Bluebird was published by Cornell Lab of Ornithology on their *Birds of the World* website (membership is required to access the full account) https://birdsoftheworld.org/bow/species/moublu/cur/introduction

Johnson, L. S. and R. D. Dawson (2020). Mountain Bluebird (*Sialia currucoides*), version 1.0. In *Birds of the World* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.moublu.01


RUSS AMY


RUSS AMY

The Mountain Bluebird

Range

The Mountain Bluebird (*Sialia currucoides*) is one of three species of bluebirds found on the North American continent. Although it is not restricted to mountains, the Mountain Bluebird is so named because it will nest at high elevations. The Mountain Bluebird is found throughout the Great Plains of central North America and west through the mountain ranges (but rarely all the way to the Pacific Ocean). Its range extends north to the Yukon and eastern Alaska, and south to central Mexico. The Eastern Bluebird (*Sialia sialis*) is generally found in the southern portions of the eastern half of Canada, the eastern United States and south through Mexico and Honduras. The Western Bluebird (*Sialia mexicana*) is found in south-central British Columbia, and south to central Mexico. Where the range of the Mountain Bluebird overlaps with the other two species, hybridization is known to occur. Hybridization of Mountain Bluebirds with Eastern Bluebirds was first documented by John Lane in Manitoba, and of Mountain Bluebirds with Western Bluebirds by Art Aylesworth in Montana.

Eastern Bluebird Female

Eastern Bluebird Male

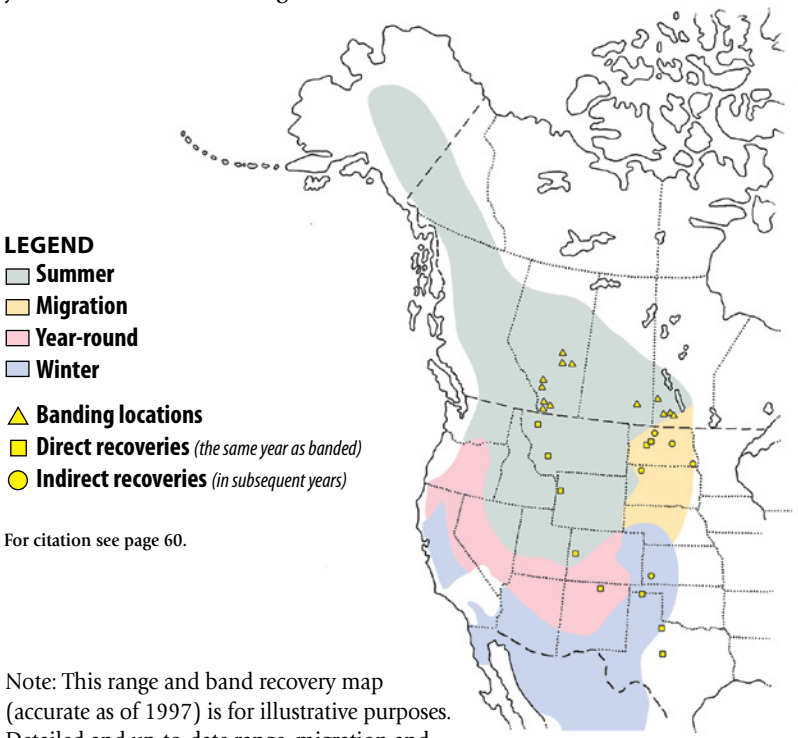
Western Bluebird Female

Western Bluebird Male

In Canada, the Mountain Bluebird breeds in Alberta, British Columbia, Manitoba, Saskatchewan and the Yukon. It overwinters in small numbers in British Columbia; there have also been rare winter records in Alberta and Saskatchewan.

In the United States, the Mountain Bluebird breeds in Alaska, Arizona, California, Colorado, Idaho, Montana, Nebraska, Nevada, New Mexico, Oklahoma, Texas and as far south as central Mexico. It overwinters in Arizona, California, Colorado, New Mexico, Oklahoma and Texas. Christmas Bird Counts show that it concentrates in the sparse creosote bush of southwestern California, the open areas of southeastern Colorado, the pinyon-juniper forests of eastern New Mexico and the open oak-juniper woodlands of southwestern Texas. The bird is a year-round resident in Arizona, California, Colorado,

Nevada, New Mexico, Oregon and Utah. Ornithologists in Oregon suggest that wintering birds sometimes seen in the southern part of that state may be migrants from British Columbia or Washington rather than non-migrating residents. The range map below shows the approximate summer, migration, year-round and winter range of the Mountain Bluebird.



For citation see page 60.

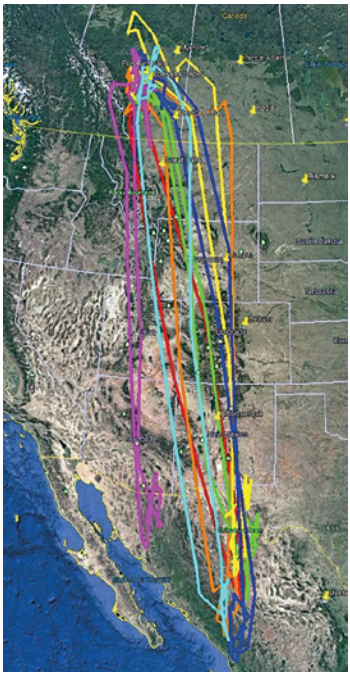
Note: This range and band recovery map (accurate as of 1997) is for illustrative purposes. Detailed and up-to-date range, migration and population trend maps can be found on eBird https://science.ebird.org/en/status-and-trends/species/moublu/range-map and Audubon https://explorer.audubon.org/explore/species/1050/mountain-bluebird/migration.

The eastern and northern limits of its range are dynamic, fluctuating from one year to the next. The Mountain Bluebird also tends to be a wanderer, as sightings of it have been made across much of the continent.

Although only a few of the tens of thousands of banded Mountain Bluebirds have been recovered, band recoveries indicate that those breeding in the Canadian prairie provinces migrate almost straight south, through the Great

Note: For the purpose of this booklet, if a banded bird is found (dead or alive) outside the 10 minute latitude/longitude block in which it was banded, it is called a band recovery. If a banded bird is found within this block, it is called a band return.

Plains, to their wintering grounds. Birds banded in Alberta, Saskatchewan and Manitoba have been recovered in Colorado, Kansas, Montana, North Dakota, South Dakota and Wyoming during the migration period (March, April, September and October). During the months of November to February, wintering recoveries have been made in New Mexico and Texas. According to the Bird Banding Data Exploration Tool (https://www.pwrc.usgs.gov/bbl/Bander_portal/login/main_login.php), 344,950 Mountain Bluebirds were banded in Canada between 1960 and 2025. Only 1,177 have been recovered. In the US, only 211 birds of 123,616 banded were recovered during the same time period. If you find a banded bird, see page 30.



Research conducted by the University of Manitoba and Ellis Bird Farm (now Ellis Nature Centre) in 2014 and 2015 using light-level geolocators documented the migration paths of several individual Mountain Bluebirds. See map on the right. The article about this research can be found in NABS' *Bluebird*. (www.nabluebirdsociety.org/PDF/Sialia%20Bluebird%20Journals/Bluebird%20v43%20no4%20web.pdf) (See page 56 for citation.)

Identification

JANE BROCKWAY

The Mountain Bluebird is easily distinguished from the other two species because it lacks any distinct red coloration. In breeding plumage, the adult male is a cerulean blue above with pale blue breast and flanks, and white belly and undertail coverts. During the winter, his plumage is a duller brownish blue. The breeding adult female is grayish in colour with a white belly. The blue on her rump, wing and tail feathers is conspicuous only when she flies. Her winter plumage is slightly brighter than her breeding plumage. In the fall and early spring, some females show a hint of reddish brown on their breasts. Nestling birds are grayish in appearance, with colour first appearing on their wing feathers at about 12 days of age. As is typical of all thrushes, juveniles have a spotted breast. They resemble the adult female in colour and usually have a non-spotted back. Adult plumage replaces juvenal plumage over the summer. There have been documented cases, albeit rare, of albinism in Mountain Bluebirds.

Mountain Bluebirds have two song types: a hauntingly beautiful warble issued by the male before the first light of day (if you've never heard this song, it is worth an early rise to savour it) and a soft, burry chortle, often heard issued between the male and female. Their call note is a soft *pew*. When disturbed, both males and females issue a harsh *chik* or *chak* sound and will clack their beaks.

Mountain Bluebird Conservation

Bluebirds are secondary cavity nesters, meaning that they nest in a pre-existing hole or cavity. In the wild, woodpeckers usually provide this accommodation. The bluebirds' penchant for using old woodpecker cavities or other natural cavities, such as those found in sandstone cliffs or clay banks, is why they will so readily accept a nesting box. Mountain Bluebirds have also been documented taking up residence in rather strange cavities, such as mailboxes, trailer hitches, under the eaves of buildings, in oil field buildings and equipment, pipes and farm implements. Many a bluebird has perished trying to check out potential nest sites, such as chimneys and vertical pipes. Where possible, open pipes or other sites that might entice bluebirds to their death should be screened or sealed.


FRED LAHRMAN

Bluebird conservation efforts have been enormously popular over the past 40 years or so, as more and more people discover that they can help increase local bluebird numbers simply by erecting and maintaining boxes in appropriate habitats. Because of the ease with which the Mountain Bluebird and many other native cavity nesters can be attracted to nestboxes, and because building, setting out and maintaining a bluebird trail is an activity that has no age, educational or social restrictions, bluebird conservation has become one of the largest grassroots conservation activities in North America. Although bluebird trails are an important conservation tool and have been responsible for the increase in regional populations of bluebirds and swallows (and perhaps other species as well), it is important to acknowledge that setting out bluebird boxes can never replace natural ecosystems. A bluebird trail can only be successful if placed in areas where suitable habitat exists, and overall biodiversity can be maintained only if tracts of natural habitat are preserved. In addition to maintaining a bluebird trail, it is important to try to do your part in your own neighbourhoods and communities to encourage habitat conservation.


MYRNA PEARMAN

Historically, Mountain Bluebird populations have been both positively and negatively affected by human activities. Agricultural settlement in the forested areas of Canada and the United States resulted in the removal of large tracts of tree cover, thus increasing the open habitat preferred by bluebirds. In treeless prairie areas, the planting of shelterbelts benefited bluebirds by increasing the number of available tree cavities for nesting. Subsequent practices, including fire suppression, saw the regrowth of tree cover and thus a reduction of open areas suitable for bluebirds. Populations of bluebirds and other native cavity nesters were dealt a blow with the introduction of House Sparrows and European Starlings. These non-native species, both secondary cavity nesters, were introduced into North America from Europe in the mid- and late 1800s. They found plenty of food, water and shelter—but few competitors—so their populations increased dramatically and their ranges quickly expanded across the entire continent. Mountain and Western Bluebirds were less negatively affected than Eastern Bluebirds by the introduction of these two species.

Food and Water


MYRNA PEARMAN

Mountain Bluebirds are diurnal foragers (hunt only during the day). During the early part of the spring and summer, they feed on spiders and insects. In the summer months, the adults continue to eat some spiders, but their diet switches predominantly to insects—including grasshoppers (which in many areas are their main food source), crickets, caterpillars, beetles, moths, butterflies (mostly larvae), flies, bees, dragonflies, cicadas and ants. Mountain Bluebirds have several techniques for obtaining their food: by hawking and fly catching (snatching up insects in midair), by ground sallying (dropping to the ground briefly from a nearby perch), ground foraging (walking around on the ground) and by hover foraging (hovering like a helicopter, then dropping down to the ground when prey is spotted). Hovering in midair is a Mountain Bluebird hunting behaviour that is not commonly practiced by the other two bluebird species. Because they obtain much of their food from the ground, bluebirds concentrate their hunting efforts in areas of low or sparse grass. See page 12 for details on what Mountain Bluebirds feed their nestlings.

During periods of inclement weather, Mountain Bluebirds will eat earthworms and berries. They depend heavily on berries during the colder winter months, including the seeds or berries of hackberry (*Celtis occidentalis*), juniper (*Juniperus* spp.), cascara (*Rhammus purshiana*), sumac (*Rhus* spp.), currant (*Ribes* spp.), elderberry (*Sambucus* spp.), cedar (*Thuja* spp.) and grape (*Vitis* spp.). Some bluebird trail operators offer mealworms

(available at pet stores or easy to grow yourself) during prolonged periods of inclement weather.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Bluebirds are also inveterate bathers. Although they usually have no problem finding water in which to bathe, many bluebird trail operators set out birdbaths for them. Communal bathing is especially popular in the late summer and early fall, when family groups enthusiastically bathe together, usually in the late afternoon.

Nesting


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Where they are non-resident, Mountain Bluebirds return to their breeding grounds early in the spring; so early, in fact, that they are regarded by many to be the harbinger of spring. There is friendly competition among many bluebirders to see who can spot the first bird of the season (e.g., in Montana, the first observer gets a hat!). By mid-March, bluebirds have usually been observed even in the far northern reaches of their range. In the south, (Nevada and the Colorado highlands, for example) arrivals may be reported in February. It is interesting to note that, although established bluebird trails in southern British Columbia and southern Alberta lie along similar latitudes, bluebirds begin arriving on territory about two to three weeks earlier in southern British Columbia (which is west of the Continental Divide and enjoys a much milder climate) than in southern Alberta. Nesting also starts later at higher elevations.

Male Mountain Bluebirds generally return to their breeding territories before the females. Once a pair has established its territory, the birds spend most of the breeding season within its confines. It is thought that territory size is dependent on the habitat quality, with the average territory being about 12 a. (5 ha) in size. Territory size tends to decrease during the nesting season, with activities becoming increasingly concentrated around the nest site.


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Although the male establishes the breeding territory, both members of the pair defend it. The male tends to defend the borders of the territory from other male bluebirds, with the intensity of his border defence determined by whether or not there are other males in adjacent territories. The female is the more vigorous defender of the immediate nesting site against

other females. Once the female begins egg laying, the male will sit near the cavity/nestbox, where he can quickly defend the nest site.

Not surprisingly, breeding activities begin earlier and last longer in the south than in the north. Generally, Mountain Bluebirds start nest building as early as the beginning of March in Nevada, mid-March in Montana and late April or early May in northern Alberta. The last broods of nestlings are usually out of the nest by late August in the south, early August in the north.

Banding returns (see Note, bottom of page 4), as documented in both Montana and Alberta, indicate that females are more likely than males to return to the same nestbox year after year, especially if they were successful the previous season. Banding research conducted by Ellis Bird Farm indicates that birds banded as nestlings have about a 4 percent chance of returning to their natal grounds the following year. Banding returns recorded in the area around Indian Head, Saskatchewan, between 1969 and 1975 showed that less than 1 percent of any recaptures were birds that had been banded as nestlings, suggesting that mortality and dispersion are critical factors. Banding data from the Calgary, Alberta, area indicate that those yearlings that return to nestboxes tend to come back to a box within 15 mi. (24 km) of their natal box.

The oldest recorded Mountain Bluebird was a female that was at least 9 years old when she was recaptured by the late Don Stiles of Calgary, Alberta, in 2005. He had banded her as an adult in 1997!

Mountain Bluebird courtship displays are very interesting to observe. Once a male has a territory established, he tries to attract a passing female by singing. Because females will often return to boxes in which they nested successfully the previous season, it is likely that after-second-year females (those that have nested at least one season) may be more interested in the actual nest site—including the habitat around it—than they are in a particular male. Perhaps, when a female arrives on territory, she inspects boxes that are already familiar to her, and if the male who has claimed the territory within which the preferred nesting site is located meets her expectations, she will acquire him as her mate. Yearling females, which have not had previous nesting experience, may be more influenced by male attention. Further research is needed to shed more light on this aspect of Mountain Bluebird courtship and nest site selection behaviour.


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In addition to singing, other male courtship behaviours include flight displays, wing-wave displays, bringing bits of nesting material in his beak to a potential nest site, entering and leaving a cavity/nestbox repeatedly and hovering in front of the entrance hole. A male will

also sing as he flutters in front of a female with his wings half open and tail spread. He will also perch beside her, preen her and offer her a food item, a practice referred to as 'mate feeding.' If a female flies inside a cavity/nestbox, especially while the male is still inside, she is indicating her interest in the nest site. Once she has made her final selection, she starts nest-building activities.

Recent research indicates that a male bluebird will occasionally mate with a female of another pair (fathering young with more than one female is called 'multiple paternity'), and a female will occasionally lay her eggs in the nest of another pair (called 'egg dumping'). The practice of extra-pair copulation, which is common among many bird species, results in young of mixed parentage and increases the chances of an individual bird passing on its genes (a perfect example of 'not putting all your eggs in one basket'!). Once a pair-bond is formed, a male bluebird will keep a close eye on the female by staying at her side at all times. This behaviour does not necessarily reflect 'true love'; rather, it is likely that the male is trying to prevent other males from attempting to mate with her. A male will sometimes follow his mate so closely and so persistently that she appears to get annoyed and becomes quite aggressive towards him.

Banding studies indicate that Mountain Bluebirds don't usually retain the same mate for more than one season; however, there are documented cases of pairs nesting together for two seasons. In these cases, it is likely that the pair is being loyal to the nest site, not to each other. If first nesting attempts fail, a pair may dissolve its bond and re-pair with other mates.

Although the male may bring bits of nesting material, the female takes full charge of building the neat, cup-shaped nest. Depending on the region and type of habitat in which the nest is located, and the bluebird's artistic preferences, nesting materials may include dry grass, shreds of dry bark, pine needles, twigs, straw, rootlets, horse hair or deer hair. The nest cup is lined with finer materials and occasionally finished off with a few feathers or such unusual materials as shredded paper and plastic cigarette wrappers (tape from a cassette has even been found!). Nest building usually takes between four and seven days, but can take much longer, or be accomplished in just a day or two. The female will build the base of the nest to fit the size of the cavity, but the actual nest cup is always just large enough for her to fit snugly. That the female Mountain Bluebird can continue incubating successfully during severe spring weather is a testament to her expert nest construction abilities!

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Egg laying usually begins a day or two after the nest is complete, with the timing generally dependent on the weather. Egg laying commences earlier in the south and at lower elevations: in the south, egg laying can start as early as late March; in the mid-portions of the range, mid-April; and in the north, it usually starts during mid-May.


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Bluebird eggs are oval-shaped and light blue in colour, although occasionally a female lacks the ability to produce the blue pigment and lays white eggs. White eggs are unusual in appearance but are still fertile. Eggs are usually laid one per day, generally early in the morning. First clutches average five to six eggs, and second clutches usually average four to five eggs. Eggs that get cracked are usually taken out of the box, while intact but nonviable eggs are rarely removed. If the first nesting is successful, and if there is good weather and an abundant food supply, a pair may attempt a second brood. Few pairs renest if conditions aren't ideal. In the south, Mountain Bluebirds will occasionally raise three broods.


LORNE SCOTT

The incubation period, which begins after the ultimate (last) or penultimate (second last) egg is laid, lasts between 13 and 15 days, depending on the region and temperature. The female is the sole incubator of the eggs because only she develops a brood patch, a bare patch of vascularized skin, on the abdomen. The female leaves her nest at regular intervals to feed during incubation, and the male will also bring her food during this time. In regions where ambient air temperatures are extremely high, incubation may be triggered before the female has laid a full clutch, resulting in nestlings of different ages. The amount of time the female spends incubating also seems to be dependent on air temperature, as she tends to spend less time on the nest during periods of extreme heat. The female sleeps inside her cavity at night during the incubation period, whereas the male commonly roosts nearby.


SCOTT JOHNSON III

Hatching usually takes place over a 24-hour period, with the young using their tiny egg tooth to break their way out of the shell. The parents either ingest the shell or deposit it some distance from the nest, probably to avoid attracting predators. The young bluebirds, hatched blind, naked and helpless, are brooded intermittently by the female for a week or longer, depending on the temperature and


MYRNA PEARMAN


MARTIN HENSEL

weather conditions. Brooding periods are longer and more frequent during inclement weather, especially at night. Males, although unable to brood the young, occasionally enter the nest to feed or protect them while the female is away.

Both parents share feeding duties, which become increasingly demanding as the ever-hungry young grow. From hatching to about five days of age, the young are fed caterpillars and other soft-bodied insects. After that, the parents begin to add spiders and hard-bodied insects to the menu. They will also feed their young fruit/berries and earthworms, especially during inclement weather.


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It is estimated that the parents provide each youngster with about three feedings per hour from dawn till dusk. They will sometimes feed their nestlings food items that are larger than what they themselves consume. Fecal sacs, which are small sacs of the young's waste material contained in a mucous membrane, are ingested by the parents when the young are small. When the nestlings are older, the sacs are carried out one at a time and deposited away from the nest, on a power line or a tree branch, atop a fence post or on another suitable repository.

Fledging and Post-fledging

Young Mountain Bluebirds leave the nest when they are 17 to 21 days of age (average 22 days in Oregon), depending on the weather and food availability. Nestling periods seem to vary from region to region, but because it is unlikely that a box is checked at the exact time of fledging, this part of the bluebird life cycle is quite poorly documented.


RON ASP

Just prior to fledging, the parents feed the youngsters less and less in an effort to coax them out of the nest. Pressed by hunger and in response to a special vocalization by its parents,

a young one will finally make its first flight. It is then called a fledgling. Initially, the fledgling is capable of flying 75-100 yd. (70 m-90 m) and aims for a fence rail, tree branch or other suitable perch. Sometimes unsuccessful, it crash-lands on the ground and tries to hop out of harm's way. If threatened, it crouches down. For the first three or so days, a fledgling is totally dependent on its parents but quickly gains coordination, acquires depth perception and can soon perch without difficulty. It continues to beg food from its parents by flapping its wings and issuing a begging call. It also depends on its parents to warn of predators and other dangers.

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Note this juvenile's yellow beak gape

Over the next few days, the fledgling becomes increasingly involved in finding its own food and, by about 10 days, is fully able to capture and prepare its prey (e.g., whacking it or removing the wings). The fledgling period is variable, depending on food supplies and how strong and healthy the young are when they leave the nest, but is thought to average three or four weeks. Although both parents feed the newly fledged young, the male will assume this duty if the female starts another clutch or disappears. The young from the first brood will sometimes help feed their second brood siblings. Even after attaining their independence, juveniles remain in a group with their parents throughout the summer and fall.

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One of the great Mountain Bluebird mysteries is the birds' apparent disappearance after the last brood has fledged, as entire family groups move away from the breeding area for a period of time, joining other juveniles and adults in post-breeding flocks. It is not clear where these flocks go, or why. In mountainous regions, they may move up to higher elevations. Flocks, varying in size from about 20 to over 100, reappear during the late summer and early fall. During this time, both adults and juveniles have been reported inspecting nest sites, a behaviour called 'prospecting'. Fall departure dates range from September in the Yukon to as late as November in Wyoming.

Mountain Bluebird Nestbox Designs

Nestbox Designs

There is no one perfect, ultimate Mountain Bluebird nestbox. Dozens of different styles of nestboxes are being used with equal success by Mountain Bluebird trail operators. Although styles and designs can vary, all boxes should provide the birds with a safe and secure nesting site. After decades of experimentation and discussion, the following nestbox design recommendations have been widely adopted:

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Twine boxes on binders were once favoured bluebird nesting sites

- The best materials for bluebird box construction are 5/8-in. (16-mm) or 3/4-in. (19-mm) exterior grade plywood or cedar. Pine boards can be used but are not recommended because they will warp over time. Do not use treated lumber or interior grade wood, including OSB board. When possible, use salvaged scraps or environmentally sound certified lumber from sustainably managed forests. Plastic jugs and milk cartons provide little insulation and should never be used. Metal is a less desirable material than wood, although prior to the widespread use of nestboxes, metal twine boxes on binders were the home of choice for bluebirds across much of the settled parts of the Great Plains.

- Bluebird boxes made from good quality plywood or cedar do not need to be stained or painted. Some of the oldest nestboxes in use today, dating back thirty years or more, are unpainted, well-weathered plywood boxes. If you do paint your boxes, use a non-leaded exterior brand in a neutral colour. Use light colours in hot areas to reduce overheating. Do not paint or stain the interior of the box or the inside of the entrance hole.

- Assemble the box with screws or nails. Screws are more expensive, but they make construction simpler and faster, and make it easier to replace parts.

- One panel (top, front or side) should open to allow for observation and cleaning. Make sure the panel fits snugly to prevent rain from blowing in the seams.

- If plywood or smooth boards are used, place hardware cloth or etch shallow saw kerfs on the inside of the front panel, just below the entrance hole. Although young bluebirds are fairly adept at exiting most boxes, this roughness provides an extra toehold for them. Having a toehold is actually more important for swallows, which have weak feet and often perish in smooth-walled boxes if they can't get out. If using hardware cloth, be sure the material is pressed tightly against the wood so the birds won't get a toe caught.

- Perches below the entrance hole encourage House Sparrows and help predators. Do not build or purchase a nestbox that has an entrance hole perch.

The Great Front-/Side- vs. Top-opening Box Debate

There is some debate among bluebirders about the merits and perils related to how a box opens. Whereas one style is not superior to the other, there are some advantages and disadvantages to each. To have the best of both worlds, some operators construct boxes that are both top- and side-opening.

The advantages of a front- or side-opening box over a top-opening box are that it can be mounted higher and still be easily monitored, and it is easier to clean than a top-opening box that does not have a removable floor. The disadvantages of this type of box compared to a top-opening box are that opening the box causes more stress to the nest occupants because the birds may feel more exposed; it is harder to see and photograph the nest occupants, especially if the nest material is quite high; and it is more likely that the young will fledge prematurely.

The advantages of a top-opening box style are that it is easier to monitor unobtrusively (the box lid can be opened just a crack to allow inspection) and, thus, the young are less likely to fledge prematurely; and it is easier to photograph the nest occupants. The disadvantages of a top-opening box compared to a front- or side-opening box are that it is harder to clean if the floor is not removable, and it needs to be mounted lower for checking (unless a ladder, stool or pocket mirror is used).

- Dimension recommendations:
  - **Entrance hole**—1 9/16 in. (40 mm). In areas where Mountain Bluebirds overlap with either Eastern or Western Bluebirds, which require a 1 1/2-in. (38-mm) hole, use the larger entrance hole on all boxes. The Johnson Slot Box (see page 16) has a 1 3/16 in. (27 mm) wide slot.
  - **Nestbox depth**—about 7 in. (17.8 cm) from the bottom of the hole to the bottom of the box. Shallow boxes put the occupants at greater risk of predation.
  - **Floor size**—at least 5 x 5 in. (12.7 cm x 12.7 cm).
  - **Roof overhang**—approximately 3 in. (7.6 cm) to provide shade, protect the entrance hole from driving rain and to discourage predators; 5 in. (12.7 cm) where predation is likely.
  - **Ventilation**—the hotter the climate, the more ventilation should be provided. Vent holes should be drilled near the top of each sideboard. Drill holes at an upward angle to provide ventilation without allowing rain to blow in. Use 1/2 in. (13 mm) holes in hotter regions, 1/4 in. (6.3 mm) or smaller holes in the north.
  - **Drainage**—cut off a small amount of each corner of the bottom board or drill 3/8-in. (9.5-mm) holes in it.

Nestbox Plans

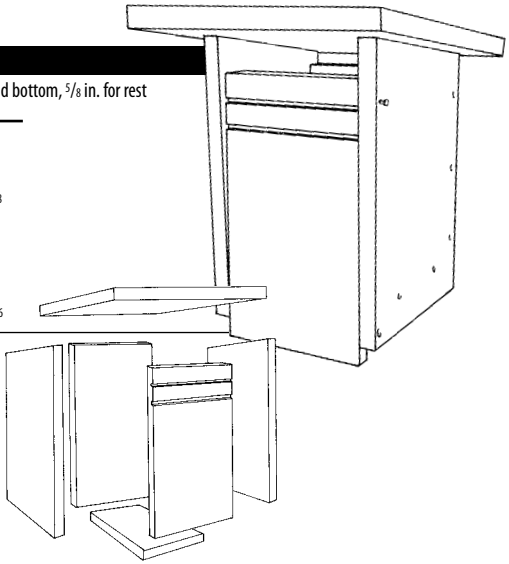
The following box designs have been extensively field-tested and are ideal for Mountain Bluebirds. All measurements are in inches. See page 56 for additional nestbox plans.

Johnson Slot Box

Use 3/4 in. plywood for back and bottom, 5/8 in. for rest

	Inches
Roof	9 1/4 x 10
Front	5 3/16 x 9 1/4
Side (front)	6 3/4 x 10 1/8
Side (back)	6 3/4 x 9
Back	5 1/4 x 8 1/2
Floor	5 1/4 x 5 1/4
Entrance Slot	1 3/16 x 5 3/16

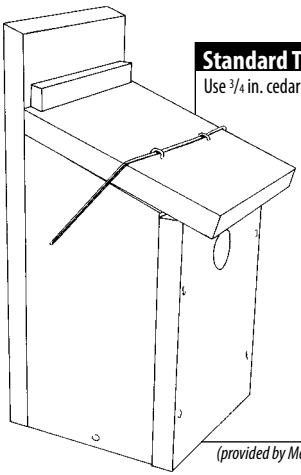
(provided by Southern Interior Bluebird Trail Society, British Columbia)



NOTES:

- Leave a 1 in. overhang at the back and make the overhang equal on both sides.
- There will be a 3/8 in. gap between the top of the backboard and the underside of the roof for ventilation.
- Cover the roof with a shingle or 90-lb. rolled roofing.
- Etch saw kerfs on the inside of front for toeholds.

Entrance hole/slot sizes must be exact. If they are even slightly larger, European Starlings can enter.

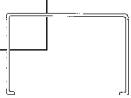


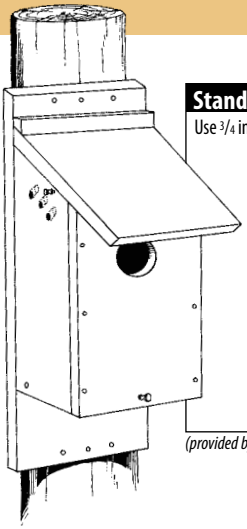
Standard Top-opening Box (Montana)

Use 3/4 in. cedar

	Inches
Roof	7 x 8
Roof cleat	1/2 x 6 1/2 (3/4 in. at back; 7/8 in. at front)
Front	7 x 10
Back	7 x 18
Floor	5 1/4 x 5 1/2
Side (front)	5 1/4 x 10
Side (back)	5 1/4 x 12
Entrance hole	1 9/16
Wire:	1/8 in. diameter 7 1/4 x 5 (1/2 in. bend at bottom)

(provided by Mountain Bluebird Trails Inc., Montana)



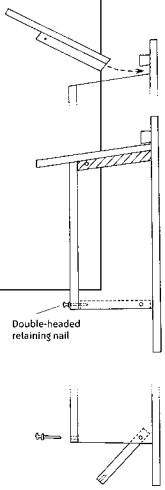


Standard Top-opening Box (Alberta)

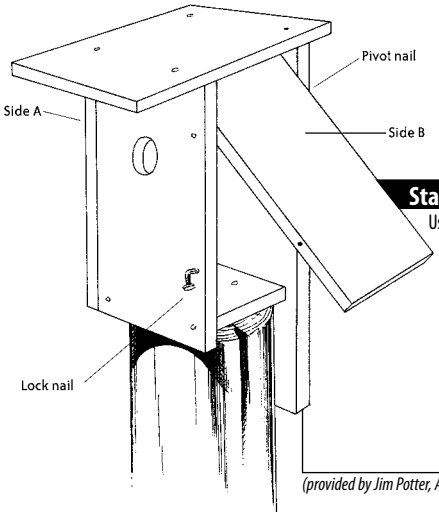
Use 3/4 in. plywood

	Inches
Roof	7 1/2 x 8
Roof insert	5 x 5
Cleat	1 x 6 1/2
Front	6 1/2 x 10
Back	6 1/2 x 16
Floor	5 x 5
Side (front)	5 x 10
Side (back)	5 x 11
Entrance hole	1 9/16

(provided by Ellis Bird Farm, Alberta)



Entrance hole/ slot sizes must be exact. If they are even slightly larger, European Starlings can enter.

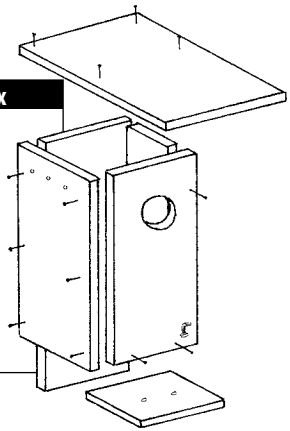


Standard Side-opening Box

Use 3/4 in. plywood

	Inches
Roof	7 3/4 x 8
Front	6 x 10
Back	6 x 18
Floor	4 1/2 x 5 1/4
Side A	6 x 10
Side B	4 1/2 x 10
Entrance hole	1 9/16

(provided by Jim Potter, Alberta)



Nest Cameras

Some bluebird trail operators have bluebirds nesting in boxes close enough to a power source that they can install a nest camera inside the box. These cameras provide an amazing glimpse into daily activities that would be otherwise hidden from view. There are limitations on the distance any camera can easily transmit images without additional equipment and even wireless cameras still need a power source.

Basic details about nest cameras can be obtained from https://nestwatch.org/learn/all-about-birdhouses/installing-a-nest-box-camera. An online search will also yield ideas.

As long as they do not interfere with the birds, exterior cameras can also be used to watch and document the comings and goings at a nestbox. Options range from small security cameras or cameras designed to be attached near bird feeders, to trail cameras. Technology changes rapidly, so do an online search for options.

Even if you can't get your own nest camera system set up, there are many websites that feature live feeds, monitoring and sharing the lives of birds from around the world (www.allaboutbirds.org/cams/).

Mountain Bluebird Trails

Breeding Habitat

The key to a successful Mountain Bluebird trail is the placement of properly constructed nestboxes in suitable habitat. Be sure to obtain landowner permission before setting out boxes on property that does not belong to you.

RAY HARRIS

Ideal Mountain Bluebird habitat in southwestern Alberta

Because Mountain Bluebirds mainly hunt for food on the ground, ideal bluebird habitat is an open or short-cut/sparsely grassed area interspersed with a few trees or shrubs. Make sure the area around the boxes (including ditches, if possible) is not sprayed with pesticides or herbicides. The issue of pesticide use is becoming increasingly serious due to the widespread use of glyphosate, brush control chemicals, insecticides and other toxicants.

Cattle, sheep and horse pastures (see page 22), cemeteries, acreages, abandoned orchards, linear trails, prairie coulees, country roads, abandoned rail lines, golf courses, open parks, the edges of meadows, regenerating clear cuts and burned areas, and sagebrush flats all provide excellent bluebird habitat. At higher elevations, boxes can be set out in open coniferous forests, or open woodlands of pinyon pine and juniper. Suitable habitat should include perch sites, such as a fence line, overhead wires or a few scattered trees where the birds can hunt from and guard their nest sites. A nearby tree provides young bluebirds with a place to fly to when they first fledge, as well as shelter from the elements and predators.

Avoid placing boxes in areas that are sprayed (i.e., near monocrops), offer poor habitat (cropland, urban and suburban yards, city centres, dense woods), where there will be competition with Northern House Wrens or House Sparrows, or in locations where the boxes are likely to be vandalized.

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Ideal Mountain Bluebird habitat in Montana

Some trail operators in Montana recommend placing boxes on fence posts located under power lines while other bluebirders note that these locations may increase the risk of avian predation. Boxes mounted along fencelines should not face perpendicular to a busy road. If the entrance hole faces parallel with the road, the birds (especially the fledglings) are more likely to fly along the ditch than into oncoming traffic.

To reduce competition from Northern House Wrens, place boxes at least 150 ft. (45 m) from brushy or heavily wooded areas. Northern House Wrens are native songsters that compete with bluebirds for nesting sites, often by throwing out the bluebird eggs or young. Active wren nests cannot be tampered with, but dummy nests can be removed if you have the necessary permits (see page 22).

Avoid places plagued by House Sparrows, a non-native species that has adapted very well to human-dominated landscapes. Their numbers are especially high in urban areas (i.e., city centres and high density housing developments), farmyards and feedlots, or any locations where grain is fed.

Don't place boxes where people are likely to tamper with or vandalize them. If passers-by might open a box, secure the opening panel with a screw. If boxes are attached to fence posts, they are less likely to be stolen if they are screwed onto the post internally (i.e., by using a long screwdriver that will reach through the entrance hole and enable the box to be screwed to the post through the back wall). A small sign explaining the importance of not opening the box may also help.

It is preferable to put out a manageable number of boxes that can be easily maintained, than to put out a large number of boxes that are then neglected. Remember, it is better to not put out a bluebird box, than to put one out and let House Sparrows use it.

Mountain Bluebird Trail Basics


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Boxes should be in place and ready for the birds prior to their arrival on territory (early February in the south, mid-March in the north). Boxes set out later in the season may be used by late/second nesters.

If you did not clean out your nestboxes the previous fall, be sure they are cleaned out before the bluebirds arrive on territory in the spring. Sometimes, this activity entails tromping through deep snow! NABS recommends the removal of nesting material after the young have fledged. Although Mountain Bluebirds will readily nest in boxes containing old nests, old nesting material can harbour blowfly eggs, can become dank and mouldy, and it may attract ants or mice. In areas where raccoons are a problem, carefully clean out the nestbox, place all the nesting material directly into a trash bag and dispose of it with your regular garbage. Always stand upwind when cleaning out a box, avoid inhaling any dust that is generated and be aware of health risks (see page 49).

Although placing nesting material in the box for the bluebirds (e.g., dry grass) is not a widespread practice—not because it will discourage the birds but because they will bring in their own material—some trail operators report that placing

material in the box makes it more attractive to the bluebirds than an empty one. Experiment on your trail by adding material to a few boxes and recording what happens.


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In areas where bluebirds do not overwinter and mice are prevalent or have a tendency to use nestboxes, seal the entrance hole or tip up/remove the floor (be sure to number each floor if you remove it) to prevent the rodents from moving in. In those areas where bluebirds do overwinter, a box might be used at night for roosting. Just plug the drain and ventilation holes so that the box can provide a snug roosting site. Other resident birds, like nuthatches and chickadees, might also use a bluebird box as a winter roost. Chickadees will often roost in old wren nests, so if you have both chickadees and wrens using your nestboxes, you might want to avoid cleaning out the wren nests until spring. Boxes may also be used by bluebirds, swallows and other birds as shelter from spring storms. Boxes intended for use by roosting birds will be safer from predators if mounted on a conduit or smooth metal pole.


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Placement and Mounting of Nestboxes

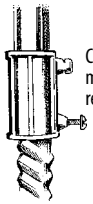
Given its relatively large territorial requirements, the Mountain Bluebird does not generally allow other bluebirds to nest within 200-300 yd. (180 m-275 m), so boxes should be spaced accordingly. However, on a trail near Indian Head, Saskatchewan, five pairs of bluebirds and four pairs of Tree Swallows were once recorded nesting in unpaired boxes along 1 mi. (1.6 km) of trail! In western Montana, bluebird occupancy is maximized by placing about 5 boxes per mile (5 boxes/1.6 km) or 1 box about every 350 yd. (320 m). In areas of ideal habitat and where the boxes are out of sight of each other (e.g., on either side of a clump of trees or small rise), the bluebirds may nest closer together. In eastern Montana, maximum bluebird density is attained by spacing the boxes at about 3 per mile (1 per 585 yd./535 m) or 4 per mile (1 per 440 yd./400 m).

Many bluebird trail operators pair boxes about 5-25 ft. (1.5 m-7.5 m) apart, at intervals of about 200-300 yd. (180 m-275 m). These operators find that pairing allows both swallows and bluebirds to nest peaceably side by side. In Montana, operators find that pairing is less successful at discouraging swallows from occupying both boxes than the practice of setting out a single box at the densities described above. In Oregon, where both Tree Swallows and Violet-green Swallows nest, experimentation with pairing has also found

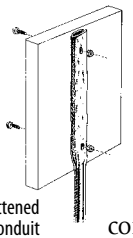
it to be unsuccessful. If swallows take up residence in both boxes of the pair placed this far apart, move the boxes closer together for the next season. Some trail operators in Alberta have found that in areas where bluebirds, swallows and wrens are all likely to vie for a nestbox, setting out three boxes together works well. If you are trying to decide whether or not to pair or triple, or at what density you should erect non-paired boxes, talk to experienced local bluebird trail operators first, then experiment and go with what works well in your locale.

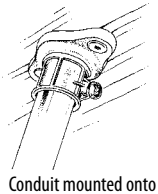
Boxes should be mounted as high as possible while still being readily accessible to the trail operator. In regions where cats or raccoons are not a problem, fence posts are ideal for mounting boxes. Using deck screws makes it much easier to attach and remove boxes than if nails are used.

In areas where predators such as raccoons, cats or snakes are found, it is best to mount boxes on a small-diameter pole such as 1/2-in. (13-mm) EMT electrical conduit. The most efficient method of installing these poles is to first pound a 5-ft. (1.5-m) piece of rebar into the ground about 2 ft. (0.6 m), and set the conduit over this base. In areas where the box needs to be higher than 5 ft. (1.5 m), place a conduit connector on the bottom of the conduit and use a long screw in the bottom set screw hole to tighten it against the rebar. The box can then be raised and lowered as required.


Conduit mounted on rebar

There are several ways to attach the box to the conduit. Attaching the box using pipe straps is easy and inexpensive—just attach the straps to the backboard. Another way is to pound the top section of the conduit (about the length of the backboard) flat, drill matching holes through the conduit and the backboard, then bolt the box into place. To attach the conduit to the floor of the box, the most efficient and least expensive system is to first screw in a waste nut onto the centre of the bottom of the box, then screw a set screw connector into the waste nut. The other end of the set screw connector simply slips over the conduit and can be held in place by a small set screw. EMT conduit, conduit connectors, waste nuts and set screw connectors can all be found in the electrical section of your local hardware store.


Flattened conduit


Conduit mounted onto box bottom using waste nut and set screw connector

Steel pipe can also be used for mounting boxes, but pipe is expensive, heavy, cumbersome and requires specialized tools. To attach a box to a pipe, screw a pipe plate (also called a floor plate) onto the floor of the box. The box can then be screwed onto the threaded end of the pipe.

For information on how to predator proof boxes that are set on conduit or pipe, see page 44.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Boxes set up around the periphery of cattle or horse pastures should be mounted at least 8 ft. (2.5 m) high, facing away from the pasture so the pasture animals cannot rub or chew them. Use a fence post as the base mounting structure, and attain the needed height by using a long piece of two-by-four (in raccoon-, cat- and snake-free areas) or a length of conduit (where these predators are a problem). A loose wrap of barbed wire around the two-by-

The Law

Laws and regulations change from time to time. For further information, contact the Canadian Wildlife Service or U.S. Fish and Wildlife Service (page 55).

Authorities in both Canada and the United States were contacted in 2005 for clarification on the laws and regulations regarding activities associated with maintaining a bluebird trail. The following summary was reviewed and approved by the Wildlife Enforcement Division, Enforcement Branch of Environment Canada and the Division of Migratory Bird Management, U.S. Fish and Wildlife Service. However, nothing contained herein is intended to provide legal advice. It is the responsibility of each bluebird trail operator to become familiar with, and abide by, all relevant laws and regulations. With the exception of bird banding, which is jointly administered by the United States Department of the Interior and the Canadian Wildlife Service, each county has its own federal laws and permit requirements. Furthermore, each province and state may also have its own set of regulations and permits that must accompany federal permits.

It is important to remember that Mountain Bluebirds and other native birds that use nestboxes are wild birds, subject to natural processes. Just because they use nestboxes does not mean that they can, or should, be treated like cage birds or pets. Furthermore, their use of nestboxes does not entitle the nestbox owner to intentionally disturb the adult birds or to interfere in any way with nesting activities. All native birds that use nestboxes are protected in Canada under the Migratory Birds Convention Act (MBCA) and in the United States under the Migratory Bird Treaty Act (MBTA).

In Canada, the MBCA states that it is illegal to disturb, destroy or take a nest, egg or nest shelter of a migratory bird, or to have in one's possession a live migratory bird or a carcass, skin, nest or egg of a migratory bird except under authority of a permit.

In the United States, the MBTA provides that it is unlawful—unless permitted under or authorized by regulations—to pursue, hunt, take, capture or kill; attempt to take, capture or kill; possess, sell, barter, purchase, import, export or transport any migratory bird, or any part, nest or egg of any such bird. Take is defined in regulations as: "pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to pursue, hunt, shoot, wound, kill, trap, capture or collect."

Permits are not required to open up a nestbox for the purpose of observing nesting progress (counting eggs, nestlings, etc.) or to clean it out once the young have fledged (or if the nest failed because the eggs did not hatch, all the young died, etc.). However, bluebirders are sometimes confronted with situations where—although intervention is deemed necessary for nestling survival—permits may first be required. Situations that may require a permit (depending on the specific circumstances) include: removing wet nesting material from an occupied nest and replacing it with dry material; treating or replacing an occupied nest that is infested with nest parasites; removing nesting material to lower it so the occupants are farther away from a predator's reach; and removing dead nestlings or unhatched eggs from a nest containing live young.

In Canada, none of the above-listed activities may be legally undertaken without a permit. In the United States, permits are also required for these activities, except that nest material can be manipulated (e.g., to lower the nest from the reach of predators) without a permit so long as the integrity of the nest is not compromised and no birds are handled in the process. Handling a live nestling for any reason (e.g., to remove blowflies, to remove orphaned nestlings to foster them out, to administer warmth or fluids) always requires a permit in both countries.

In Canada, federal permits are issued by the Canadian Wildlife Service (CWS) and provincial Fish and Wildlife (or equivalent)

four or conduit discourages rubbing by livestock. In areas where predators are not a problem, cattle and horse damage can also be avoided by placing the box on the far side of the fence, below the pasture animals' reach. Operators in Montana have bluebirds successfully nesting in boxes placed 2.5 ft. (0.75 m) off the ground.

If there are elk and other large ungulates in your trail area, you might want to fasten the box only by one screw or bolt at the top—if an animal rubs against it, the box

departments issue provincial permits. To obtain the necessary permits, a bluebird trail operator must first apply to the CWS for a Federal Scientific Permit. If granted, this permit will outline all the relevant conditions and restrictions that apply to trail monitoring activities. Contact your regional CWS office to obtain the necessary application form, and ask to speak to a staff member who can help guide you through the process. CWS contact information is included in Appendix 1. Once you have been issued with the federal permit, you then need to contact your nearest Fish and Wildlife (or equivalent) office and apply for the relevant provincial permit(s). Keep a copy of all permits with you while out on the trail, and be sure to submit the necessary reports at the end of the season.

In the United States, permits are issued by the U.S. Fish and Wildlife Service. A state permit may also be needed from the state's wildlife conservation (or equivalent) department. The first step towards obtaining the necessary permits is to contact your nearest U.S. Fish and Wildlife Service's Migratory Bird Permit Office and inquire about obtaining a Migratory Bird Permit. Some states require that this federal permit be obtained before they will issue the appropriate state permit; other states require that a state permit be issued first. Permit staff will guide you through the process and will provide you with information about your state's regulations. Keep a copy of all permits with you while out on the trail, and be sure to submit the necessary reports at the end of the season.

Once you have your permits in place, it is a good idea to pay a visit to your closest provincial/state Fish and Wildlife Department (or equivalent) office and get to know your local Fish and Wildlife officers and biologists. Tell them where your bluebird trail is located, show them your permits, and ask if you might consult with them should a crisis or problem arise on your trail. These individuals are usually very supportive of bluebird conservation efforts and can be useful sources of information and advice.

Another recommendation is to visit your nearest wildlife rehabilitation centre (rehab centre) and get to know the folks who operate the facility. While most bluebird trails are too distantly located for these centres to be of much practical assistance, a rehab centre can be called for advice should a crisis arise. If it is feasible, rehab staff or volunteers will either come out and pick up orphaned or injured bird(s) or make arrangements for you to deliver it. Rehab centre contact information is listed on page 55.

Last, but certainly not least, get to know the other bluebirders in your area. Not only will they have lots of information and experiences to share, but they can also offer advice and provide support should you require assistance. If you would like to have the birds that nest in your boxes banded, contact your local master permit holder to see if there might be a bander in the area who would be willing to band them.

It is illegal in both countries to collect eggs or nests without permits. Although nests containing intact abandoned eggs make excellent educational tools, such collections may be allowed, but only under special federal and provincial/state permits. In some cases, educational institutions (including nature centres) can obtain these permits, then 'loan' the collection to a trail operator for the sole purpose of education. There will be special conditions attached, depending on the individual circumstance. Check with your federal and provincial/state wildlife authority for information. If you do obtain a permit, keep the original in a safe place and attach a copy to the display case so that it is readily available should you be questioned by the authorities.

It is not legal to hand-raise a bluebird or any other wild bird that is protected under the Migratory Birds Convention Act or Migratory Bird Treaty Act.

is more likely to swing than to break apart, which is what would probably happen if it was fastened on both the top and the bottom.

Utility poles are used with success in some areas, but in other regions, utility companies prohibit the attachment of boxes to their poles. Check with your local utility company or provider if you are considering using these poles.


MYRNA PEARMAN

Although boxes mounted on trees might be subject to higher predation in some areas, a tree may sometimes be the only location where a box can be placed. Use lag bolts or deck screws when attaching a box to a tree, and be sure to loosen the fasteners a bit every year so they won't be pulled through the box as the tree grows.

Boxes can also be hung from chain-link fences. Use wire to attach a box to this kind of fencing.

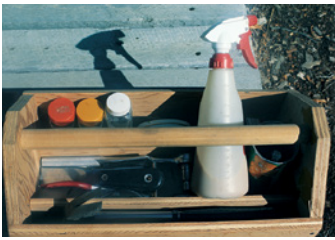

JANE BROCKWAY

To spare the birds the intensity of the hot afternoon sun, mount the boxes on the east side of trees, large poles or posts. Boxes placed in full sun without adequate ventilation can be about 17˚F (9˚C) warmer than ambient air temperature. Bluebird eggs and young will perish at temperatures of about 107˚F (42˚C). If possible, face the entrance hole away from the prevailing winds, although extreme weather can come in from any direction.

Boxes should be numbered both outside and inside. Numbers on the outside tend to fade. Permanent markers (e.g., Jiffy Artline 400 Paint Marker®) can be used to write directly on the box or onto a material (e.g., livestock ear tags, etc.) that is then stapled or nailed to the box. Numbers can also be cut out from old plastic jugs, for example, or etched into small copper or aluminum tags.

A map that shows all box locations can help you keep your trail organized and make it easier for someone else to check your trail, should the need arise. Keeping a master map of all locations ever used on a trail will make it possible to compare long-term data on box use, habitat preference and so on. It is fairly easy to map all your boxes by entering their locations through the NestWatch app (see page 26) or by entering GPS coordinates into Google Maps or other mapping programs.

Tools of the Trail Trade


RAY HARRIS

A bluebird monitor's tool box

Setting up a Bluebird Trail: The tools required to erect nestboxes depend on whether you are using existing structures, such as trees or fence posts, or installing posts or poles. Fastening a box to a fence post or a tree requires only a hammer and nails or cordless drill and some screws. Attaching a box to a freestanding pole takes more planning, time, equipment and supplies (e.g., lengths of pipe and rebar, attachment pieces [such as conduit connectors, waste nuts, set screw connectors, screws], pipe or conduit cutters, heavy maul for pounding in rebar, etc.).

Monitoring a Trail: Be sure to carry the necessary tools with you on the trail so you can undertake minor repairs and deal with emergencies. Some of what you'll need (extra boxes and so on) can be left behind in your vehicle; other bits and pieces should be carted along. The farther you have to walk, the sparser and more versatile your arsenal is likely to be. Fishing tackle and tool boxes make excellent

Tools and Supply List

- Screwdriver and/or cordless drill; bring extra drill bits (and spray paint them a fluorescent colour if you, like the author, tend to drop things in tall grass)
- Hammer (big enough to do the job but small enough to carry along if it is necessary); a rock will sometimes work!
- Pliers (to pull out nails if you use nails to hold the box opening panel shut; double-headed nails are easier to pull out than regular nails)
- Screws (wood, deck or drywall screws work well). Choose one style of screw and stick with it to avoid the annoyance of having to change bits all the time.
- Nails (use galvanized)
- Bolts (size and type depends on what they're needed for)
- Wire (14-gauge galvanized is recommended) plus wire cutters, if you use wire on your boxes
- Leatherman® or similar tool, which has many different bits and blades, is lightweight and is easy to carry or wear on a belt
- Replacement boxes and extra pieces
- Felt pen or other marking method for box numbering
- Pocket mirror for examining nests on high posts
- Binoculars
- Disposable hand wipes (to clean up before you eat and after you're done checking boxes)
- Disposable rubber gloves (in case you have to deal with rotting corpses, mice and so on)
- Putty knife or small plastic scraper (to lift up old nests and clean out material in side- or front-opening boxes)
- Stiff-bristled brush (for cleaning out debris)
- Plastic bags (for collecting used nests if applicable and to carry used wipes, rubber gloves and other litter home)
- Cloth or handkerchief to put in nestbox hole (a hastily removed sock will do in a pinch)
- Entrance hole restrictor (to use in the event of premature fledging—see page 39 for details)
- Disinfectant spray, or a bottle of bleach solution (to spray inside boxes that were cleaned out after having had dead birds or a mouse infestation, see page 49 for instructions)
- Half-mask respirator with a HEPA (high efficiency particulate) cartridge (to use if you are concerned about hantavirus, see page 49)
- Small container of cinnamon (for ants)
- Field notebook and pencils or NestWatch app on your phone (see page 26)

bluebird trail tool kits, as do backpacks and fanny packs. Some bluebird trail monitors use fishing vests, which can hold a surprising amount of stuff! A few times out on the trail and you'll know exactly what you need.

Collecting Data

Keeping detailed written records while out monitoring a bluebird trail is very important and can contribute to our understanding of bluebird natural history and population dynamics.

Most trail operators carry notebooks in the field to collect their data. Some organizations provide field forms while others ask for a seasonal summary.

If using their own forms, some bluebird trail monitors start with a clean page on each visit, filling in information about each box as they go along. Others have a small binder or field notebook already numbered, then fill in the information related to the box at each visit. Some start new field notes each year, whereas others use the same field book from year to year. While there is no "right" way to collect field information, it is important to have the previous visits' information with you out in the field and try to at least capture the information listed on page 27 (especially the bolded items).

The Cornell Lab of Ornithology has an app which can be downloaded to your phone and enables data to be collected in real time. Download it from NestWatch (see Side Bar, below) and follow the instructions provided. NestWatch also provides sample paper data sheets that can be downloaded and printed off (see facing page).

Summarizing Data: Some bluebird organizations create and summarize their own annual data which are published in annual summaries, on websites and in newsletters. Contact the bluebird organization nearest you in your province/state (see page 55) to get more information and/or to access their forms.

If you don't belong to a bluebird organization but would still like to contribute your data, it is advisable to submit it to Project NestWatch (Canada) or NestWatch (USA). See Side Bar, below.

NestWatch

NestWatch is a program of the Cornell Lab of Ornithology and accepts data from citizen scientists across the globe: https://nestwatch.org

Note: at the time of writing, Birds Canada collects data through Project NestWatch. www.birdscanada.org/bird-science/project-nestwatch

https://nestwatch.org/wp-content/uploads/2017/11/DataSheet_20171103.pdf

Basic Data to Collect (bolded items are most important)

- **Date of first sighting of the season**
- Date of first egg
- **Number of eggs**
- **Number of young**
- **Number fledged**
- Hatching date
- Fledging date
- **Cause of nest failure**


RON ASP

The Cornell Lab of Ornithology
NestWatch

Nest check data sheet

Use this form to describe your nest site and to record data from each visit. Use a separate form for each nest monitored and each new nesting attempt. See back for explanations of codes and fields. When finished, please enter completed forms online at: **www.nestwatch.org.**

Year _____ **Species** _____

1. NEST SITE LOCATION

Nest site name

_____

Address: Nearest street address ***OR***

_____

_____

Latitude (decimal degrees; ex 47.67932)

N _____

Longitude (decimal degrees; ex -76.45448)

W _____

2. DESCRIPTION (see key on back)

Nest is located (circle one) IN ON UNDER

Nesting substrate_____

Cavity orientation (circle one) N, S, E, W, NE, SE, NW, SW

Cavity opening width _____ ❑ in. or ❑ cm

Predator guard ❑ None or ❑ Type: _____

Habitat within 1 arm length_____

Human modified description_____

Habitat within 1 football field length _____

Human modified description_____

Height above ground _____ ❑ ft. or ❑ m

3. BREEDING DATA If eggs or young are present but not countable, enter "u" for unknown.

	DATE	HOST SPECIES			STATUS & ACTIVITY CODES				COWBIRD ACTIVITY			MORE INFO	
	Month / Day (1-12) /(1-31)	Eggs	Live Young	Dead Young	Nest Status	Adult Status	Young Status	Mgmt. Activity	Eggs	Live Young	Dead Young	Obs. Initials	Notes (or mark X for notes below)
Ex.	05/06	1	0	0	cn	aa	no	no	0	0	0	BB	X
1	/												
2	/												
3	/												
4	/												
5	/												
6	/												
7	/												
8	/												
9	/												
10	/												

4. NESTING ATTEMPT SUMMARY Fill in information for HOST SPECIES TOTALS below after the nesting attempt is complete.

IMPORTANT DATES

First Egg Date	
Hatch Date	
Fledge Date	

HOST SPECIES TOTALS

Visits to nest	Clutch Size	Unhatched Eggs	Live Young	Fledglings

NEST FATE:

NOTES:

Please enter data online at www.NestWatch.org

Counting Considerations

- A nest is counted as a clutch only if at least one egg is laid. If a nest is complete but no eggs are laid, it is not considered a nesting.
- It is sometimes difficult to draw the line between what could be documented as a first clutch vs. a second clutch. (Three scenarios are possible: a pair could be late in 'getting its act together,' the birds could renest after the failure of the first nest, or there could be a second nesting attempt after a successful first fledge.) To try to reconcile this gray area, several trail operators in Alberta and Saskatchewan have agreed on a tentative cutoff date. This date was established after examining several years of data: young hatching on or before June 20 are considered a first clutch; young hatching after that date are considered to be late/renests or second clutches (lumped together as second clutch). Each region should establish what this cutoff date should be, based on regional data. There are insufficient data to establish a cutoff date between second and third clutches.
- You will also have to decide whether you want to track data 'by the box' or 'by the bird.' If, for example, a pair uses Box A for the first clutch, then moves to Box B for its second clutch, the data for Box B would show 'empty' for the first clutch and Box A would show 'empty' for the second (assuming no other species take up occupancy). Banding is the only way to confirm which birds are involved and to avoid the potential problem of counting both nestings as the work of two pairs, not one pair of birds. The fact that birds will move to different boxes for different clutches and that they will move into and out of your trail for one or more nestings/renestings makes it difficult to estimate the number of breeding pairs in an area or along a section of trail. One way to estimate the maximum number of breeding pairs is to count the total number of boxes being used by bluebirds at approximately the same time.

For You

Although there is relatively little risk out on the bluebird trail, take all necessary precautions to ensure your safety and well-being. Use common sense!

- Wear appropriate clothing and footwear and bring rain gear and/or extra clothing if needed
- Always bring a cell phone, water, snacks, insect repellent, a first aid kit, matches and a spare set of keys
- Don't park your car in tall, dry grass because the catalytic converter might ignite the vegetation. If you are checking boxes during extreme drought, bring along a small fire extinguisher.
- Be aware of bulls and cows with new calves while crossing pastures
- In the backcountry, be aware of the potential dangers and be familiar with all appropriate actions to take in the event of a wildlife encounter. If you are going to a remote area, bring an assistant along, bring pepper spray and tell someone about your expected travels. Know how to change a spare tire and ensure the spare is inflated.
- Never reach into a box you haven't looked into first
- Be aware of, and take precautions against, serious health risks such as hantavirus pulmonary syndrome and Lyme disease (see page 49)
- Be aware of any poisonous plants
- Wash your hands after checking boxes
- Read the story on the inside back cover!

Monitoring Nestboxes

Although 'weekly monitoring' has become a mantra of the bluebird movement, it is important to remember that there are millions of natural cavities out there, none of which are ever monitored. However, the act of setting out a nestbox carries with it a responsibility to monitor and maintain it. NABS recommends weekly checks, but this schedule is not feasible for many trail operators who are able to check their trail only on weekends or even less frequently. There are many, many Mountain Bluebird trail operators who monitor their very productive and successful trails every two weeks or so.

Regular box monitoring allows you to collect important information and permits you to troubleshoot quickly and efficiently. Because bluebirds and other songbirds have a very poorly developed sense of smell and they are not able to detect human scent, they will not abandon their nest if you touch the box.


MYRNA PEARMAN

Do not open a nestbox during excessively cold weather or during heavy rains. If the female is frightened off the nest during cold periods, the eggs can become chilled, which may delay or halt embryo development. During excessively hot weather, make sure box checks are kept as brief as possible. Do not open a box after young Mountain Bluebirds reach the age when they may fledge prematurely. To reduce the problem of premature fledging, do not open front- and side-opening boxes after the young are 14 days old and top-opening boxes after they are 16 days old (see Side Bar on page 30).

Checking a Nestbox:

- Approach the box quietly from one side (don't stand in front of the entrance hole)
- Place your hand over the hole (or stuff a cloth in it if you think the box might contain a rodent or stinging insects)
- Open it up and peek inside
- Make a mental note of what is in the box. Be sure to get an accurate count of eggs or nestlings, and note the overall condition of the box contents.
- Secure the nestbox
- Leave quickly and quietly
- Write down your observations in your field notebook

Inspecting a Top-opening Box Containing Older Nestlings

There may be times when it is necessary to check a top-opening box in which Mountain Bluebird young may be older than 16 days (e.g., on remote trails where monitoring is sporadic, if for some reason the box hasn't been monitored for a long period of time, or after a severe storm). Here's how to check without causing premature fledging: walk up to the box quietly, stuff something into the entrance hole to darken the box, then quietly open the roof just enough to allow in adequate light to see the nestlings. As long as the observation is done quickly and quietly, and the nestlings are not handled, they rarely get agitated; they usually just hunker down in the box during the observation. If the young do get agitated, leave the entrance hole plugged for a few minutes before removing it. It is best to avoid checking front- or side-opening boxes containing 14-day or older nestlings, although some monitors report success by slipping a piece of plexiglass up as the panel is opened.

It is important to record all banding returns and recoveries (see footnote on page 4). However, non-banders cannot legally handle a bird, even to read a band number, without the required permits (see the Side Bar on the law on pages 22-23). If you do not have permits, the best way to get the required information is to first observe the birds near the nest site using binoculars. If you observe that one or both adults are banded, call your local bander and ask for help with the next step. If the bander is proficient at banding adult bluebirds, he/she will be familiar with trapping techniques. In order to minimize the risk that a banded female might abandon the nest by being handled, be sure that she is brooding young at the time of capture, or that she has been incubating for at least 12 days. She may desert the nest if disturbed before this critical time. The bander will lift the bird up gently, then record the number and release or replace her. Banders release a bird by letting it fly out of their hand. To return a female to the box, banders either set her back down on the nest, or replace the nestbox lid first and slip her back in the box through the entrance hole. If a male bluebird is known to be banded, there are several different techniques that banders use to trap the male when he enters the box to feed the young (see www.sialis.org). Tree Swallows and other native nestbox users should also be inspected for bands.

Finding a Banded Bird

If you see a banded bird and you do not have a permit to trap it, use binoculars to read the numbers or, better yet, get a local bander to capture the bird. Be sure to carefully write down the band numbers (there will be two lines – four numbers on top and five on the bottom) and then go online to report it. Have the following information ready: band number sequence; other markers (if applicable); species, sex and age of the bird (if known); how the band number was obtained; condition of the bird (alive or dead); date and exact location; any other relevant information; your name, address, phone number and email address.

In Canada:

www.canada.ca/en/environment-climate-change/services/bird-banding/how-to-report.html

In USA:

www.usgs.gov/labs/bird-banding-laboratory/science/report-a-band

Nestbox Monitoring Timetable: The following timetable is a general guideline for nestbox trail monitoring. Exact timing will depend on your region.

Early February (south)/ mid-March (north or at higher elevations)	• Repair or replace boxes as required (and clean out if not done in fall) • Make sure all boxes are mounted securely and ready for occupancy • Reapply exterior numbers if required • Make sure predator guards are in place if applicable • Remove House Sparrow nests; begin trapping adult House Sparrows
February (south)/ March, April (north or at higher elevations)	• Open up all drainage and ventilation holes (if plugged the previous fall for roosting)
February/April through August	• Conduct regular box inspections and collect data • Continue vigilance against House Sparrows • Watch for banded birds • If weeds or other plants grow tall around your bird boxes, mow or remove them (by hand or mechanically; avoid herbicides)
September	• Do final nest inspections • Clean out all nests (or if you want to encourage *Nasonia* wasps, clean out the following spring) • Repair and replace boxes as required • Compile data; prepare and send in your report
September (north)/ October (south)	• Winterize boxes that will be used for roosting • Seal up entrance hole or tip up/remove floor on boxes that might be taken over by mice

Mountain Bluebird Life Cycle

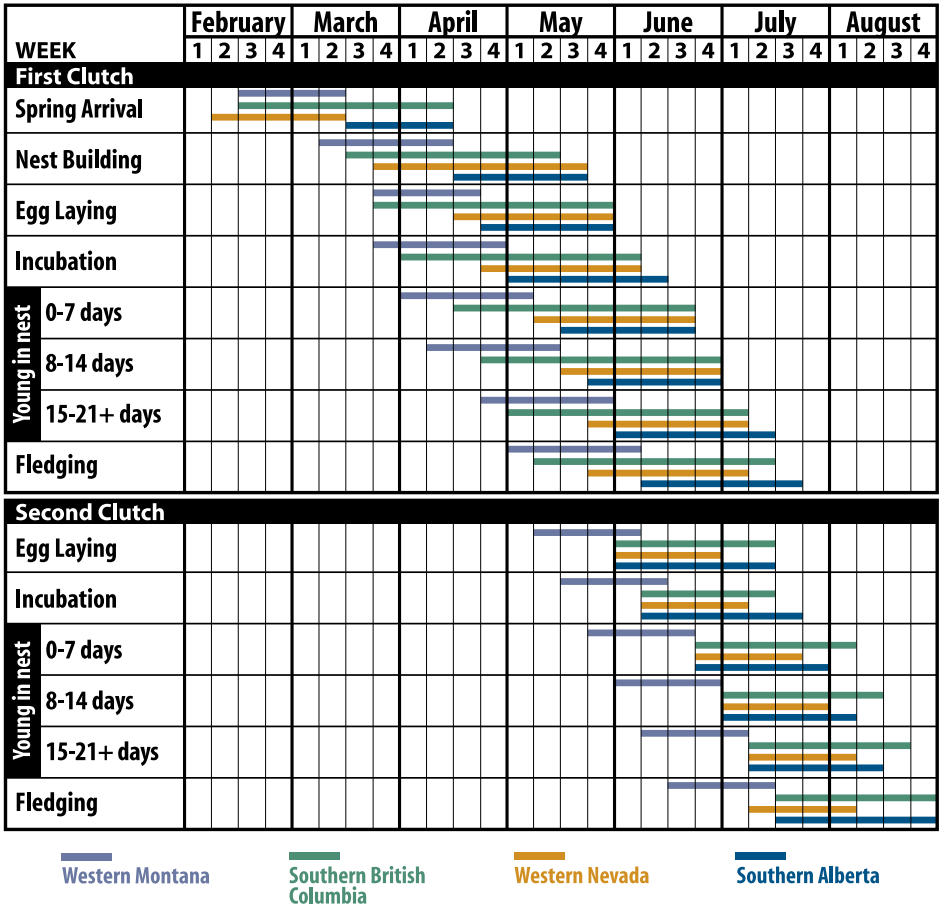

MYRNA PEARMAN

Life Cycle Phases:

Nest building: 1 to 6 days
Egg laying: 5 to 7 days (depending on the number of eggs laid)
Incubation: approximately 12 to 15 days (begins after ultimate or penultimate egg is laid)
Nestling: about 17 to 22 days (6 to 8 days will involve brooding by female)
Fledgling: approximately 21 to 28 days

The following life cycle chart was designed by the late Don Stiles of Calgary, Alberta. It shows the approximate time and duration of the Mountain Bluebird nesting cycle in different regions of the continent.

TABLE 1. Life Cycle Chart



Aging Nestlings

Being able to accurately age Mountain Bluebird nestlings is important for those operators who band, but it is equally important for those who wish to collect accurate data on the nesting cycle. Most ornithological research documents the date on which the first egg is laid. In cases in which this date can't be calculated (e.g., if you checked a box and it contained no eggs, then found that incubation had begun at the next inspection), it is possible to extrapolate the approximate first-egg date by working backwards through accurate aging of nestlings. Even if the date of first egg can't be calculated, the hatching date is equally important. The comparison of hatching dates over time and/or between areas provides important insight into migration patterns, responses to climatic conditions, nesting phenology, etc.

Are Mountain Bluebirds Arriving Earlier These Days?

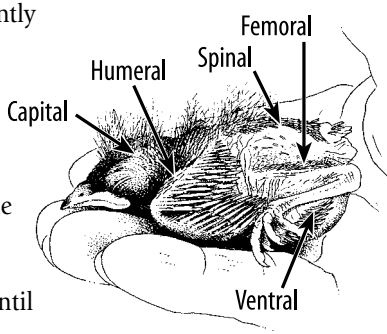
By summarizing 58 years of Mountain Bluebird spring arrival records in Central Alberta—collected first by Winnie Ellis and then by staff at Ellis Bird Farm (now Ellis Nature Centre)—it was determined that Mountain Bluebirds had advanced their first arrival dates by 19 days (0.33 days per year) between 1961 and 2018. Interestingly, while overall March temperatures increased, the temperatures on the date of arrival cooled slightly (5˚ F/2.8 ˚C) over the study period while snow depth on the date of arrival decreased slightly (0.59 in./1.5 cm). Although Mountain Bluebirds have arrived considerably earlier over the past decades, temperatures and snow depth have been highly variable, suggesting that multiple factors, including weather, snow depth and other environmental conditions, exert a strong influence on arrival dates.

https://journal.westernfieldornithologists.org/index.php/westernbirds

Pearman, M., de Groot L., Holroyd G. and Thunberg S. (2020). Earlier spring arrival of the mountain bluebird in Central Alberta, Canada. *Western Birds*. 51:47–58. doi 10.21199/WB51.1.4

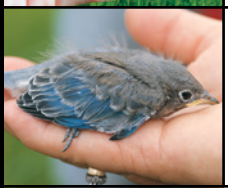
The chart and photographs on pages 34-35 should help you hone your skill at aging Mountain Bluebird nestlings. Some leeway must be allowed, however, because a clutch of bluebirds generally takes 24 hours to hatch, with the first nestlings usually hatching in the early morning. Given the nestlings' rapid growth rate, this delay in hatching can result in a noticeable difference in age between the first and last young hatched. There will also be a significant change during each 24-hour period. It is recommended that you assign a hatching date according to the oldest nestling. Note also that growth and development rates of the young may be influenced by conditions of weather and food availability; a well-fed single nestling, for example, may be significantly more advanced at the same age than those nestlings in a brood of six that are poorly fed because they are being raised by a single parent during inclement weather.

The descriptions accompanying the photos outline some general characteristics of the young as they age. Just as humans aren't considered to be one year old until they reach their first birthday, bluebirds aren't one day old until the first 24-hour period has passed. For this reason, hatching day is considered to be Day 0.



Mountain Bluebird nestling feather tracts

Day 0		Hatching day; pink in colour; eyes sealed; sparse tufts of down; moist at hatching; very tiny.	
Day 1		Similar to hatching date but with longer down tufts ('bad hair day'). Note that down is only on capital, humeral and spinal tracts.	
Day 2		Larger; down tufts still very long ('very bad hair day').	
Day 3		Ear openings evident for the first time; dark pin feather development under skin noticeable.	
Day 4		Body weight starts to increase rapidly; rapid growth of feet allows young bird to begin balancing itself.	
Day 5		**DAY 5 TO 8: Eyes open for the first time.** Feather tracts all dark.	
Day 6		Feathers start to break through femoral, humeral and spinal tracts.	
Day 7		Feathers fully broken through all tracts except wings.	

Day 8		Still a little groggy; eyes focus; primary and secondary wing feathers still enclosed in the sheath.	
Day 9		Becoming more alert; primaries not yet exposed, but other feather growth evident; bare patches of skin still visible.	
Day 10		Primary wing feathers exposed just slightly; ventral and femoral tracts 'fluffy.'	
Day 11		Primary wing feathers exposed a bit more; becoming quite active; spots on breast evident.	
Day 12		Wing feather colour usually pronounced enough to sex them (males are intense blue; females are a more muted blue-gray).	
Day 13		Bright, alert and active; down feathers on crown stick out; no exposed skin except on lower abdomen; primary wing feathers more exposed; wing feather colour can definitely be used to sex; some individuals start to clack their beaks.	
Day 14		Sleeker; coordination increases. Avoid opening front- and side-opening boxes after this date.	
Day 15		Smooth in appearance; a few down feathers poke up here and there.	

Day 16 to Fledging

Increase in weight; sleeks out and become more agile; all down feathers drop out. Avoid opening top-opening boxes after this date unless the protocol for opening a box outlined on page 30 is followed.

DAYS 9 AND 11 PHOTOS BY CARA GRANBERG;
ALL OTHERS BY MYRNA PEARMAN

Female Nestling

Male Nestling

Determining Fledging Success

If boxes are not checked frequently enough to determine the exact numbers of young that have fledged, it is often possible to determine fledging success based on circumstantial evidence. It is likely that fledging has been successful if:

- The nest contains matted and flattened nesting material covered with dirt, fecal material, discarded insect body parts, or fruit/berry stains or seeds. Occasionally, a nest can be completely flattened, without significant fecal material. Some trail operators have observed that there appears to be less fecal material left behind during dry weather than when the weather is wet. Perhaps some parent birds are also more diligent than others at removing fecal material. If you happen upon a box after the first brood has fledged and the parents are beginning round number two, they may have removed some of the fecal material in preparation for building the second nest.

- The inside of the box is splattered with dried fecal material and/or there are fruit/berry stains on the walls.

- There is a substantial amount of chitin at the bottom of the nest under the nesting material. Chitin, in this case, refers to the dandruff-like flakes that accumulate as the sheaths that contain the nestlings' feathers dry up and disintegrate. The more nestlings there are in the box, the deeper the layer of chitin.

Final Notes

Be sure to check through the nesting material when you clean out the box to determine if there are any unhatched eggs, egg shells or decomposed/desiccated bodies that might have been overlooked during the monitoring stage. Parents will sometimes, but not always, haul the bodies of dead nestlings out of the cavity.

After the young have fledged, the boxes can be cleaned out. Some monitors wait until the first killing frost so there are fewer nest parasites, but it is usually more efficient to clean them out right away.

challenges

Dealing with Challenges on the Trail

Problems will inevitably arise on a bluebird trail, no matter how carefully it is tended. It is important to remember that bluebirds are just one link in a complicated and finely tuned food chain. As with all other links in the chain, 'calamities' such as predation and starvation are sometimes inevitable. Although bluebird trail operators try to minimize losses on a bluebird trail through proper box construction and placement, as well as through regular monitoring, it is important to remember that bluebirds are wild birds that are subject to natural processes. A successful bluebird trail is one that contributes to biodiversity, not one that simply mass-produces bluebirds at the expense of all other creatures that might avail themselves of a bluebird box, or that does not contribute to the food chain (i.e., bluebirds, like all songbirds, are eaten by a variety of predators).

Potential Problems

Bluebird Bullying: Although bluebirds have a reputation for being gentle, they—like all wild birds—will do what it takes to raise a family. Bluebirds have been observed driving out other birds, especially chickadees, so that they can have a nestbox. If you encounter this situation, set out a nestbox immediately for the bluebirds, and protect the chickadees by placing a 1 1/8-in. (29-mm) restrictor over the hole of the chickadee box.

Wet Nest: No matter how well a box is constructed, driving rain can sometimes get into it through the entrance hole. Removing a wet nest and replacing it with dry grass or other material will greatly improve the chances of nestling survival. Not surprisingly, nest replacement is the course of action outlined in most bluebird guides and suggested by experienced bluebirders. However, permits are required in order for this procedure to be legally undertaken in Canada. Permits are not required in the U.S. so long as the integrity of the nest is not compromised and no birds are handled in the process (see The Law section on pages 22-23 for more details).

Dead Young and Abandoned Eggs in an Active Nest: Removing rotting or desiccated dead young or unhatched eggs from a nest in which there are live young can be done only if the trail operator is in possession of the appropriate permits. Unhatched eggs may harbour harmful bacteria and viruses that, should the eggs break, might infect the nestlings. Unhatched or abandoned, intact clutches of eggs cannot be collected without permits either (see page 23).

Abandonment: Because only the female has a brood patch, she alone is capable of incubating the eggs. If she is killed or for some other reason permanently leaves the nest during incubation, the male cannot complete this initial phase of the young's life cycle. A female will sometimes abandon a nest if she is disturbed, especially during the first 12 days or so of incubation. Never attempt to foster out the eggs to other nests. Simply clean out the nest for the bluebirds to start over again.

Feeding and caring for the young are duties that are shared by both parents. If the male is killed, the female can successfully feed and fledge a brood (assuming there is an adequate food supply). However, if the female is killed while the young are still being brooded by her, the male is unable to provide the necessary warmth to keep them alive, especially at night. Once the young are about a week old, and if there is adequate food, the male can perform all the required parental duties. For this reason, consider a nest abandoned only if both adults are known to be dead or if the young are extremely weak and cold. If the nest appears to be abandoned, and you don't have time to stay to observe it, simply wedge a grass stem across the entrance hole. Return in an hour or so and check the piece of grass. If it is gone, a parent or parents have entered the box. If not, you can assume that the nest has been abandoned and the young will die without intervention.

Fostering: Once you have determined that a brood of nestlings is going to die without intervention, you need to make some decisions. If you accept that bluebirds are wild birds that would not be saved if they were in a natural cavity, you may opt to let nature take its course and leave the birds alone. If, however, you would like to make an effort to save the birds, fostering is an option that is often successful. Only trail operators who are in possession of the necessary permits are legally entitled to foster young.

If you have the required permits, here's how to foster efficiently: if the young are too weak to lift their heads or open their mouths, they are not likely to survive unless they can be warmed up immediately. If they can open their mouths, they stand a good chance of surviving. To warm them up, hold them next to your bare tummy, sit them on a towel-lined hot water bottle, or put them in a box and place the box near your vehicle's heater (turn it on high until the young are warmed up). Transfer the nestlings as soon as possible to nestboxes containing young of the same age or slightly younger than the foster young. Placing them with younger birds helps to compensate for their disadvantage of being cold and hungry. If possible, try to add one orphan per foster box to a maximum of eight nestlings.

If fostering isn't feasible, make arrangements to deliver the orphans to a wildlife rehab centre (see page 55). Make sure the birds are warmed up before being transferred to a transport container (e.g., a shoebox lined with rags

or an old towel) and that they remain warm during transit. Ask the rehab centre staff for other advice, including whether or not you should administer fluids (e.g., a few drops of water mixed with Gatorade®) or offer food (e.g., mealworms, earthworm pieces, cat food soaked in Gatorade®).

Injured Birds: If you find an injured bluebird (or any other wild bird), it is important to assess the extent and severity of the injuries. If the bird is so badly injured that its chances of returning to—and fully functioning in—the wild are minimal, then why doom it to a life of pain and misery? As humans, we have a natural desire to try to 'save' everything, especially wild creatures. From a wildlife conservation point of view, treating injured wild animals for which a full recovery and return to the wild isn't feasible is a drain on time and resources that could be better spent on other pursuits, like saving habitat. In many cases, the most humane alternative is to euthanize the bird. Since this is a procedure that can be undertaken only under authority of a permit, contact your local wildlife rehab centre or Fish and Wildlife (or equivalent) office for advice. If the injury is slight, however, arrange to get the bird to a rehab centre as quickly as possible. Call ahead for instructions on procedure. In most cases you will be asked to capture the bird, being as gentle as you can, and place it in a suitably sized cardboard box with bedding of some sort (rags or an old towel). You will be asked to keep the bird quiet, dark and warm, and to not make any attempt to feed it. Most injured animals are suffering from shock and are dehydrated. Keep the bird warm and as stress-free as possible. See page 55 for rehab centre contact information.

Premature Fledging: If you happen to open a box and one or more of the young jump out before they are physically ready for life on their own, you have a problem on your hands. Immediately close the opening panel and stuff a cloth (or a hastily removed sock!) in the entrance hole. Retrieve the errant youngsters and gently slip them back into the nest. Generally, the quiet and the darkness will settle them down. If, however, pandemonium breaks loose again when you quietly remove the cloth, you will need to place a hole restrictor over the entrance hole. This restrictor is simply a small block of plywood or other thin wood (approximately 2 x 2 in. [5 cm x 5 cm]) into which has been drilled a 1 1/4-in. (32-mm) hole. Using a screw or a piece of duct tape, secure the restrictor over the hole. The parents can now feed the young, but the young cannot get out. Return after dark and quietly remove the restrictor. If you can't return to remove the restrictor by the time the young would naturally fledge, it is better to leave the young outside than to risk imprisoning them in a nestbox. To minimize the risk of premature fledging, do not open front-/side-opening boxes after young are 14 days old, or top-opening boxes after the young are 16 days old (see pages 15 and 30).

Competitors and Predators

Mountain Bluebirds have many competitors and predators. Predation is to be expected, and although it is sometimes difficult to acknowledge that 'your' bluebirds might become a meal for a hawk, owl, snake or weasel, it is important to avoid branding predators as the bluebirds' enemies and your adversaries. However, it is also important that steps are taken to ensure that the birds nesting in nestboxes are not placed at a greater risk than they would be in an environment where they nest only in natural cavities. For detailed information on local predator issues that might affect your bluebird trail, check out the NABS website or contact a local bluebird organization.

MYRNA PEARMAN

Avian Concerns:

House Sparrows. House Sparrows were introduced into North America in the 1850s. Aggressive nestbox competitors, they will usurp a box being used by native cavity nesters and will often kill the intended occupants by pecking their heads.

To reduce House Sparrow problems, do not place nestboxes in urban areas where there are high populations of House Sparrows, nor near the sparrows' other favourite haunts—farmsteads, feedlots, barns or other outbuildings, or areas where livestock are fed.

MYRNA PEARMAN

House Sparrows typically claim their nesting sites early in the spring, often before the bluebirds arrive on territory. To prevent sparrows from taking up residence in a box, some trail operators turn their boxes into 'non-cavities' until the bluebirds return simply by plugging the entrance hole or by tipping up/removing the floor.

Monitor your boxes regularly and continually remove House Sparrow nests early in the season. A House Sparrow nest is easy to identify, as it is a large, messy, domed structure made out of grass, feathers and sometimes green plant material (see page 54). The nesting material usually fills the entire box. If the sparrow continues to rebuild his nest after the box has been cleaned out, plug the entrance hole until he leaves or set an in-box trap. If another male lays claim to the box, move the box to a more suitable location. Since the male bonds to a nestbox (as opposed to a mate) and it is the male that does the killing, it is important to remove him. If only the female is removed, the male will quickly find a replacement mate.

If you would like to encourage chickadees, wrens or other small cavity nesters in a sparrow-infested yard, set out boxes with 1-in. (25-mm) or 1 1/8-in. (29-mm) entrance holes. Be warned that, although the sparrow cannot enter a hole this small, he may still defend the box against the smaller birds. If you

would like to attract Tree Swallows or Violet-green Swallows, try using a box that has a slot entrance hole measuring 15/16 in. (24 mm) by 2 1/2 in. (63.5 mm). This narrow slot will allow swallows to enter but will almost always exclude the plumper House Sparrows.

Do not relocate trapped sparrows, as this practice just moves the problem to another area. Most wildlife rehabilitation centres will take sparrows to feed their rehabilitating birds of prey.

House Sparrows can be trapped all year round. Detailed information about House Sparrow control, the use of Sparrow Spookers (strips of mylar that are attached above the box – the flapping is tolerated by bluebirds but disliked by sparrows) and plans for single- and multi-bird traps can be found at www.sialis.org/hosp and on the North American Bluebird Society website: www.nabluebirdsociety.org/PDF/House%20Sparrow%20Control_2018.pdf. There are also several Facebook pages dedicated to House Sparrow issues and control.

Birds of Prey. Several species of raptors have been observed preying on adult, fledgling and juvenile bluebirds. Owls may also prey on bluebirds. There is little that can be done to 'protect' bluebirds from these natural and vital predators. If you set boxes out for larger cavity nesters, avoid placing boxes for American Kestrels near your bluebird trail. Birds of prey do not take a significant toll on bluebird populations, but they may decimate local numbers during a season.

Tree and Violet-green Swallows. Tree Swallows and Violet-green Swallows will compete with Mountain Bluebirds for nesting sites. Tree Swallows are the more aggressive of the two species, but individuals of both will 'gang up' to drive a pair of bluebirds from a nestbox. See pages 20-21.

Magpies, Crows and Jays. Some members of the corvid family, including Black-billed Magpies and most species of crows and jays, can be predators of bluebirds. All of these species are native and are protected in the U.S. In Canada, check with your provincial wildlife agency to confirm regulations. In some areas, magpies, crows and jays have learned how to land on a nestbox containing older nestlings. When a young bird comes up begging for food at the entrance hole, the corvid simply pulls it out. Using extremely large roofs, or retrofitting existing roofs with metal flashing (see photograph to the right), will prevent predators from accessing the entrance hole. Removing nesting material to lower the nest farther from the entrance hole, although often recommended, requires a permit in Canada. In areas where magpie numbers

KATHY KOENIG

appear high, traps are sometimes used to reduce the local population. Magpie trap plans can be downloaded from https://open.alberta.ca/dataset/cec58712-5460-4d6c-af6e-ffe81cb78718/resource/49a969ef-1ea8-42b1-9a91-73528d876329/download/2005-685-3.pdf.

In Alberta, Peterson-style boxes, which have slanted fronts and large, oval-shaped entrance holes, seem to be particularly subject to avian predation. The problem arises because Mountain Bluebirds, which are slightly larger than Eastern Bluebirds, build larger and deeper nests inside these boxes, which put the eggs and young very close to the entrance hole. The box design makes it easy for a magpie, crow or jay to stick in its head and pluck out the eggs or young. The box also has large ventilation holes, which could put the nest occupants at risk during cold weather.


MYRNA PEARMAN

Mammalian Concerns:

Domestic Cats are major predators of birds. They are efficient bird killers whether or not they are hungry, whether or not they have a bell on, and whether or not they have been declawed. Cats can climb posts and reach into nestboxes, where they grab both nestlings and incubating or brooding females. They will also snatch adults while they are feeding on the ground, as well as newly fledged young. Do not set up bluebird boxes in areas where cats roam—doing so is likely to condemn the birds to death. If you are not sure whether or not there are cats around, you can take extra precautions by mounting a nestbox at least 8 ft. (2.5 m) high on conduit pipe and attaching a predator guard. See the Side Bar on pages 44-45 and the NABS website (www.nabluebirdsociety.org) for details on predator proofing.

If you have a cat, confine it to your house or keep it in a cat run. Stray and feral cats should be live-trapped and taken immediately to your local humane society (be sure that you treat the cat humanely—it's not the cat's fault that it does what it does!). The American Birding Conservancy has excellent information on how to keep both cats and birds safe: https://abcbirds.org/strategies/solutions-for-indoor-cats.


DICK PETERSON

Raccoons can climb up onto nestboxes at night and devour eggs, young and even adult birds. If you monitor a nest and find nesting material sticking out the entrance hole with eggs and nestlings missing, you can suspect the work of a raccoon. If there are raccoons in your area, you would be wise to consider methods that deter these intelligent and interesting, but efficient and determined predators.


STEVEN SHUMBORSKI


MYRNA PEARMAN

The most raccoon-resistant nestbox is one that is mounted atop a conduit pole that has been further protected as described in the Side Bar on predator proofing (see pages 44-45).

Red (left above) and Flying Squirrels sometimes enlarge nestbox entrances by chewing around them. Unless your trail is totally overrun with squirrels (in which case you've got your boxes in the wrong habitat), leave a few boxes for them—especially flying squirrels. To prevent squirrels from enlarging an entrance hole, use fir plywood (very hard to chew, even for a squirrel) or attach a piece of metal or plastic laminate, into which has been drilled the same-sized hole, over the entrance hole. A box mounted on conduit at least 9 ft. (2.75 m) from the closest squirrel 'launching pad' (e.g., a conifer branch) and protected with a large baffle below the box should be squirrel-proof (although you can never really say 'never' with squirrels).

Weasels are also capable of climbing into nests and eating eggs and young. There have been documented cases of weasels targetting every box along a trail by following the scent left by the monitor. To reduce the problem of weasel predation, avoid placing boxes near rock piles, which are favoured areas, and place the boxes farther out in the open (weasels don't like to travel too far out in the open). If your boxes aren't predator-proofed, you might want to either add predator proofing, or check your boxes less frequently to avoid leaving a scent trail.


JIM LEITCH

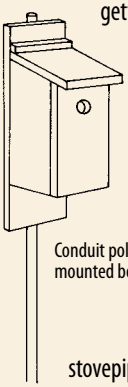
Bears can make short work of a nestbox. If you live in bear country, try a small trail and see if the bears target your boxes. To avoid attracting bears to your trail, don't leave any potential food sources behind and avoid coating conduit poles with grease. If you have bear problems, try putting up bright-coloured flagging tape on your boxes, erecting electrified fencing around certain boxes or even consider skipping a year so that a 'problem' bear will go elsewhere. If bears continue to target your trail, it is best to remove the boxes.

Bats will occasionally roost inside a bluebird box. If you find a bat, leave it be; bats need all the help they can get.

Snakes: Where they occur, snakes may become predators of bluebirds. Again, snakes are an important link in the food chain, and the odd meal of a nest of bluebirds by a snake is proof that the ecosystem is functioning. However, it is not recommended that you set up a snake-snack trail. If snakes are targeting your boxes (i.e., you discover them in your boxes, or you find empty nests that show no other sign of disturbance), there are precautions that can be taken to deter these animals. Snakes can easily climb trees, fence posts and poles (even if the poles are greased). The most effective snake guards include the Kingston baffle (see Side Bar below) or a large flat baffle made from hardware cloth and placed horizontally below the box and extending 2 ft. (0.6 m) on each side of the box. Boxes placed on conduit poles in open areas with short grass are less likely to be targeted

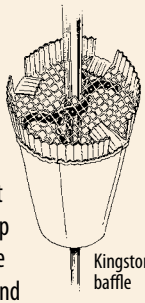
Predator Proofing

Several different techniques for predator proofing nestboxes have been developed and tested by trail operators throughout North America. After decades of experimentation and experience, most bluebird trail operators agree that it is best to keep the predator away from the box in the first place, rather than trying to keep it from getting into the box while perched atop or in front of it. For detailed information on predator guards, consult the NABS web site.



Conduit pole-mounted box

The most predator-resistant box is one that is mounted on a smooth, clean pipe, such as EMT electrical conduit (see page 21). For added protection, rub the pole down with steel wool and apply a layer of carnauba car wax or silicone spray, or apply a coating of high quality axle grease (mix 5 lb. [2.25 kg] of grease to 1 qt. [1 L] of turpentine to keep the grease soft). The grease will eventually harden and become coated with dust (especially in dry areas), so it may have to be reapplied on occasion. Do not use the grease in cattle pastures, because the animals will lick it off.



Kingston baffle

Poles can also be protected by using a baffle made from a section of stovepipe. The Kingston baffle, so-called because it was designed by the late Ron Kingston of Charlottesville, Virginia, has proven effective. The Kingston baffle consists of a 2-ft. (0.6-m) long section of 8-in. (20-cm) stovepipe. The top of the baffle is made by cutting a 9-in. (23-cm) diameter circle out of 1/2-in. (13-mm) hardware cloth. Cut a hole in the middle so it will slip loosely over the mounting pole, and bend the edges so it can be pushed down into the top (crimped end) of the pipe. Cut some tabs in the crimped end and bend them in, over the hardware cloth. Near the top of the mounting pole, bolt two strips of hanger iron or metal strapping and bend them back so they will support the hardware cloth. A few wraps of duct tape below the straps will keep them from slipping. Set the baffle down over the top of the pole until it rests on the straps, up near the bottom of the nestbox. Make sure it wobbles—it is the wobble that foils the predators. Large conical baffles made from old disc blades or sheet metal will also work to deter predators, as may a large piece of hardware cloth (4 x 4 ft. [1.2 m x 1.2 m]) attached directly beneath the box.

by snakes than those placed along fence lines, in wooded areas or in dense grass.

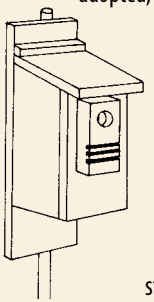
Insects and Spiders: The native insects and spiders that might take up residence in your bluebird box have as much right as bluebirds to exist. If you can leave some boxes for these other species, you are contributing to biodiversity.


JANE BROCKWAY

Wasps, Yellow Jackets and Bumble Bees. Several species of Hymenoptera (an Order of insects with transparent, unadorned wings) will build their nests in or on nestboxes. If you'd rather not share your bluebird trail with wasps and their ilk, rub petroleum jelly or soap on the inside of the box lids at the beginning of the season.

Predator guards can also be placed directly on the box. One technique that has been widely adopted, but has proven to be largely ineffective against most predators, is the placement of a thick block of wood over the entrance hole—the thickness seems to deter the bluebirds from choosing the nestbox while providing little protection from a determined mammalian predator. However, the wooden block will help prevent avian predators from reaching inside a box, and it may reduce the amount of rain that blows directly into the entrance hole (see A). A hardware cloth predator guard, commonly referred to as the 'Noel' guard, appears to reduce predation, although it does not always stop an especially bright or determined raccoon. The most efficient Noel-style guard is one that is constructed from a 3- x 5-in. (7.6-cm x 12.7-cm) block of wood, around which is wrapped an 8-in. (20-cm) piece of hardware cloth. A matching entrance hole is drilled into the block, and the apparatus is screwed onto the front of the box (see B). Be warned that there have been documented cases in which bluebirds have caught their legs in the wire mesh, and there have been other cases in which cattle, horses or elk have rubbed the guard and crushed it closed, trapping the occupants in the nestbox. Using mesh on each side, and a piece of wood for the top and bottom, should reduce the problem of the guard getting crushed (see C). Boxes can be further protected from aerial predators by installing a metal cap on top (see page 41).

A guard can also be constructed from a 6-in. (15-cm) section of 4-in. (10-cm) PVC pipe and a 4-in. (10-cm) PVC cap (see D). Drill a 2-in. (5-cm) hole though the cap, then screw the cap on the front of the box with the hole in the cap matching the entrance hole. Slip the PVC pipe into the cap, and hold it in place with a couple of small screws (screw through the cap collar into the pipe).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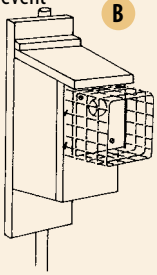
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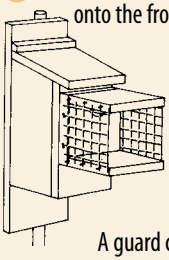
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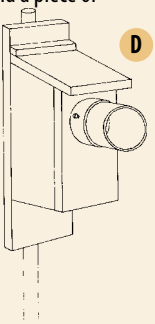

D

Dealing with these insects depends on the species and when during the breeding season they build their nests. If they take over early in the spring, before the birds arrive, consider leaving them (especially bumble bees, which need our help) alone and simply set out another box for the birds. If, however, they (especially the more aggressive wasps, bald-faced hornets etc.) move in after the birds have commenced egg-laying, you should remove the nest. There is no one perfect solution for all situations—use common sense, get expert advice from other trail operators, and take personal safety precautions. Do not spray insecticides in, on or near boxes occupied by birds.


MYRNA PEARMAN

Ants. If a nestbox is located near an anthill, ants may swarm up the post, tree or pole and become predators of the nest occupants. Ants may also move into a box as 'clean-up crews' after the young fledge or if the young birds die. Boxes mounted on trees are especially vulnerable to ant predation. If an ant-filled box is on a tree, move it (the box, not the tree) onto a greased conduit pole. Some trail monitors report that ants can be deterred by sprinkling cinnamon on the ground around the base of the post and (with a permit) sprinkling it on the box floor, beneath the nest.


MYRNA PEARMAN

Blowflies. The bluebird blowfly (*Protocalliphora sialia*) lays its eggs in bluebird nests. The larvae (gray maggots) will move up through the nesting material at night and attach themselves to the nestlings to suck their blood. Blowfly pupae are hard, dark-coloured capsules. According to blowfly researchers, blowflies and bluebirds have coexisted and co-evolved for millennia. Although the larvae can consume large amounts of blood from the nestlings, the birds replace it very quickly. Only when larval populations are quite high (10 or more per nestling) will blood levels be affected. Although young bluebirds in heavily infested nests rarely die, it is not known if their survival rates or breeding success are affected.

Trail operators (with a permit) who encounter a blow-fly infested nest usually undertake the following: pull off all attached larvae; remove the infested nest; scrape all larvae and pupae off the nestbox floor; then replace the old nest with a new one fashioned from dried grass (or even an abandoned bluebird nest that they have collected and kept for this purpose).

There is some debate about the merits of controlling blowfly infestations by leaving the nesting material in the box over the winter. Blowflies are parasitized by a small wasp (*Nasonia* spp.), whose larvae overwinter inside blowfly pupae, then resume development the following spring. Nests that are left inside the box over winter will help increase the population of these wasps and will enable them to start their assault against blowflies early in the spring.

As previously mentioned, bluebirds and blowflies have evolved together, with the blowflies helping to ensure that the fittest individual bluebirds survive. Blowflies, like other parasites, help cull the weak and the young of poor parents, as well as those that nest in marginal areas. By continuously removing the larvae, are trail operators—much like parents who refuse to let their children get dirty, only to find that the youngsters' immune systems are compromised by overly sanitary conditions—actually hindering the long-term vigour and fitness of the bluebirds that use boxes? Perhaps these actions are well-intentioned, but is it possible that this interference might be misguided, indeed harmful?

Fleas, Ticks, Lice, Mites, etc. The tiny creatures you see leaping about in a nestbox are fleas. In the spring and fall, you may see large numbers of them around the outside of the box. Like blowflies, these fleas (*Ceratophyllus* spp.) have evolved with bluebirds, so are not usually a threat to their health. That sudden itch you develop after monitoring your boxes may be the result of hitchhiking fleas. Don't worry—they'll die after a few good scratches and a few hours (our body temperature, compared to that of birds, is frigid; the fleas perish from hypothermia!).

Ticks, lice, mites and sand flies are also sometimes found in boxes, none of which usually pose a problem. In the south, you may find praying mantis egg cases in, on or around your nestboxes. Invasive mantis species are becoming a problem in some areas, so do an online search to determine if the cases you find belong to a native or non-native species. Remove and destroy the egg cases of non-native species.

Some trail operators place diatomaceous earth beneath the nesting material to help control parasites. Avoid using insecticides, even 'natural' ones (see Side Bar opposite).

The Myth of 'Natural' Insecticides

Although they are often recommended, even 'natural' pesticides such as rotenone and pyrethrin are toxic and should be handled accordingly. Just because these substances come from plants or because they degrade quickly doesn't mean they aren't poisonous to all living creatures, including insects, birds and humans.

Rotenone labels, for example, indicate that the chemical is safe after one day. It is, but the day it is applied it is very toxic. Pyrethrin, which comes from the pyrethrum daisy, is not as safe as is widely assumed, either. Synthetic pyrethroid insecticides, such as resemethrin, cypermethrin and permethrin, can leave residues for 10 to 30 days.

TABLE 2. Troubleshooting Chart

PROBLEM	CAUSE	OPTIONS
Box filled with twigs	Northern House Wren	Make sure Mountain Bluebird boxes are at least 150 ft. (45 m) from wooded area
Box filled with messy, domed nest; adults or nestlings dead in nest, heads pecked	House Sparrow	Don't put bluebird boxes where there are House Sparrows; set out boxes with small entrance holes for smaller native species; remove sparrow nest and trap male; if another male claims box, plug hole or move box into more suitable habitat
Feathers and/or white eggs on top of bluebird nest	Tree Swallow, Violet-green Swallow	Reduce box density; erect another box 5-25 ft. (1.5 m-7.5 m) away
Eggs or young gone; nesting material not disturbed	Crows, Jays, Magpie	Put predator guard over entrance hole; retrofit roof (see page 41)
Messy straw nest with large blue eggs	European Starling	Clean out nest; make sure entrance hole/slot is correct size
Large grayish speckled egg in nest	Brown-headed Cowbird	With permit, remove cowbird egg (photograph first and record all details–a rare occurrence!); ensure entrance hole/slot is correct size
Eggs or young gone; nesting material disturbed or pulled out of hole; scratch marks	Raccoon	Mount box on predator-proofed conduit pole
Box filled with shredded bark, leaves, mosses, lichens, etc.; eggs or young gone; nesting material disturbed	Red Squirrel or Flying Squirrel	Build boxes out of fir plywood; leave the squirrels be and set out another box for the bluebirds; move box away from trees; mount on predator-proofed conduit pole; protect entrance hole with metal or plastic laminate protector
Eggs or young gone; nesting material disturbed; feathers on ground; dead bird on doorstep	Domestic Cat	Trap and remove stray and feral cats; keep other cats indoors or in cat run; don't set up a trail where cats roam; mount box at least 8 ft. (2.5 m) high on predator-proofed conduit pole
Eggs broken or holes in eggs but nest intact; small compact dome of grass; moss in nest	Chipmunks	Mount box on predator-proofed conduit pole; leave the chipmunks be and set out another box for bluebirds
Young dead with head missing or otherwise mutilated	Weasels	Move box to more open area, away from rock piles; mount box at least 6 ft. (1.8 m) high on predator-proofed conduit pole
Box contains seeds and seed heads, or nest made of loose plant fibres, or old bluebird/swallow nest	Mice	Leave them be and set out another box for bluebirds, or evict (see Hantavirus Pulmonary Syndrome, page 49) and move box to conduit pole
Eggs or young gone; nesting material not disturbed	Snakes	Place box in open area; mount box on metal pole with Kingston predator guard, or place a 4-ft. (1.2-m) piece of hardware cloth beneath box
Adults reluctant to go in box	Wasps, Yellow Jackets, Bumble Bees	Rub petroleum jelly or soap on the inside of nestbox lid; see page 45
Nest full of ants	Ants	Remove nestbox; sprinkle cinnamon on ground beneath nestbox and on box floor under nest (with permit); mount box on greased or waxed conduit pole
Larvae attached; pupae or larvae under nest	Bluebird Blowfly	With permit, remove larvae from nestlings, clean out old nest and replace nesting material (see pages 46-47)
Nestlings dead or chilled in wet nest	Rain in box; wet adults have entered box; nestlings have been abandoned	Face entrance hole away from prevailing wind; make sure box has proper overhang, upward-tipping vent holes and that all seams are tight; with permits, replace wet nesting material, remove dead young, foster orphans
Adult dead in nest for no apparent reason	Injury from vehicle collision; pesticide poisoning	If box is by a road, place box so entrance hole faces down fence line; never spray or allow spraying around a box; move box if spraying continues; avoid using insecticides in box
Both parents disappear	Parents have abandoned the young or have been killed	If you have permits, foster the nestlings; otherwise, arrange to have them delivered to a rehab centre

Human Health-related Concerns

Lyme Disease and Human Granulocytic Ehrlichiosis: There are two potential diseases transmitted by deer ticks (*Ixodes scapularis* or *I. dammini*)—Lyme disease and human granulocytic ehrlichiosis. If either disease is known to be a problem in your area, be sure to take all necessary precautions: wear light-coloured, long-sleeved shirts and long pants (tuck the pant legs into your socks); apply an insect repellent to your clothes; remove any ticks from your clothes before they reach your skin; search for ticks on your body after you monitor your trail; and correctly remove attached ticks as soon as possible. Contact your local health authority for current concerns and information.

Hantavirus Pulmonary Syndrome: Hantavirus pulmonary syndrome is a very serious, often fatal (about a 50 percent mortality rate) respiratory disease that is caused by a hantavirus carried by rodents and passed on to humans through infected rodent urine, saliva or droppings. Deer Mice and White-footed Mice are the primary carriers of the virus that causes hantavirus pulmonary syndrome. The most common way of becoming infected is by breathing in the virus, which gets in the air as mist from urine and saliva or dust from feces. One can also become infected by touching one's mouth or nose after handling contaminated materials or by being bitten by an infected rodent. Although hantavirus pulmonary syndrome is not a new disease (it has been around for many centuries), bluebird trail operators place themselves at risk when monitoring a box that has, or has had, mice living in it.

The risk of contracting hantavirus pulmonary syndrome on a bluebird trail can be minimized by plugging the nestbox entrance holes in the fall or removing/lifting floors—make sure to number the floors if you are removing them—to prevent mice from taking up occupancy over the winter. If mice occupy a box, one option is to simply leave them alone. Mice form an important prey base for many native predators and, as such, help to fuel a healthy ecosystem. However, if you need to evict the mice, open the box gently, making sure to avoid breathing any dust. Let the mice escape, then soak all the nest contents thoroughly with a disinfectant (e.g., disinfectant spray or a bleach solution [one part household bleach to nine parts water]). Wait 10 to 15 minutes before removing the material. Be sure to stand upwind of the box. If you are especially concerned, wear rubber gloves and a half-mask respirator with a HEPA (high efficiency particulate) cartridge. A hardware store mask, like that used to keep out drywall dust, will not protect you.

For more details on hantavirus pulmonary syndrome see: Canada: www.ccohs.ca/oshanswers/diseases/hantavir.html – US: www.cdc.gov/hantavirus/about/index.html

Avian influenza

NOTE: While avian influenza (bird flu) has affected waterfowl and domestic poultry, there is no evidence that the virus affects passerine birds, including bluebirds. Take the usual common sense safety precautions when monitoring your boxes, especially when cleaning them out (e.g., avoid inhaling any dust, wash your hands after checking boxes/before eating, etc.).

Protecting Other Native Cavity Nesters

Some people are disappointed when their nest occupants are not bluebirds. Like bluebirds, however, these other species (see chart) play an important role in the ecosystem and are protected by law. As native cavity nesters, they face problems similar to those faced by bluebirds. They should be welcomed tenants!

Proper placement is the most effective way to minimize competition between bluebirds and other species. By placing bluebird boxes in ideal bluebird habitat, then placing additional boxes in habitats more suited to other species, these other cavity nesters will be less likely to compete with Mountain Bluebirds for a box. In some areas, pairing or tripling boxes (placing two or three boxes 5 - 25 ft. [1.5 m-7.5 m] apart) will enable bluebirds to inhabit a nestbox beside another species.

Box design will also affect usage. Boxes with entrance holes between 1 in. (25 mm) and 1 1/8 in. (29 mm), for example, can be used by the smaller birds, such as chickadees, titmice and wrens, but the small hole does not permit entry by House Sparrows, Mountain Bluebirds or swallows.

Other Bird Tenants

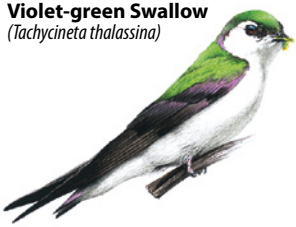
The following is a chart of other native cavity nesters found within the range of the Mountain Bluebird. If you are unsure of which species are found in your area, check with your local bluebird trail operators or naturalist club/Audubon society. In areas where Eastern or Western Bluebirds are not known to nest, or are rarely seen, observation and breeding records should be documented.

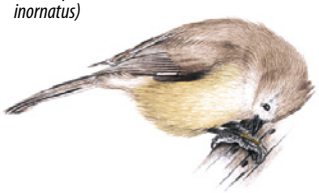
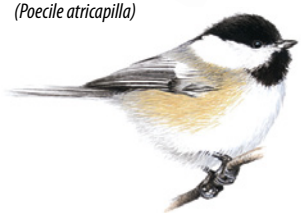
Note: This table excludes woodpeckers, as the majority of species—apart from the Downy Woodpecker (*Picoides pubescens*) and Northern Flicker (*Colaptes auratus*)—nest in cavities they excavate themselves. Nuthatches and chickadees are notable for both excavating their own nesting cavities and occasionally utilizing nest boxes.

MYRNA PEARMAN

TABLE 3. Other Native Cavity Nesters in Mountain Bluebird Range

(Illustrations not to scale)

SPECIES	RANGE	NEST DESCRIPTION	EGG DESCRIPTION	BREEDING HABITAT	NESTBOX HEIGHT
FLYCATCHERS					
Ash-throated Flycatcher *(Myiarchus cinerascens)* 	All western states	Moss lined with rootlets, grass, topped with a layer of coyote, fox or raccoon dung, then topped with a layer of hair and fur	Creamy white to pinkish, streaked, spotted, splashed or blotched with purple or brown	Oak-savannah, open juniper woodlands	4 - 10 ft. (1.2 m–3 m)
Great Crested Flycatcher *(Myiarchus crinitus)* 	Prairie provinces; eastern states	Grass, moss, bark fibres, rootlets, cast-off snake skins, cellophane, onion skins	Yellowish white to pinkish white, blotched or streaked with brown and purple	Open deciduous woods	4 - 10 ft. (1.2 m–3 m)
SWALLOWS					
Violet-green Swallow *(Tachycineta thalassina)* 	Western Alberta, British Columbia, Yukon; Alaska and all western states	Grass base lined with feathers (usually white)	White	Variety of habitats, generally open areas	4 - 5 ft. (1.2 m-1.5 m)
Tree Swallow *(Tachycineta bicolor)*   	Throughout range of Mountain Bluebird	Grass base lined with feathers (usually white)	White	Variety of habitats, generally open areas and wetland areas preferred	4 - 5 ft. (1.2 m-1.5 m)

SPECIES	RANGE	NEST DESCRIPTION	EGG DESCRIPTION	BREEDING HABITAT	NESTBOX HEIGHT
TITMICE AND CHICKADEES					
Oak Titmouse *(Baeolophus inornatus)* 	California, Oregon	Moss base, lined with hair, fur, feathers, wool, plant down	White (sometimes with reddish dots)	In or near oak-dominated woodlands	4 - 10 ft. (1.2 m–3 m)
Juniper Titmouse *(Baeolophus ridgwayi)* 	Arizona, Colorado, Nevada, New Mexico, Utah	Moss base, lined with hair, fur, feathers, wool, plant down	White (sometimes with reddish dots)	Mature pinyon-juniper woodlands, ponderosa pine forests, riparian edges	4 - 10 ft. (1.2 m–3 m)
Black-capped Chickadee *(Poecile atricapilla)*   	Throughout northern range of Mountain Bluebird, south to California and Nevada	Moss base, lined with hair, fur, feathers, wool, plant down	Tiny, reddish brown speckled	Within or at the edge of mixed or poplar forests, suburban areas	4 - 10 ft. (1.2 m–3 m)
Mountain Chickadee *(Poecile gambeli)* 	Western Alberta, British Columbia; mountain regions of western states, east to edge of Great Plains	Moss base, lined with hair, fur, feathers, wool, plant down	Tiny, reddish brown speckled	Mixed woods, open coniferous forests	4 - 10 ft. (1.2 m–3 m)

SPECIES	RANGE	NEST DESCRIPTION	EGG DESCRIPTION	BREEDING HABITAT	NESTBOX HEIGHT
CHICKADEES . . . CONTINUED					
Boreal Chickadee *(Poecile hudsonica)* 	Alberta, British Columbia, Manitoba, Saskatchewan, Yukon; Alaska	Moss base, lined with hair, fur, feathers, wool, plant down	Tiny, reddish brown speckled	Coniferous forests	4 - 10 ft. (1.2 m–3 m)
Chestnut-backed Chickadee *(Poecile rufescens)* 	Extreme southwestern edge of Alberta, western British Columbia; western Alaska, California, Oregon, Washington	Moss base, lined with hair, fur, feathers, wool, plant down	Tiny, reddish brown speckled	Within or at the edge of mixed woods, poplar or spruce woods	4 - 10 ft. (1.2 m–3 m)
NUTHATCHES					
Red-breasted Nuthatch *(Sitta canadensis)*  	Throughout range of Mountain Bluebird except Alaska	Grass, rootlets, moss, plant fibres	White or pinkish	Spruce woodlands	At least 8 ft. (2.5 m)
White-breasted Nuthatch *(Sitta carolinensis)* 	Central Alberta, southern British Columbia; all U.S. states in range of Mountain Bluebird	Bark shreds, twigs, grass, feathers, fur, wool	White or pinkish	Deciduous woodlands, coniferous and oak forests	At least 8 ft. (2.5 m)

SPECIES	RANGE	NEST DESCRIPTION	EGG DESCRIPTION	BREEDING HABITAT	NESTBOX HEIGHT
NUTHATCHES . . . CONTINUED					
Pygmy Nuthatch *(Sitta pygmaea)* 	Southern British Columbia; Arizona, California, Colorado, Idaho, New Mexico, Oregon, Utah, Washington, Wyoming	Bark shreds, plant down, feathers, bits of cocoons	White with a few reddish dots	Ponderosa and Bishop pine forests	At least 8 ft. (2.5 m)
WRENS					
Bewick's Wren *(Thryomanes bewickii)* 	Southwestern British Columbia; Arizona, California, Colorado, Nevada, New Mexico, Oregon, Utah, Washington	Similar to Northern House Wren (see below), with a wider variety of base material, and with moss or dry leaves in cup	White with irregular brown, purple or gray spots	Brushland, stream edges, open woods, hedgerows	4 - 5 ft. (1.2 m– 1.5 m)
Northern House Wren *(Troglodytes aedon)* 	Alberta, British Columbia, Manitoba, Saskatchewan; all U.S. range of Mountain Bluebird except Alaska	Assemblage of sticks, rootlets or thick stems, lined with fur or feathers	Reddish brown, speckled	Brush and shrubland, urban areas	4 - 5 ft. (1.2 m- 1.5 m)

Adapted from D.A. Sibley. 2000. The Sibley guide to birds. National Audubon Society, Alfred A. Knopf, New York, New York.

NON-NATIVE HOUSE SPARROW *(Passer domesticus)*

Nest

ABBEY VAN HEUVEL

Nest with Eggs

MYRNA PEARMAN

Nestlings

MYRNA PEARMAN

For more information about House Sparrows and how to deal with them, see pages 40 -41.

Appendix 1. Resources

Mountain Bluebird Organizations

Bluebird trail monitors in many provinces, states and regions have established their own bluebird groups, some dating back to the 1950s (e.g., the Brandon Junior Birders in Manitoba). Some bluebird groups are informal, whereas others act under the umbrella of local organizations (e.g., Audubon) or are registered as non-profit societies. Since the late 1990s, groups across North America have joined the North American Bluebird Society as affiliates. Check the NABS website (www.nabluebirdsociety.org) for the most updated information.

Current website and email addresses for active bluebird groups, including NABS affiliates located in the range of Mountain Bluebirds, are shown below. Many groups also maintain Facebook and other social media platforms.

Note: Information on the organizations that helped fund the original book are included on page 58-59.

Canada

Alberta

Calgary Area NestBox Monitors Society
www.mountainbluebird.org
canms@shaw.ca

Ellis Nature Centre
(formerly Ellis Bird Farm Ltd.)
https://ellisnaturecentre.ca
info@ellisnaturecentre.ca

Mountain Bluebird Trails Conservation Society
https://bluebirdtrails.org
bluebirdtrailsociety@gmail.com

British Columbia

BC Bluebird Society
www.bcbluebirds.org
bcbluebirdsociety@gmail.com

Manitoba

The Friends of the Bluebirds
https://mbbluebirds.org
fotbmanitoba@gmail.com

Saskatchewan

Anaka Bluebird Trail c/o Yellowhead Nature Society
www.yfbta.com
yellowheadflywaybirding@gmail.com

Mary Houston Bluebird Trail
c/o Saskatoon Nature Society
https://saskatoonnature.org/the-mary-houston-bluebird-trail/
naturekids@saskatoonnature.org
saskatoonnaturekids@gmail.com

United States

California

California Bluebird Recovery Program
www.cbrp.org

Colorado

Colorado Bluebird Project
www.denveraudubon.org/community-science
info@denveraudubon.org

Idaho

Golden Eagle Audubon Society
www.goldeneagleaudubon.org
info@goldeneagleaudubon.org

Montana

Mountain Bluebird Trails Inc.
www.mountainbluebirdtrails.com
bluebird@ronan.net

Sacajawea Audubon Society
Bluebird Trail Project
PO Box 1711
Bozeman, Montana 59771 USA

Nebraska

Bluebirds Across Nebraska
https://bbne.org

Oregon

Mid-Willamette Bird Alliance
https://mwbirdalliance.org
Information@mwbirdalliance.org

Prescott Bluebird Recovery Project
https://prescottbluebird.com
info@prescottbluebird.com

Wyoming

Jackson Hole Wildlife Foundation
https://jhwildlife.org

Wildlife Rehabilitation Centres

Canada (in alphabetical order)

Alberta
https://wildlifecentres.ca/alberta

British Columbia
https://wildlifecentres.ca/british-columbia

Manitoba
https://wildlifecentres.ca/manitoba

Saskatchewan
https://wildlifecentres.ca/saskatchewan

United States

www.wildlife411.org

Animal Help Now
https://ahnow.org

Permit Information

Canada

www.canada.ca/en/environment-climate-change/services/migratory-bird-permits/application-forms.html

https://www.canada.ca/en/environment-climate-change/services/avoiding-harm-migratory-birds/canadian-wildlife-service-contact-information.html

United States

US Fish & Wildlife Service
www.fws.gov/program/migratory-bird-permits

Websites and Social Media

There are many websites and social media platforms related to Mountain Bluebird natural history and conservation, and most bluebird trail organizations host Facebook and other social media accounts.

An online search will reveal other groups, resources and programs related to Mountain Bluebirds.

The following websites provide updated information and links to other resources:

- North American Bluebird Society - www.nabluebirdsociety.org
- Bet Zimmerman Smith - www.sialis.org

Breeding Bird Surveys

Canada: www.birdscanada.org/bird-science/breeding-bird-survey
United States: https://www.usgs.gov/centers/eesc/science/north-american-breeding-bird-survey

www.birdscanada.org/bird-science/project-nestwatch

NestWatch
https://nestwatch.org

eBird:
https://ebird.org

iNaturalist
www.inaturalist.org

Merlin
https://merlin.allaboutbirds.org

Facebook
Do a search for other groups that might interest you:

- NABS: www.facebook.com/NorthAmericanBluebirdSociety
- Bluebird-L: www.facebook.com/groups/111295438893211
- Native Cavity Nesting Birds of North America: www.facebook.com/nativecavitynestingbird

Downloadable Books about Mountain Bluebirds and other Cavity-nesting Birds

Mountain Bluebird Trail Monitoring Guide
www.rdrn.ca

Children's Mountain Bluebird Activity Booklet: www.mountainbluebirdtrails.com/general-9

Get To Know Bluebirds: A Guide for Young Nature Lovers: www.nabluebirdsociety.org/publications/

Nest Box Guide for Waterfowl: Alberta Edition www.ab-conservation.com/downloads/educational_materials/brochures/nest_box_guide_and_instructions.pdf

Cavity-Nesting Birds of North American Forests, Agriculture Handbook 511: www.gutenberg.org/files/49172/49172-h/49172-h.htm

Books/Journals

The most up-to-date information on the life history of Mountain Bluebirds can be accessed from *The Birds of the World* website (subscription required)

Mountain Bluebird Species Account
Johnson, L. S. and R. D. Dawson (2020). Mountain Bluebird (*Sialia currucoides*), version 1.0. In *Birds of the World* (P. G. Rodewald, Editor). Cornell Lab of Ornithology, Ithaca, NY, USA. https://doi.org/10.2173/bow.moublu.01

Check the North American Bluebird Society website www.nabluebirdsociety.org for a current list of books and other resources

Barker, M. and E.R. Wolfson. 2013. *Audubon Birdhouse Book: Building, Placing, and Maintaining Great Homes for Great Birds.* Voyageur Press, McGregor, Minnesota.

Berger, C., K. Kridler and J. Griggs. 2001. *The Bluebird Monitor's Guide*. HarperCollins, New York, New York.

Bluebird. Journal of the North American Bluebird Society (NABS) www.nabluebirdsociety.org

Corkran, C. 2004. *Birds in Nest Boxes*. Naturegraph Publishers, Happy Camp, California.

Davis, W., and P. Roca. 1995. *Bluebirds and their Survival*. University Press of Kentucky, Lexington, Kentucky.

Grooms, S., and D. Peterson. 1991. *Bluebirds!* NorthWord Press Inc., Minocqua, Wisconsin.

Johnson, H. 1997. *Living with Mountain Bluebirds*. Carlisle Printing, Sugarcreek, Ohio.

Laubach, R., and C. Laubach. 1988. *The Backyard Birdhouse Book: Building Nestboxes and Creating Natural Habitats*. Storey Books, Pownal, Vermont.

Pearman, M. 2026. *Mountain Bluebird Trail Monitoring Guide*. Third Edition. Red Deer, River Naturalists, Red Deer, Alberta.

Pearman, M. 2023. *Get to Know Bluebirds: A Guide for Young Nature Lovers*. North American Bluebird Society, Bloomington, Indiana.

Pearman M. and L. de Groot (2021). Mountain Bluebird Migration Tracking, *The Bluebird* 43 (4), 9-13.

Pearman, M. and P. Mousseau. 2008. *Children's Bluebird Activity Book*. Mountain Bluebird Trails, Ronan, Montana.

Pearman, M. 1992. *Nestboxes for Prairie Birds*. Ellis Bird Farm Ltd., Lacombe, Alberta.

Shalaway, S. and W. Thompson. 1995. *A Guide to Bird Homes*. Bird Watcher's Digest Press, Marietta, Ohoio.

Stokes, D.W., and L.Q. Stokes —. 1991. *The Bluebird Book: The Complete Guide to Attracting Bluebirds.* Little, Brown & Co., Boston, Massachusetts.

Toops, C. 1994. *Bluebirds Forever.* Voyageur Press, Stillwater, Minnesota.

Zeleny, L. 1976. *The Bluebird: How You Can Help its Fight for Survival*. Indiana Press, Bloomington, Indiana.

Zickefoose, J. 1993. *Enjoying Bluebirds More.* Bird Watcher's Digest Press, Marietta, Ohio.

If You Find a Banded Bird

Canada
www.canada.ca/en/environment-climate-change/services/bird-banding/how-to-report.html

United States
www.usgs.gov/faqs/i-found-or-killed-a-bird-a-band-or-color-marker-around-its-leg-what-do-i-do?qt-news_science_products=0#qt-news_science_products

Keeping Nestbox Trail Records

Project NestWatch (Canada)
www.birdscanada.org/bird-science/project-nestwatch

NestWatch (United States)
https://nestwatch.org

Additional Nestbox Plans

Mountain Bluebird Trails Conservation Society - https://bluebirdtrails.org

NABS - www.nabluebirdsociety.org/PDF/NABS%20factsheet%20-%20Nestbox%20Recs.pdf

Nestbuilder - www.nestboxbuilder.com

NestWatch - https://nestwatch.org/learn/all-about-birdhouses/right-bird-right-house

Index

Project Partners and Funders:

PUBLISHER

Red Deer River Naturalists (RDRN)

RDRN is the oldest natural history organization in Alberta, tracing its origins to the North-West Entomological Society that was formed in 1899. RDRN is a well-respected organization that speaks on behalf of the environment in Central Alberta and beyond. Members are involved in several local, regional and provincial committees. The club has launched several conservation initiatives and hosts monthly meetings, summer field trips and annual bird counts. This booklet is one of several publishing projects undertaken by RDRN.

Box 785, Red Deer, AB T4N 5H2, Canada
(403) 347-8200
www.rdrn.ca
rdrn.nature@gmail.com

ORIGINAL BOOK PARTNERS/ FUNDERS (IN ALPHABETICAL ORDER)

British Columbia Bluebird Society (BCBS)

Formerly the Southern Interior Bluebird Trail Society, BCBS was founded by Vern Johnson, who started a small bluebird trail in the Oliver area in 1989. He developed the 'Johnson Slot Box,' which is a design widely used by BC bluebird monitors. The group changed its name in 2021 to encompass all provincial bluebird groups.

Box 473, Vernon, BC V1T 6M4, Canada
www.bcbluebirds.org
bcbluebirdsociety@gmail.com

Community Foundation of Central Alberta *(formerly Red Deer and District Community Foundation [RDDCF])*

The CFCAB was established as the RDDCF in 1989 through an anonymous gift that was later revealed to have been made by Charlie and Winnie Ellis. The funds came from the sale of their land to Union Carbide Canada Ltd., which ultimately became Ellis Bird Farm Ltd. Since that time, the Foundation has grown significantly; through partnerships with donors and community organizations, the Foundation provides grants that strengthen programs, services and environmental initiatives across Central Alberta. The original *Mountain Bluebird Trails Monitoring Guide* was supported through the *Conservation of Bluebirds, Swallows and Other Cavity-Nesting Birds Fund*.

Suite 401 Parkland Square, 4901 48th Street, Red Deer, AB T4N 6M4, Canada
https://cfcab.ca
(403) 341.6911

Erv Davis

Erv Davis was a keen bluebirder, President of Mountain Bluebird Trails and bird bander who lived in Charlo, Montana. After retiring as an educator and coach, he became inspired by Art Aylesworth to get involved with bluebirds. He eventually oversaw a bluebird trail of almost 450 boxes, was the first Montana trail monitor to get a banding licence, banded thousands of bluebirds, and invented a remote in-box trap for banding adult bluebirds. He passed away in 2015. This image is of Erv when he visited Ellis Bird Farm to help review the original manuscript for this book. At the time, we had two orphan bluebirds, Bruce and Bob. As soon as Erv arrived, Bruce flew over and landed on Erv's hat. The bird remained beside Erv for the entire afternoon.

Ellis Nature Centre *(formerly Ellis Bird Farm Ltd.)*

Ellis Nature Centre (ENC) was founded as Ellis Bird Farm Ltd. in 1982 to carry on the work of pioneer Alberta bluebird conservationists, Charlie and Winnie Ellis of Lacombe, Alberta. Supported by MEGlobal Canda and managed by a volunteer Board of Directors, Ellis Nature Centre is both a place (part of the original Ellis farm), as well as a non-profit company dedicated to environmental education and wildlife conservation. ENC conducts research on Mountain Bluebirds, Tree Swallows and Purple Martins and manages over 480 a. (195 ha) of agricultural land. The Visitor Centre, original farmhouse, demonstration gardens and wetlands are set aside for wildlife and public enjoyment.

39502 Range Rd 260, Lacombe County, AB T4L 1W7, Canada
(403) 885-4477
https://ellisnaturecentre.ca
info@ellisnaturecentre.ca

Mountain Bluebird Trails Conservation Society (MBTCS)

MBTCS continues the nestbox trail legacy started in 1974 by the late Duncan Mackintosh of Lethbridge. After Montana bluebirders joined the effort in 1980, the cross border partnership separated in 1994, with the Alberta organization becoming Mountain Bluebird Trails Conservation Society in 1995. Today, MBTCS monitors approximately 2,700 nest boxes and a volunteer network of about 100 trail monitors across southwestern Alberta, from Medicine Hat to the Crowsnest Pass. The Society trains and supports trail monitors, renovates and installs nest boxes, collects annual nesting data, and shares best practices and research to conserve Mountain Bluebirds and other native cavity nesting birds.

Box 71, Lethbridge, AB T1J 3Y3, Canada
https://bluebirdtrails.org
bluebirdtrailssociety@gmail.com

Mountain Bluebird Trails Inc. (MBT Inc. [Montana])

Mountain Bluebird conservation efforts were started in 1974 by the late Art Aylesworth of Ronan, Montana. In 1980, Art and Duncan Mackintosh from Alberta (see above) joined forces to form a loose network of bluebirders in the region under the umbrella of "Mountain Bluebird Trails (MBT)". When the two groups split in 1994, Art continued at the helm of the MBT Inc. (Montana), which was officially incorporated in 1997. Art, who passed away in 1999, also oversaw the establishment of the Montana Centennial Trail in 1989, a bluebird trail that ran from one end of Montana to the other along Highway 200. Since 1974, MBT has built and distributed thousands of bluebird nestboxes and they continue their efforts to help new and experienced trail monitors through presentations and workshops.

Box 794, Ronan, MT 59864, U.S.A.
Phone: (406) 676-0300
www.mountainbluebirdtrails.com
bluebird@ronan.net

North American Bluebird Society (NABS)

NABS is a nonprofit conservation, education and research organization that promotes the recovery of bluebirds and other native, cavity-nesting bird species. It also acts as an umbrella organization, supporting and assisting regional, provincial and state bluebird groups. NABS publishes a quarterly journal (*Bluebird*), maintains an extensive educational website, offers grants to fund scientific research, and co-hosts occasional conferences throughout North America.

www.nabluebirdsociety.org
info@nabluebirdsociety.org

ORIGINAL ACKNOWLEDGEMENTS, CONTINUED FROM INSIDE FRONT COVER

project, but he also made a special trip up to the Ellis Bird Farm and spent many hours with me reviewing the material. I am also grateful to the following bluebirders for so freely sharing their knowledge and experiences: Ron Bittner (Saskatchewan), Charlotte Corkran (Oregon), Elsie Elzroth (Oregon), Bob Ewart (Saskatchewan), Cam and Joy Finlay (British Columbia), Donna Hagerman (Nevada), Ardell and Ray Harris (Alberta), Dr. Stuart and Mary Houston (Saskatchewan), John Ivanko and Lisa Kivirist (Wisconsin), Marijke and Wim Jalink (Alberta), Lois Johnson (Alberta), Keith Kridler (Texas), Dr. Bob Lane (Alberta), Marion and Sherry Linn (British Columbia), George Loades (Alberta), Linda Morgan (Alberta), Del and Debra McKinnon (Alberta), Bob Niebuhr (Montana), Jack Park (Alberta), David and Kathy Richmond (Idaho), Lorne Scott (Saskatchewan), Dean Sheldon (Ohio), Ann and Roger Smith (Manitoba), Don Stiles (Alberta), Gwen Tietz (Alberta), Tom Webb (Alberta), Ann Wick (Wisconsin) and Don Yoder (California). A special thanks goes to Don Stiles for sharing band recovery information and for producing the life cycle chart, and to Erv Davis, Donna Hagerman and Sherry Linn for providing life cycle information for their areas. Sincere thanks go to Noreen Damude and Melanie Pavlas (Texas), Elsie Eltzroth (Oregon), Hatch Graham (California), Bryan Shantz (Alberta) and Julie Zickefoose (Ohio), who wrote booklets similar to this one, and to Ruth Staal (Garden Centre Manager, Alberta), for providing information on insecticides. I appreciate the input of the following technical reviewers: Brenda Dale, Songbird Specialist; Hélène Lévesque, Migratory Bird Regulations Specialist; Bev McBride, Bird Banding Program Coordinator; and Wayne Spencer, Wildlife Enforcement Coordinator, all with the Canadian Wildlife Service, Environment Canada, as well as Stan Markham, District Conservation Officer, and Ron Bjorge, Habitat Biologist, both with Alberta Sustainable Resource Development. Input on regulations in the United States for the first edition was provided by the U.S. Fish and Wildlife Service. For the reprint edition, information on regulations and permit requirements was provided by the Wildlife Enforcement Division, Enforcement Branch of Environment Canada and the Division of Migratory Bird Management, U.S. Fish and Wildlife Service. Finally, I am grateful for the ongoing encouragement and support offered by NABS president, Doug LeVasseur, and RDDCF Executive Director, Janice Wing.

Many thanks to RDRN for overseeing this project, with a special thank-you to RDRN members, Judy Boyd, Margaret Coutts, Eileen Ford, and Bill and Liz Heinsen for their assistance and patience. Thanks also to Eldon Neufeld, Dr. Bob Lane and the other members of the Ellis Bird Farm Board of Directors for their support. Edrea Daniel spent many long hours editing the manuscript, and her meticulous editorship was greatly appreciated. I thank the incredibly talented Red Deer, Alberta, artist, Gary Ross, for the fabulous illustrations, and I owe the beauty of these pages to Judy Fushtey, Broken Arrow Solutions Inc., St. Albert, Alberta. My thanks to Cara Granberg, Ray Harris, Fred Lahrman, John Lane (deceased), Dick Peterson (deceased), Marie Pijeau, Carolyn Sandstrom, Lorne Scott and Linda Violett for generously donating the use of their photos.

MAP CITATION FROM PAGE 4

Mountain Bluebird Range and Band Recovery Map

Based on D.A. Sibley. 2000. *The Sibley guide to birds*. Alfred A. Knopf, New York, New York; H.W. Power and M.P. Lombardo. 1996. Mountain Bluebird (*Sialia currucoides*). In: The Birds of North America. No. 222. A. Poole and F. Gill, eds. The Academy of Natural Sciences, Philadelphia, Pennsylvania, and the American Ornithologists' Union, Washington, D.C.; and D.J. Stiles. 1997. Recoveries of Mountain Bluebirds south of 49º latitude, and a recent Tree Swallow. Blue Jay (55)1:48-52.

SOME GOOD ADVICE

From the late Rod Spencer of Montana.

DO NOT:

1. Borrow your son's new four-wheel drive pickup in February, when the weather is about to change;
2. Go to a remote logging road high in the mountains;
3. Accidentally lock the doors, with your cell phone on the front seat beside the keys;
4. Forget where your son hides his spare set of keys;
5. Panic as you watch the storm clouds roll in;
6. Break a shatterproof window and watch glass spray all over the cab;
7. Endure a cold ride home; and
8. Spend a lot of time cleaning up glass and a lot of money replacing the window.

In 2002, Ellis Bird Farm (now Ellis Nature Centre) biologist, Myrna Pearman, teamed up with Mountain Bluebird enthusiasts from across North America to publish a first-ever trail monitoring guide. The book was reprinted in 2005.

Mountain Bluebird

TRAIL MONITORING GUIDE

THIRD EDITION

This **Third Edition**, with a fresh new look and full of new and updated information as well as the tried-and-true techniques, makes the perfect resource for anyone interested in Mountain Bluebirds. Its small size makes it easy to carry out in the field.

This book:

- Summarizes the interesting and unique natural history of *Sialia currucoides*
- Provides step-by-step instructions on how to establish and maintain a successful Mountain Bluebird trail
- Includes nestbox designs that are suited for Mountain Bluebirds and other small native cavity nesters
- Describes how to accurately age nestling Mountain Bluebirds and collect pertinent nestbox trail data
- Offers advice on how to deal with challenges and problems that might arise on a bluebird trail
- Lists relevant bluebird resources as well as contact information for Mountain Bluebird groups in both Canada and the United States

Whether you're a veteran trail operator or are thinking about putting out your first bluebird box, this booklet will be a welcome reference guide and trail companion.

Myrna Pearman started her own small bluebird trail on her family's farm near Rimbey, Alberta while still a teenager. She led Ellis Bird Farm as the Biologist and Site Services Manager from 1987 to 2020. She now shares her bluebird trail as a Nanna and is living her dream as a nature photographer, nature writer and backroads rambler.

ALL PROCEEDS FROM THE SALE OF THIS BOOK WILL BE USED BY THE RED DEER RIVER NATURALISTS TO SUPPORT NATURE RESEARCH, CONSERVATION AND EDUCATION.