
Mountain Bluebird
TRAIL MONITORING GUIDE
MYRNA PEARMAN

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TRAIL MONITORING GUIDE

Myrna Pearman

ILLUSTRATED BY GARY ROSS

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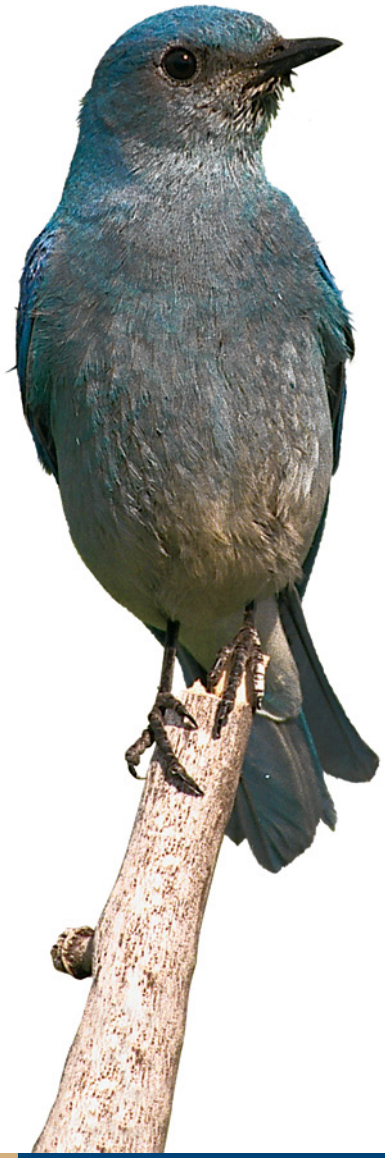
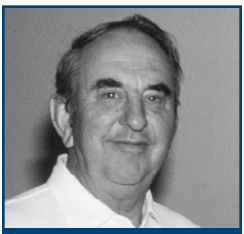
to the memory of . . .





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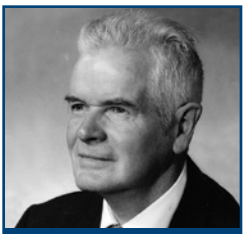

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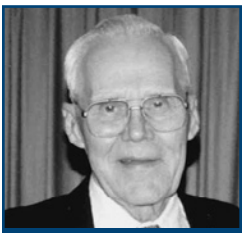

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Introduction

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 and establishing bluebird trails, and also encourage current trail monitors to communicate with each other so that Mountain Bluebird trail data can be compiled from across this bird's range. 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.

There is so much about the life cycle and natural history of the Mountain Bluebird that is still unknown: Where do non-resident Mountain Bluebirds go for the period of time between fledging and when the birds regroup prior to migration? What are the dynamics of courtship and nest site selection? Do clutch sizes vary geographically, with latitude or altitude, over the course of the breeding season, according to box floor size and/or according to the

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age of the female? 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? Have Mountain Bluebird reproductive cycles been influenced by global warming—to what extent might the species' range be expanding or contracting; are the birds arriving earlier, laying larger or smaller clutches, having more or fewer broods? Does the Mountain Bluebird prefer certain box designs and shun others? The list is endless! Bluebird trail monitors can contribute significantly, through careful observation and data collection, to our understanding of the ways of the Mountain Bluebird.

Please use this booklet as a guide, not as a set of commandments; experienced bluebirders acknowledge that what works well in one region or under one set of circumstances might not work as well elsewhere. Differences may be significant, even within the same region, province or state. Experiment and conduct your own research—adopt what works best for the bluebirds on your trail.

This booklet will be updated from time to time. If you have advice to give, experiences or data to share, points to contest or have invented a better bluebird box, please tell us! Up-dated information will be added to each revision. It may also be posted on the Ellis Bird Farm web site. To contact the author, see the inside front cover.

Note: This booklet does not cover topics or issues related to banding bluebirds; rather, it is intended to be a general guide for trail monitors who do not band (however, we hope banders will find it useful too!)

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Please note that imperial measurements are listed first, followed by metric measurements in parentheses. We chose this approach for two reasons: Americans do not use metric measurements, and in Canada, most building materials are still measured in, and most carpenters still understand and use, imperial measurements.

bluebird
The Mountain Bluebird


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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 through 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, 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.

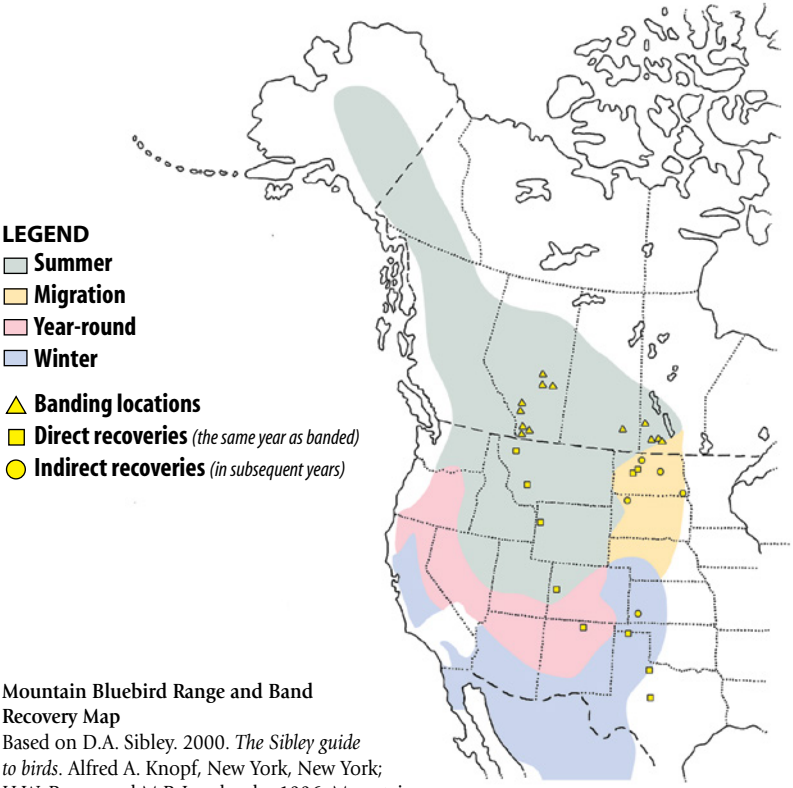

JOHN LANE

Mountain Bluebird and Eastern Bluebird hybrid

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, North Dakota, Oregon, South Dakota, Texas, Utah, Washington and Wyoming. 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 Mountain Bluebird may overwinter as far south as central Mexico. The range map on the following page shows the approximate summer, migration, year-round and winter range

of the Mountain Bluebird. 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. If you have a more accurate range map for the Mountain Bluebird in your province or state than what is shown here, please contact the author (see the inside front cover).



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 49° latitude, and a recent Tree Swallow. Blue Jay (55)1:48-52.

Although tens of thousands of Mountain Bluebirds have been banded over the past decades, fewer than 20 long-distance recoveries[1] have been documented since 1939. These recoveries indicate that the Mountain Bluebirds which breed in the Canadian prairie provinces migrate almost straight south, through the Great Plains, to their wintering grounds. Birds banded in Alberta, Saskatchewan and Manitoba have been recovered in

1. 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.

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 ground recoveries have been made in New Mexico and Texas. Band recoveries documented to date are shown on the range map. For more information on banding recoveries, check out the Bird Banding Laboratory's site at www.pwrc.usgs.gov/bbl/ or the Canadian Atlas of Bird Banding at www.cws-scf.ec.gc.ca/publications/spec/atlas_e.cfm.

Mountain Bluebird Female

Mountain Bluebird Male

Eastern Bluebird Female

Eastern Bluebird Male

Western Bluebird Female

Western Bluebird Male

Identification

The Mountain Bluebird is easily distinguished from the other two species because it lacks any distinct red colouration. 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.

LORNE SCOTT

Partial albino Mountain Bluebird

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

An unusual home!

Bluebird conservation efforts have been enormously popular over the past 20 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 habitat. Because of the ease with which the Mountain Bluebird and many other native cavity nesters can be attracted to nestboxes, and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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.

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. House Sparrows and European Starlings, 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. According to Breeding Bird Surveys, the current overall Mountain Bluebird population appears to be stable.

Food and Water


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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.).


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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


LORNE SCOTT

Where it is non-resident, the Mountain Bluebird returns to its breeding grounds early in the spring, so early, in fact, that it is 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 T-shirt!). 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.


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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.

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 come quickly to the defence of 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 footnote on 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 Indian Head area, 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.

Mountain Bluebird banders have observed that, even if all nestlings and breeding females are banded during one season, most of the females using the boxes the following year are unbanded (usually in the order of 70 to 75 percent). This low return rate suggests that mortality and dispersion are also factors that have an impact on adult populations and that birds are continually recruited into the nestbox trail population from elsewhere.

Ellis Bird Farm data indicate that the most common age of returning birds is two, with fewer three- and four-year-olds. The number of birds returning that are five years or older is very small, although Mountain Bluebirds have lived up to nine years in captivity. Ellis Bird Farm has recorded an eight-year-old male and a seven-year-old female.

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.

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 she is interested in the nest site. Once she has made her final selection, she starts nest-building activities.


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A typical early spring prairie scene

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!


LORNE SCOTT

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 the first week of May. It is interesting to note some earliest date-of-first-egg records for different regions (listed chronologically): western Nevada (Reno)—March 27; Oregon (northeast)—April 4; British Columbia (southern Interior)—April 7; central Alberta (Lacombe)—April 23; southeastern Saskatchewan (Qu'appelle Valley)—April 25; southern Alberta (Calgary)—April 25; central Idaho (Clayton)—April 27; southeastern Saskatchewan (Indian Head)—April 27; southwestern Alberta (Porcupine Hills)—April 28; southeastern Saskatchewan (Abernethy)—April 29; and east central Alberta (Viking)—April 30.

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. 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. Recent reports of triple broods as far north as eastern Alberta are thought by some to indicate global climate change.


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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. He may also enter the nest and sit on the eggs to protect them in her absence. 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.


LORNE SCOTT

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 weather conditions. Brooding periods are longer and more frequent during inclement weather, especially at night. A male is occasionally found in boxes containing very young nestlings. He is unable to brood the young, but he does enter the nest to feed them, and may guard and protect them while the female is out of the nest.


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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. 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. If you have been able to collect sufficient data on exact nestling periods in your area, please contact the author (see inside front cover).

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[2]) 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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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. Even after attaining their independence, juveniles remain in a group with their parents throughout the summer and fall.

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.

One of the great Mountain Bluebird mysteries is the birds' apparent disappearance after the last brood of young has fledged. It seems that the entire family group (including all offspring) moves away from the breeding area for a short period of time, joining other juveniles and adults in postbreeding flocks. It is not clear where these postbreeding flocks go, or why, but some bluebird trail operators suggest that the birds may disperse to locate new feeding grounds. In mountainous regions, they may move up to higher elevations during this period. In areas where they migrate, the birds reappear in fall migratory flocks during the late summer and early fall. These flocks can consist of 100 birds or more but usually number about 20. Both adult and juvenile birds have been reported inspecting nest sites, a behaviour called 'prospecting,' during the fall migration period. Fall departure dates from the breeding grounds range from September in the Yukon to as late as November in Wyoming.

LORNE SCOTT

A postbreeding flock of Mountain Bluebirds in South Dakota

[2]Except in those cases in which conversions from imperial measurements to metric measurements must be exact (e.g., nestbox entrance hole sizes), they may be approximate.

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:

- 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 (see www.forestewardship.org). Plastic jugs and milk cartons provide little insulation and should never be used. Metal is a less desirable material than wood, although aluminum buried cable markers, when retrofitted to become nestboxes, have been used with success in Alberta. 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.

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Twine boxes on binders were once favoured bluebird nesting sites

- 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.

- 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 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.

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).

Nestbox Plans

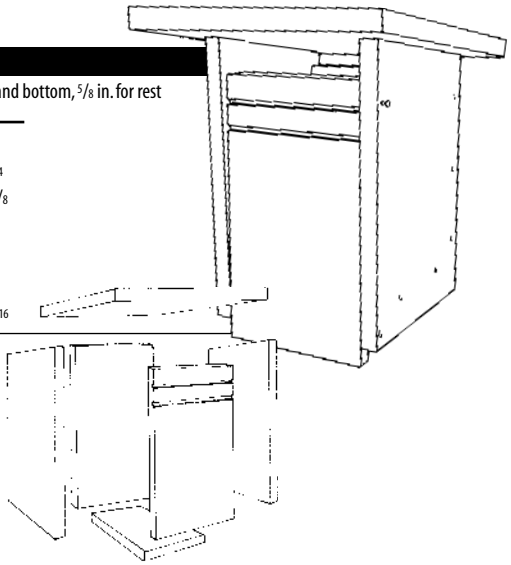
The following box designs have been extensively field-tested and are ideal for Mountain Bluebirds. All measurements are in inches. Check the North American Bluebird Society (NABS) web site for additional box styles.

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

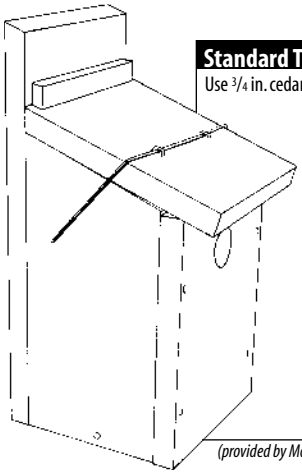
(provided by Southern Interior Bluebird Trail Society, British Columbia)



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.

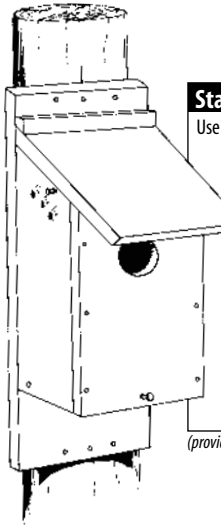


Standard Top-opening Box (Montana)

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)

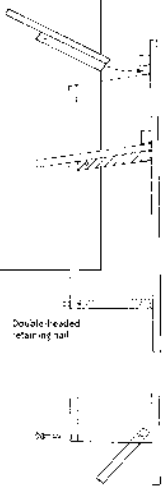


Standard Top-opening Box (Alberta)

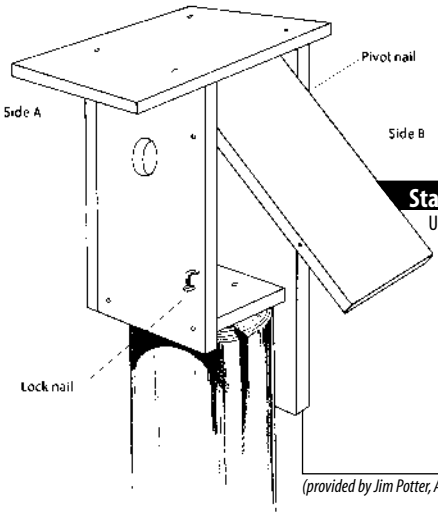
Use 3/4 in. plywood

	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.

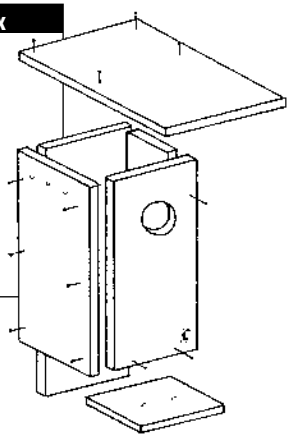


Standard Side-opening Box

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)



North American Bluebird Society (NABS) Bluebird Nestbox Approval Process

Recognizing the need for clear standards related to bluebird nestbox design, as well as the need for an educational program to assist bluebirders, NABS has established a bluebird nestbox approval process. Manufacturers, distributors and retailers who would like to have their boxes approved must submit a sample box to NABS for examination. If the box meets NABS criteria, approval is provided by way of a small label and a confirmation letter from NABS. There is no cost for this service, and 'NABS Approved' labels can be purchased at a nominal charge. This increasingly popular partnership is of benefit to all—the bluebirds get better homes; the manufacturers, distributors and retailers of nestboxes can be confident that they are selling good products; and NABS is able to expand its conservation efforts. NABS recommends that you purchase only NABS-approved bluebird nestboxes. If you have designed your own box and would like to have it officially approved by NABS, send a sample to Steve Eno, 2500 West James Drive, Raymond, NE 68428, U.S.A.

Mountain Bluebird Trails

Breeding Habitat

The key to a successful Mountain Bluebird trail is the placement of properly constructed nestboxes in suitable habitat. If you plan to place boxes on property that does not belong to you, be sure to explain your intentions to the landowner(s) or other authority and obtain permission first.

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 and barren or short-cut/sparsely grassed area with a few trees nearby. Make sure the area is not sprayed with pesticides or herbicides. Grazed cattle or horse pastures, cemeteries, acreages, abandoned orchards, hike-and-bike trails, prairie coulees, lightly travelled roadsides, abandoned railroad rights-of-way, golf courses, open areas in parks, the edges of meadows, clear cuts adjacent to or within forested areas that have been recently burned, 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 bluebirds can search for food and guard their nests. A nearby tree provides young bluebirds with a place to fly to when they first leave the nest, as well as shelter from the elements and predators.

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Ideal Mountain Bluebird habitat in Montana

Trail operators in Montana have found that an ideal location for Mountain Bluebird boxes is on fence posts located under power lines. Other operators feel that the birds nesting in boxes thus placed are subject to increased predation by hawks and other avian predators (see further comments on page 41). Boxes mounted along roads should not face a busy road. If the entrance hole faces down the fence line, the birds (especially the fledglings) are more likely to fly along the ditch than into the path of oncoming traffic.

Poor bluebird habitat includes areas that they naturally shun (i.e., city centres, dense woods or intensively farmed regions where there is little natural habitat), areas where they are in competition with House Wrens or House Sparrows, or locations where the boxes are at greater risk of vandalism.

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

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

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


MARIE PLIEAU

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 (in fact, some research indicates that the birds are more likely to use a box containing an old nest), old nesting material 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 of 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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Deer Mice like bluebird boxes

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. Around Abernethy, Saskatchewan, operators have found that

pairing a Bittner Box (see illustration on page 43) with a standard box at a distance of 15 - 30 ft. (4.5 m-9 m), then repeating the pairing at intervals of about 250 - 500 yd. (230 m-460 m), has been extremely successful. 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. 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.


Conduit mounted on rebar


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 predators are a problem). A loose wrap of barbed wire around the two-by-four or conduit discourages rubbing by livestock. In areas

The Law

Authorities in both Canada and the United States have been contacted for clarification on the laws and regulations regarding activities associated with maintaining a bluebird trail. The following summary has been 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) 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

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

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. Migratory Bird Permit Office contact information is listed in Appendix 1. 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, if 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 53.

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. Check the Canadian Wildlife Service at www.cws-scf.ec.gc.ca or the United States Fish and Wildlife Service at www.fws.gov for a list of bird species that are protected in each country and for copies of relevant legislation.

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 or providers 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.

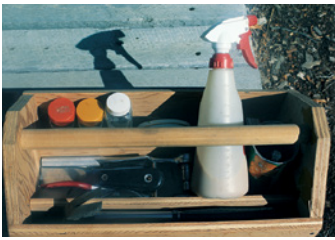
To spare the birds the intensity of the hot afternoon sun, mount the boxes on the east side of trees, large poles or posts. Boxes placed in full sun without adequate ventilation can be about 17˚F (9˚C) warmer than ambient air temperature. Bluebird eggs and young will perish at temperatures of about 107˚F (42˚C). If possible, face the entrance hole away from the prevailing winds, although extreme weather can come in from any direction. A recent study of Eastern Bluebird nesting success by the Cornell Lab of Ornithology concluded that, in northern latitudes, the percentage of eggs that produce fledglings is higher in boxes that face in an easterly direction. It is likely that the same is true for Mountain Bluebirds.


CAROLYN SANDSTROM

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., small section of discarded venetian blinds) 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. GPS locators, which are readily available, relatively inexpensive and very easy to use, can give you accurate latitude and longitude readings for each of your boxes.

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 screwdriver/moderately powered 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

Tools and Supply List

- Screwdriver and/or cordless drill (keyless chuck drill is ideal); 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 also 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)
- Duct tape (wrap some around your hammer or scraper handle)
- 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)
- Pencils and field notebook (waterproof if it might get wet). See Side Bar on keeping notes.

OPTIONAL: some NABS brochures (contact NABS for a supply), brochures from your local bluebird organization and extra copies of this booklet.

your arsenal is likely to be. Fishing tackle and tool boxes make excellent 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 of the birds' progress is very important and can contribute to our understanding of bluebird natural history and population dynamics. Data are only useful if shared, however, so try to submit your results to an organization or agency that will publish them or make the data available to others.

An ideal way to collect and record bluebird trail data is to participate in a nest record scheme. In both Canada and the United States, nest record cards can be obtained from, and submitted to, the Cornell Lab of Ornithology (159 Sapsucker Woods, Ithaca, New York, New York 14850, U.S.A.). Cornell also accepts on-line data submissions at http://birds.cornell.edu/birdhouse/.

In Canada, cards can be obtained from:

Federation of Alberta Naturalists
11759 Groat Rd.
Edmonton, AB T5M 3K6
Phone: (780) 427-8124
E-mail: fan@fanweb.ca
Web Site: www.fanweb.ca

Royal Saskatchewan Museum
2445 Albert St.
Regina, SK S4P 3V7
Phone: (306) 787-2859
E-mail: gsutter@mah.gov.sk.ca
Web Site: www.royalsaskmuseum.ca

Manitoba Museum of Man and Nature
190 Rupert Ave.
Winnipeg, MB R3B 0N2
Phone: (204) 956-2830
E-mail: info@manitobamuseum.mb.ca
Web Site: www.manitobamuseum.mb.ca

You might also check the NABS web site at www.nabluebirdsociety.org to see if its on-line data collection system is operational.

If you don't participate in a nest record scheme, the list on page 27 outlines the information you should collect from

Keeping Notes

Most trail operators carry a small binder or waterproof field book with them while monitoring, which they fill in as they go along. Others carry a Dictaphone/tape recorder so they can keep verbal notes. Some trail monitors organize their field notes by box number; others record the day's activities in a notebook. They then transfer those notes to a master file or put them into a database when they return home. Some prefer to use a pre-designed form; others just use a blank piece of paper. Some start new field notes each season, whereas others use the same field notebook from year to year. Choose whichever method suits you, as long as you have the previous visits' information on hand when making the current visit.

your trail. If you can't collect it all, at least try to note the items listed in boldface type.

- **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

The top section of the example form is a summary of the basic information about the box and its location; the section below provides space to record the date of your visit and to summarize the activities in and around the box. Be sure to keep as detailed notes as possible. Submit your data as soon as you can after the breeding season is over.

RECORDING FORM EXAMPLE

Year _____ Box # _____ Style _____

Habitat _____

Land Location/Landowner _____

Latitude _____ Longitude _____

Box Height _____ Mounted On _____

Floor Size _____ Aspect _____
(direction hole faces)

	First Clutch	Second Clutch	Third Clutch
Species			
# Eggs			
# Young			
# Fledged			
Date of First Egg			
Hatch Date			
Fledge Date			
Cause of Nest Failure			

Date	Notes
	Make this section as long as is required to write down the necessary information.

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, it is advisable to take all necessary precautions to ensure your safety and well-being. If your trail is remote, you may want to take an assistant along or carry a cell phone, plus take a first aid kit, matches and a spare set of car keys. Leave information about your expected travels with someone before you depart. Bring lots of water and some snacks, and be sure that you are prepared for all weather conditions and any emergency that might arise. If you have to cross a pasture, be aware of the danger that bulls, or cows with new calves, might pose. If you are in bear, wolf or Cougar/Mountain Lion country, proceed with caution. Most wild creatures have a natural fear of humans, but they may pose a danger, especially if they are protecting their young. Make plenty of noise in areas of possible concern and know beforehand which actions are the most appropriate to take if confronted (you might want to carry pepper spray too). Never reach into a box you haven't looked into first. Don't park your car in tall, dry grass because the catalytic converter might ignite the vegetation. Protect yourself against insect pests such as mosquitoes and ticks, and don't wear perfume or after-shave that might attract insects. If you are allergic to bees, be sure to have a bee kit on your person at all times. Be aware of, and take precautions against, serious health risks such as hantavirus pulmonary syndrome and Lyme disease (see page 49). Watch out for poisonous plants and always wash your hands thoroughly after checking boxes.

Some Good Advice

Rod Spencer of Montana has the best advice of all. Do NOT:

1. Borrow your son's new four-wheel drive pickup to put up new boxes when the weather is about to change in February;
2. Go to a remote logging road at a high elevation;
3. Leave the cell phone in the truck with the motor running and the lock buttons on;
4. Forget to find out where your son hides his spare set of keys;
5. Panic as you watch the storm clouds roll in;
6. Break a shatterproof window that costs a fortune to replace and fills the cab with glass;
7. Endure a cold ride home; and
8. Spend a lot of time cleaning up glass and a lot of money replacing the window.

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.

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.

MYRNA PEARMAN

Inspecting a Top-opening Box Containing Older Nestlings

There may be times when it is necessary to check a 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 get the information without disturbing the birds: walk up to the box quietly, cover the entrance hole and quietly open up the top of the box (slide the roof away from the backboard) just a very thin crack—only 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. Do not attempt these late-stage observations in front- or side-opening boxes (see Side Bar on the advantages/disadvantages of different box types on page 15).

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 bees).
- 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.
- Leave quickly and quietly.
- Write down your observations in your field notebook.

It is important to record all banding returns and recoveries (see footnote on page 4). However, non-banders cannot 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

Finding a Banded Bird

If a banded bird is found, call the band number in to the Bird Banding Laboratory (BBL) at 1-800-327-BAND (2263), or report the number electronically at www.pwrc.nbs.gov/bbl/homepage/mailrecv.htm. Be sure to read the numbers carefully (four digits on the top and five digits on the bottom). The BBL will later mail both the reporter and the bander a certificate showing where and when the bird was banded, by whom, and its species, age when banded and sex. Have the following information ready before you call: the band number (including any auxiliary plastic colour bands); the species and sex of the bird, if known; the date and location where the bird was recovered (latitude and longitude, or distance from nearest town); and whether the bird was dead or alive when found. If the bird is a bluebird or other bird found in a nestbox, the master bander in your area should also be contacted. The master bander will be able to tell you if the band number is from the set of numbers issued to him/her and, if so, will be able to give you additional details on the banded bird. The master bander will likely be interested in finding out how the bird died, if you know (e.g., it was caught by a cat, hit a window, etc.).

different techniques that banders use to trap the male when he enters the box to feed the young. Tree Swallows and other native nestbox users should also be inspected for bands.

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

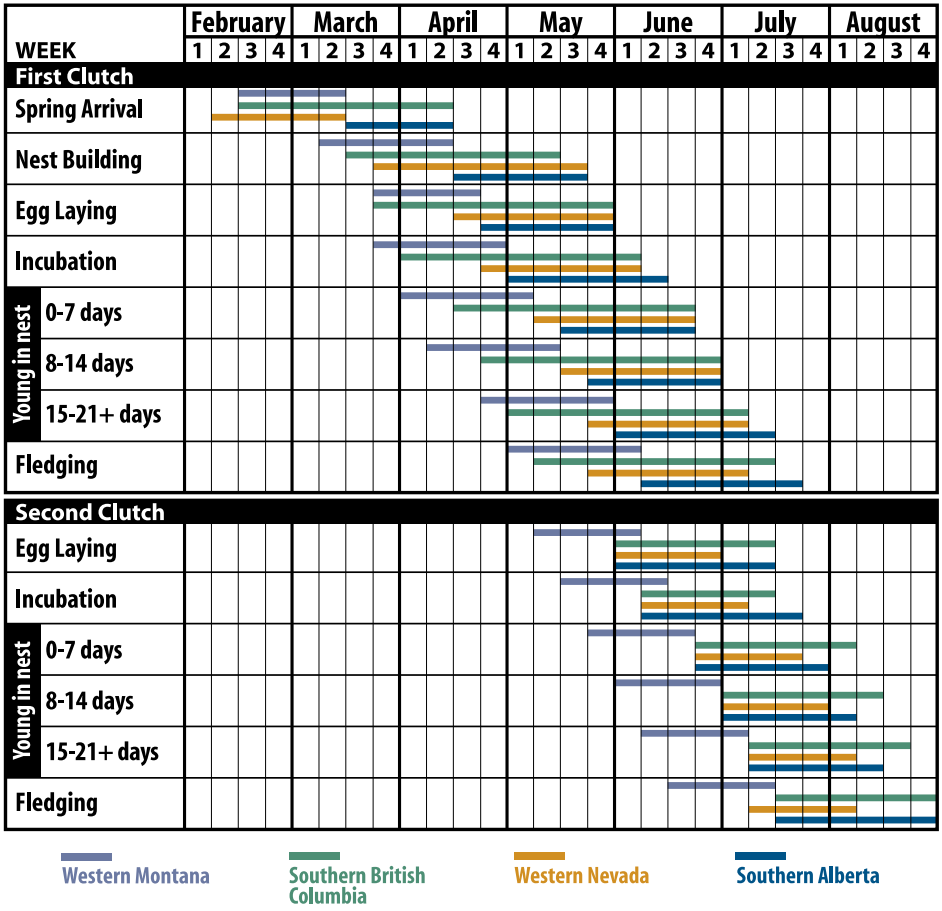
It is important to know something about the nesting cycle of the Mountain Bluebirds in your area.

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 Don Stiles of Calgary, Alberta, with information added from western Montana, southern British Columbia and western Nevada.

The chart shows the approximate time and duration of the Mountain Bluebird nesting cycle in different regions of the continent.

TABLE 1. Life Cycle Chart



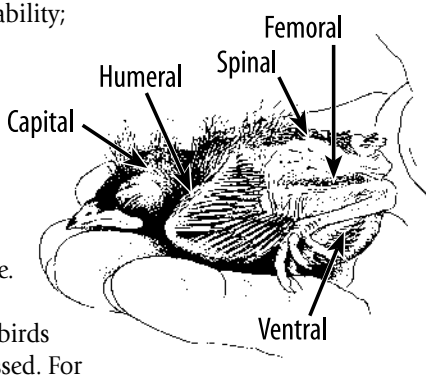
Aging Nestlings

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 gives us a glimpse into such Mountain Bluebird population dynamics as nesting patterns, habitat preference, habitat quality and so on. It may also provide information on the possible implications of global climate change.

Are Mountain Bluebirds and Tree Swallows Arriving Earlier These Days?

In central Alberta, records of the first observed arrival (FOA) date of Mountain Bluebirds and Tree Swallows have been kept since 1961 and 1958 respectively, first by Winnie and Charlie Ellis, and subsequently by the Ellis Bird Farm (EBF) biologist. EBF board member, Dr. Bob Lane, and the author, have compared these arrival dates with the average March and April temperatures over this same time period as recorded at the nearby Lacombe Research Centre, Agriculture and Agri-Food Canada. Interestingly, the analyses of these data show a striking and statistically significant trend towards earlier arrivals of both species and warmer average temperatures in both months. The earlier arrival of Tree Swallows may have implications for nestbox conflict and competition between swallows and bluebirds. It would be useful to compare FOA dates across the continent. If you have collected historical FOA records and are interested in sharing them, please contact the author (see inside front cover).

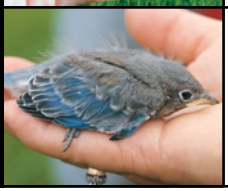
The following chart and photographs should help you hone your skill at aging Mountain Bluebird nestlings. Some leeway must be allowed, however, because a clutch of bluebirds generally takes 24 hours to hatch, with the first nestlings usually hatching in the early morning. Given the nestlings' rapid growth 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 of a brood of six who are poorly fed because they are being raised by a single parent during inclement weather.



Mountain Bluebird nestling feather tracts

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

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 whitewashed and 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. It has been reported that Mountain Bluebird adults will haul the bodies of dead nestlings out of the box; however, in most cases, the nesting birds do not make any attempt to remove corpses.

After the young have fledged, the boxes can be cleaned out. Some monitors wait until the last killing frost so there are fewer nest parasites. For further discussion on nest cleaning, refer to pages 19, 20 and 22.

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 need to be viewed as a natural part of the process. 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 takes 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 53). 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 advice on 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 have euthanasia performed on 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 53 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 (i.e., the young fledge at 17 to 22 days of age, depending on the region and on their rate of development), 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 predator issues that might affect your bluebird trail, check out the NABS web site or contact one of your local bluebird organizations.

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

The body of a male Mountain Bluebird in a House Sparrow nest

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. 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. Wildlife rehab centres will take sparrows to feed their rehabilitating birds of prey.

Sparrows can be trapped all year round. Fact Sheets on House Sparrow control, including in-box and multi-bird trap plans, are available from both NABS and Ellis Bird Farm. Send a legal-sized stamped self-addressed envelope if requesting plans.

Birds of Prey. Several species of raptors (e.g., Red-tailed, Swainson's, Sharp-shinned and Cooper's Hawks, Peregrine and Prairie Falcons, American Kestrels, Merlins and Northern Harriers) 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 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. For more information about swallows, 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 (and box fronts, if they are rough) with pieces of aluminum flashing will prevent the predatorial birds from reaching into the hole. The flashing should extend at least 5 in. (13 cm) beyond the roof on the front and both sides. Removing nesting material to lower the nest farther from the entrance hole, although often recommended, is illegal without permits. In areas where magpie numbers appear high, traps are sometimes used to reduce the local population. Contact Ellis Bird Farm for plans.

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 two 1/2-in. (13-mm) ventilation holes on each side, holes that are much too large for boxes used in areas where snow and cold temperatures are often experienced during the nesting season. The above is not a general criticism of the Peterson Box, which was designed by the late Dick Peterson of Minnesota, and is widely used with great success throughout the American Midwest (see the NABS web site for box plans).


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 predator guards. See the Side Bar on pages 44-45 and the NABS web site for details on predator proofing.

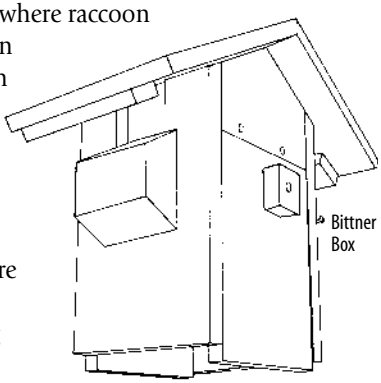
If you have a cat, confine it to your house or keep it in a cat run. Stray and feral cats should be live-trapped and taken immediately to your local humane society (be sure that you treat the cat humanely—it's not the cat's fault that it does what it does!). For more information on cats, contact the American Birding Conservancy about its program called Cats Indoors! The Campaign for Safer Birds and Cats at www.abcbirds.org/cats/catsindoors.htm.


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.

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).

Research has also been done on raccoon-resistant box designs. The most extensively tested one in western Canada is the Bittner Box, shown here. After ten years of field testing this box in an area where raccoon predation was once a serious problem, it has been demonstrated that the slot entrances and wooden blocks below the slots prevent raccoons from reaching into it. Where this box has been used in southeastern Saskatchewan, trail operators have found that Mountain Bluebirds prefer this style of box, whereas Tree Swallows tend to shun it. If you have a trail in an area where raccoons are becoming a problem and would rather use fence posts as opposed to freestanding poles, this box is worthy of consideration. For detailed plans, please contact Ron Bittner at Box 97, Abernethy, SK S0A 0A0, Canada. In southern Alberta, where there are several thousand boxes attached to fence posts and where raccoons are beginning to make an appearance, research is currently underway to examine techniques that might keep raccoons off fence post-attached, standard top-opening boxes. The results of this research, a cooperative project of the Calgary Zoo and MBT (Alberta), will be shared in future revisions of this booklet or may be posted on the Ellis Bird Farm web site. If you'd like to see how this research is progressing, contact MBT (Alberta); address on the inside back cover.



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.

Red 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).

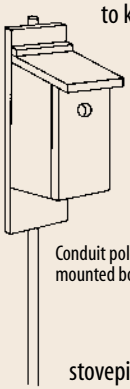
Bears can make short work of a nestbox. If you live in bear country, try a small trail and see if the bears target your boxes. To avoid attracting bears to your trail, don't leave any potential food sources behind and avoid coating conduit poles with grease. If you have bear problems, try putting up 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, take down your boxes and take up gardening.

Other Mammals. See the Troubleshooting Chart on page 48 and Hantavirus Pulmonary Syndrome on page 49.

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

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 installation ideas). 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.

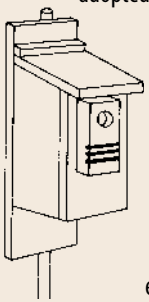
Kingston baffle

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 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 (see Snakes).

not recommended that you set up a snake-snack trail. If snakes are targetting 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 page 44) 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 targetted by snakes than those placed along fence lines, in wooded areas or in dense grass.

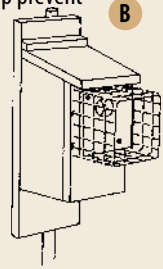
Insects and Spiders: The native insects and spiders that might take up residence in your bluebird box have as much right as bluebirds to exist. If you can leave some boxes for these other species, you are contributing to biodiversity!

A



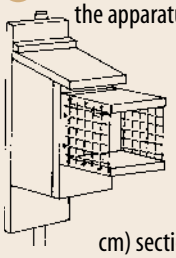
Predator guards can also be placed directly on the box. One technique that has been widely adopted, but has proven to be largely ineffective against most predators, is the placement of a thick block of wood over the entrance hole—the thickness seems to deter the bluebirds from choosing the nestbox while 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).

B



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). 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).

C



D

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. Always be prepared for a nest of these insects to be present when you open a box. Unless they are especially abundant or are known to cause undue stress or harm, just leave these insects be and set out another box for the bluebirds. If you'd rather not share your bluebird trail with wasps, yellow jackets and their ilk, rub petroleum jelly or soap on the inside of the box lids at the beginning of the season.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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.

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.


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Although most trail operators pull off any blowfly larvae that they find attached to a nestling, it is important to note that only those operators in possession of the appropriate permits are legally entitled to undertake this activity. Trail operators who have permits can also lift up the nesting material with a putty knife and remove the larvae found on the box floor.

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.

Aside: As was mentioned above, 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 behind your ear or under your armpit 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 and mites are also sometimes found in boxes, none of which usually pose a problem. In the south, you may find praying mantis eggs. Leave them be! Some trail operators place diatomaceous earth beneath the nesting material to help control parasites; such action is legal only with permits (see the Side Bar on the law, pages 22-23). 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, have portions toxic to humans removed, but some leave residues for 10 to 30 days. If you feel you have to use insecticides, use those that are safe for cage birds, or the ones with the highest LD_{50} numbers (a measure of the lethal dose that it takes to kill 50 percent of the test animals, measured in mg/kg; the higher the number, the more it takes to be fatal).

TABLE 2. Troubleshooting Chart

PROBLEM	CAUSE	OPTIONS
Box filled with twigs	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; place extension on roof
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	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	Use Bittner Box (see page 43); 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; leave them be and set out another box for bluebirds
Nest full of ants	Ants	Remove nestbox if on tree with ants; clean out nest after young have fledged; mount box on greased or waxed conduit pole
Nestlings with larvae attached; black pupae or gray maggots under nest	Bluebird Blowfly	With permits, remove blowfly larvae or pupae from nestlings or nesting material; see pages 46-47 for issues related to blowfly control
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 to see if you should save the ticks and take them in for analysis.

If you are concerned about these diseases, contact your nearest health care facility for updated information, risks and precautions. It is important to note that Lyme disease is spreading westward and northward in North America.

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. 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, check out www.cdc.gov/ncidod/diseases/hanta/hts/noframes/consumer.htm or Health Canada at www.hc-sc.gc.ca.

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 of 1 in. (25 mm) or 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

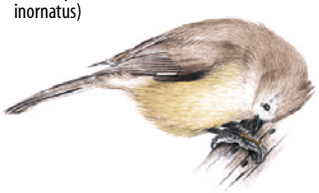
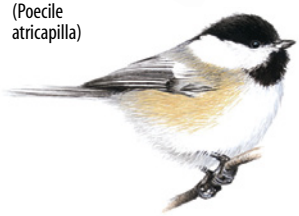
The following is a chart of other native cavity nesters found within the range of the Mountain Bluebird. If you are unsure of which species are found in your area, check with your local bluebird trail operators or naturalist club/Audubon society. In areas where Eastern or Western Bluebirds are not known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

Note: This table does not include woodpeckers because woodpeckers are considered to be primary cavity excavators. Although there are occasional reports of Downy Woodpeckers (Picoides pubescens) using nestboxes, these birds nest almost exclusively in cavities that they themselves have excavated. Nuthatches and chickadees are unique because, although they usually excavate their own cavities, they will (depending on the area and species) also use nestboxes.

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 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)
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

Nest with Eggs

Nestlings

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

Appendix 1. Resources

Bluebird Organizations

Bluebirders 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 are registered as non-profit societies, charitable organizations or incorporated companies. In the late 1990s, the North American Bluebird Society (NABS) established the affiliation process to help foster improved communication with and among these bluebird groups. The list of NABS Mountain Bluebird affiliates, below, was current at time of printing. Check the NABS web site for more information and for a current affiliate list. If your bluebird group is not yet a NABS affiliate, it is encouraged to become one.

Note: Some of the funders of this booklet (Ellis Bird Farm, Mountain Bluebird Trails Inc., Mountain Bluebird Trails Conservation Society, Southern Interior Bluebird Trail Society) are NABS affiliates. Their addresses are listed on page 59.

Canada

Alberta

Calgary Area Bluebird Trail Monitors
c/o Don Stiles
20 Lake Wapta Rise SE
Calgary, AB T2J 2M9
Phone: (403) 271-4689
E-mail: stilesdj@shaw.ca

Manitoba

The Friends of the Bluebirds
c/o Barry and Judy Danard
P.O. Box 569
44 Erin Drive
Killarney, MB R0K 1G0
Phone: (204) 523-8258
E-mail: jbdanard@mts.net

United States

California

California Bluebird Recovery Program
2021 Ptarmigan Drive #1
Walnut Creek, CA 94595-5402
Phone: (925) 937-5974
E-mail: cbrp@value.net

Idaho

Our Bluebird Ranch
152 N 200 E
Blackfoot, ID 83221
Phone: (208) 782-9676
E-mail: pjbarnes@micron.net

Rocky Mountain Blues
c/o David Richmond
HC67 Box 680
Clayton, ID 83227
Phone: (208) 838-2431
E-mail: ssprings@custertel.net

Nebraska

Bluebirds Across Nebraska
c/o Steve Eno
2500 West James Drive
Raymond, NE 68428
Phone: (402) 783-3011
E-mail: cleno@aol.com

Oregon

Audubon Society of Corvallis
c/o Elsie Eltzroth
6980 NW Cardinal Rd.
Corvallis, OR 97330
Phone: (541) 745-7806
E-mail: eltzroth@peak.org
OR
tara.robinson@oregonstate.edu

Prescott Bluebird Recovery Project
c/o Voice of Prescott
Box 1469
Sherwood, OR 97140
Phone: (503) 245-8449
E-mail: email@prescottbluebird.com
Web Site: www.prescottbluebird.com

Washington

c/o Dr. Michael Pietro
Cascade Bluebird and Purple Martin Society
3015 Squalicum Parkway, Suite 250
Bellingham, WA 98225
E-mail: mmpietro@hinet.org

Wildlife Rehabilitation Centres

Canada (in alphabetical order)

Alberta

www.albertawildliferehab.org
Phone: 1-888-924-2444

British Columbia

www.wildliferescue.ca
Phone: (604) 426-7275

Wildlife Rehabilitators Network of British Columbia
www.wrn.bc.ca

Manitoba

Manitoba Wildlife Rehabilitation Organization
www.wilds.mb.ca/mwro

Saskatchewan

Western College of Veterinary Medicine
University of Saskatchewan, Saskatoon
Phone: (306) 966-5099

United States

National Wildlife Rehabilitators Association

www.nwrawildlife.org/home.asp
14 N 7th Ave, St. Cloud, MN 56303
Phone: (320) 259-4086

International Wildlife Rehabilitation Council

www.iwrc-online.org
P.O. Box 8187
San Jose, CA 95155
Phone: (408) 271-2685

Permit Information

Canada–Canadian Wildlife Service

Alberta

Room 2000, 2nd Floor
4999-98 Ave,
Edmonton, AB T6B 2X3
Phone: (780) 951-8700

British Columbia

5421 Robertson Road, RR 1
Delta, BC V4K 3N2
Phone: (604) 940-4700

Manitoba

Suite 150, 123 Main Street
Winnipeg, MB R3C 4W2
Phone: (204) 983-5259

Permit Information continued

Saskatchewan
115 Perimeter Road
Saskatoon, SK S7N 0X4
Phone: (306) 975-4087

United States–U.S. Fish and Wildlife Service, Migratory Bird Permit Office

Region 1 (California, Idaho, Nevada, Oregon, Washington)
911 NE 11th Ave.
Portland, OR 97232-4181
Phone: (503) 872-2715

Region 2 (Arizona, New Mexico, Oklahoma, Texas)
P.O. Box 709
Albuquerque, NM 87103-0709
Phone: (505) 248-7882

Region 6 (Colorado, Montana, Nebraska, North Dakota, South Dakota, Utah, Wyoming)
P.O. Box 25486-DFC 60154
Denver, CO 80225-0486
Phone: (303) 236-8171

Region 7 (Alaska)
1011 E. Tudor Road
Anchorage, AK 99503
Phone: (907) 786-3693

Web Sites

Start with the Ellis Bird Farm www.ellisbirdfarm.ab.ca, NABS www.nabluebirdsociety.org and the MBT Inc. (MT) www.mountainbluebirdtrails.com web sites because they list links to many other related sites.

Bluebird List Serve

Bluebird-L, hosted by the Cornell Lab of Ornithology, is the most popular forum for (ongoing!!) discussions and debates about issues related to bluebirding. Here's how to subscribe: In the 'To' field, type 'listproc@cornell.edu.' Leave the subject line blank. In the body of the message, type 'subscribe bluebird-L,' then your first name and last name (e.g., subscribe bluebird-L Bertha Bluebirder).

Books/Journals

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), Wilmot. Ohio.

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.D. 1992. Nestboxes for prairie birds. Ellis Bird Farm Ltd., Lacombe, Alberta.

Power, H. W., 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.

Scriven, D. 1989. Bluebirds in the Upper Midwest: A guide to successful trail management. Bluebird Recovery Committee, Audubon Chapter of Minneapolis, Minneapolis, Minnesota.

——. 1999. Bluebird trails: A guide to success. 3d ed. Bluebird Recovery Program, Audubon Chapter of Minneapolis, Minneapolis, Minnesota.

Shantz, B. 1986. Mountain bluebird management. Deer Ridge Consulting, Lacombe, Alberta.

Sibley, D.A. 2000. The Sibley guide to birds. Alfred A. Knopf, New York, New York.

Stiles, D.J. 1997. Recoveries of Mountain Bluebirds south of 49° latitude, and a recent Tree Swallow. Blue Jay (55)1:48-52.

Stokes, D.W., and L.Q. Stokes. 1989. A guide to bird behavior. Vol. 3. Little, Brown & Co., Boston, Massachusetts.

——. 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, Marietta, Ohio.

Resources Available from NABS

Check web site or contact NABS for updated lists and ordering information.

- Educational poster
- Pocket Field Guide for Kids (Booklet)
- Getting to Know Bluebirds (Educators' Packet)
- NABS Bluebird Slide Program
- Luther Goldman Cavity Nesters Slide Program
- Stokes Bluebird Basics (Video)
- Bluebirds Up Close (Video)
- Mountain Bluebirds (Video)

Index

Project Partners and Funders:

Red Deer and District Community Foundation (RDDCF)

Red Deer & District Community Foundation

was founded in 1987, with a $1 million bequest from an anonymous donor, and plays a truly unique role as a catalyst for community action and a resource for philanthropy and charitable giving. Through its endowment fund program (the community's savings account), the RDDCF offers community-minded citizens a means of providing for the ever-changing needs of their community with gifts both large and small, thereby playing a role in shaping its future. This pooling and investment of charitable gifts from many people thus generates revenue for the benefit of central Alberta forever. Funding for this booklet was provided from a RDDCF fund entitled Conservation of Bluebirds, Swallows and Other Cavity-nesting Birds Fund.

503, 4808 Ross St., Red Deer, AB T4N 1X5, Canada
Phone: (403) 341-6911
Fax: (403) 341-4177
E-mail: rdcomfdn@telusplanet.net
Web Site: www.rddcf.ca

Red Deer River Naturalists (RDRN)

RDRN

lays claim to being the oldest natural history organization in Alberta and traces its origins to the North-West Entomological Society, formed in Blackfalds in 1899. Officially founded as the Alberta Natural History Society in 1906, the group changed its name to the Red Deer River Naturalists in 1976. RDRN is a well-respected organization that speaks on behalf of the environment in central Alberta. Members are involved in a number of local, regional and provincial committees, and the club hosts monthly meetings, summer field trips and annual bird counts. RDRN has spearheaded the Habitat Steward Program and, most recently, NatureScape Alberta.

Box 785, Red Deer, AB T4N 5H2, Canada
Phone/Fax: (403) 347-8200
E-mail: rdrn@rttinc.com
Web Site: www.rdrn.fanweb.ca

Other Project Funders (in alphabetical order):

Erv Davis has lived in Charlo, Montana, for the past 50 years. He is a retired educator, having spent his career as a teacher, coach and administrator. He is a very active volunteer at the National Bison Range, Moiese, Montana, where he works in the Visitor Center and assists with the yearly game count and annual bison roundup. He maintains a 40-box bluebird trail on the bison range, as well as an additional 350 boxes on six other trails. He is an avid bluebird bander and has invented a remote in-box trap that enables him to recapture a large number of adults every year. He is the past president of Mountain Bluebird Trails Inc.

Ellis Bird Farm Ltd. (EBF) was founded in 1982 by Union Carbide Canada Inc. (now MEGlobal Canada) to carry on the work of pioneer Alberta bluebird conservationists, Charlie and Winnie Ellis of Lacombe, Alberta. Managed by a volunteer Board of Directors, Ellis Bird Farm is both a place (a 640-a. [260-ha] block of the original Ellis farm), as well as a non-profit company, charged with a mandate that includes operating a bluebird trail, maintaining an extensive winter bird feeding program, conducting scientific research and undertaking educational programs. Ellis Bird Farm oversees a bluebird trail of 420 nestboxes and boasts the world's largest collection of bluebird boxes, a Visitor Centre, Tea House, extensive gardens and walking trails, as well as award-winning educational programs. Ellis Bird Farm and Mountain Bluebird Trails Conservation Society co-sponsor an annual Blue Feather Award. This award recognizes outstanding bluebird conservationists in Alberta.

Box 5090, Lacombe, AB T4L 1W7, Canada
Phone/Fax: (403) 346-2211
E-mail: myrnap@ellisbirdfarm.ab.ca
Web Site: www.ellisbirdfarm.ab.ca

Mountain Bluebird Trails Conservation Society (MBT [Alberta]): Mountain Bluebird conservation in southern Alberta was pioneered by the late Duncan Mackintosh of Lethbridge, Alberta, who started setting out nestboxes in 1974. He soon had a core of volunteers, and the group called itself Mountain Bluebird Trails (MBT). In 1980, Duncan met with Art Aylesworth of Ronan, Montana (see below), and the Montana bluebirders joined MBT. In 1994, Duncan and Art agreed that, from a logistical point of view, it would be more efficient for bluebirders on each side of the border to run their own organizations. Duncan led the Alberta group, which was officially renamed Mountain Bluebird Trails Conservation Society (MBT [Alberta]) in 1995. At the time of his passing in 1995, Duncan and more than 50 volunteers were looking after 3000 boxes spread out over a 12 000 square mile (31 080 square kilometre) area across southwestern Alberta, from Medicine Hat to the Crowsnest. Today, MBT (Alberta) continues to be run by an enthusiastic group of 120 bluebirders who band thousands of bluebirds each year, host workshops and conferences, and actively promote the conservation of all native, cavity-nesting birds.

Box 401, Station Main, Lethbridge, AB T1J 4Z1, Canada

Mountain Bluebird Trails Inc. (MBT Inc. [Montana]): Mountain Bluebird conservation efforts were started in Montana by the late Art Aylesworth of Ronan, Montana, in 1974. 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 title of Mountain Bluebird Trails (MBT), a name already used by Duncan's group in Alberta. 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 runs from one end of the state of Montana to the other along Highway 200. In the last 25 years, the group has built and distributed over 40 000 bluebird nestboxes throughout Montana and the surrounding region. It also hosts conferences and regional workshops.

Box 794, Ronan, MT 59864, U.S.A.
Phone: (406) 676-0300
E-mail: bluebird@ronan.net
Web Site: www.mountainbluebird trails.com

North American Bluebird Society (NABS) is a non-profit 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 web site; funds scientific research studies; and administers a continent-wide bluebird nestbox approval process. NABS has also established the Transcontinental Bluebird Trail (TBT), a network of bluebird trails spanning the continent. Check the NABS web site for updates on the organization's programs and activities.

481 Athens Road, Royston, GA 30662
Phone: (706) 246-9670
Fax: (706) 246-0456
E-mail: info@nabluebirdsociety.org
Web Site: www.nabluebirdsociety.org

Other Project Funders (in alphabetical order):

Southern Interior Bluebird Trail Society (SIBTS) of British Columbia, Canada, was founded in 1989 by Vern Johnson, who started a bluebird trail with 37 nestboxes. He developed the 'Johnson Slot Box,' which is now the exclusive box design used by all SIBTS members and is the predominant box used in British Columbia. By 1992, the group had acquired society status and oversaw a trail of 1200 boxes. It now has about 200 members who monitor over 5000 boxes and give freely of their time to promote bluebird conservation in British Columbia. SIBTS trails cover about 25 000 square miles (64 750 square kilometres) of the province, from east of Grand Forks to west of Princeton, and from Osoyoos in the south to Quesnel in the north. Over 15 species of birds and other wildlife have been recorded using SIBTS nestboxes!

Box 494, Oliver, BC V0H IT0, Canada
Phone: (250) 495-7891
E-mail: goldstrm@vip.net

Ellis Bird Farm biologist, Myrna Pearman, has teamed up with bluebird experts from across North America to bring you this up-to-date and comprehensive …

Mountain Bluebird
TRAIL MONITORING GUIDE

She draws on her own extensive experience, as well as the expertise and experiences of other bluebird trail monitors, to:

- Summarize the unique natural history of Sialia currucoides, the Mountain Bluebird
- Describe and illustrate nestbox designs that are suited for Mountain Bluebirds and other small native cavity nesters
- Outline tips on how to establish and maintain a successful Mountain Bluebird trail
- Provide guidelines on how to accurately age nestling Mountain Bluebirds and collect pertinent nestbox trail data
- List ways to deal with challenges and problems that might arise on a bluebird trail

Whether you're a seasoned 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 travels across Alberta each spring to deliver an award-winning outreach program entitled The Nestbox Program. *She is shown here (front row) with a class from the Cayley (Alberta) Hutterite Colony.*

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All proceeds from the sale of this booklet will be used by the Red Deer River Naturalists to underwrite the cost of producing booklet reprints.