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Homes for Birds

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Homes for Birds

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Photo: Hubert Brandenburg

Homes For Birds

Many people enjoy songbirds and would like to do something to attract them to their surroundings. Birds are fascinating to look at, listen to, and study. Habits of nesting and rearing and feeding the young can be studied, as well as growth of the young from emergence from the eggs to time of departure from parental care.

Building a nesting box for birds is the start of an immensely rewarding hobby—bird watching—and at the same time satisfies an urge by many to do something to attract our feathered friends. Many types of designs for bird houses are available, including several that are simple to build. All that's required are a few basic tools and materials and anyone can complete such a project given a simple design. Choice of specific design for the bird house is essential, however, as each species of bird is attracted by a different type of home.

This pamphlet reviews some of the principles of bird house design, the materials necessary to build the homes and their location. Specific likes and dislikes of various species of songbirds are reviewed. Ample simple designs are given that can lead to successful attraction of songbirds, particularly during nesting.

Building The House

The actual needs of hole-nesting birds are few, and may often be met by a small expenditure of time and effort. To make the nesting facilities safer, however, and probably more desirable to the occupants, certain principles of construction, design, and location should be observed. A well-built bird house should be durable, rain-proof, cool, and readily accessible for cleaning. Furthermore, by adopting high standards of neatness in construction, bird houses may be made not only to serve the strictly utilitarian purpose of encouraging beneficial species but also to add a touch of attractiveness to the backyard.

Materials.—For anyone wishing to construct bird houses, wood is the best building material. Except for special types, such as martin houses, metal should be avoided, as it becomes intensely hot when exposed to the rays of the sun. Pottery nesting boxes have some points in their favor but are not readily made in the average home workshop. Bird houses constructed of tar paper or similar products have no particular advantage over wooden ones, and the use of these materials is unrealistic for some of the larger houses. In the choice of wood, an easily workable kind—cedar, pine or yellow poplar—is preferable; the first-named is the most durable. Exterior grade plywood is excellent for nesting box construction. It weathers well and resists warping. Lumber for nesting boxes should be at least $\frac{3}{4}$ inch thick to provide adequate insulation against the heat from the sun's rays as well as from abnormally cold periods which may occur during the nesting season. Sawmill waste (rough slabs with the bark on) furnishes cheap and satisfactory material for rustic houses. To make the nesting box hold together longer use galvanized or aluminum nails, as these will not rust. Nails with roughened shanks (designed to hold tightly) are superior to smooth nails but cost slightly more. Galvanized siding nails of either 12½ or 14 gauge, 1½-1¾ inch long, are excellent, and are commonly available. Gluing all permanent joints adds to the life of the box. You can successfully construct bird houses from many other materials such as PVC drain pipes, milk cartons, and bleach bottles. The possibilities are virtually limitless.

Paint.—Paint greatly enhances the weathering qualities of wooden bird houses. It is particularly useful to paint the roof of the nesting box as this receives the most exposure and weathers faster than the other pieces. Modest tones, such as light brown, gray, or dull green are preferred because they absorb less heat and are not as conspicuous to predators or vandals as a white house. However, martin houses should be painted white to reflect heat due to their placement in exposed situations. Don't paint the entrance hole or inside of the box. Exterior latex paints are recommended because they are easy to apply but you can use exterior oil-based paints not containing lead as well.

Protection From Rain.—Roofs should be made with sufficient slope to shed water readily; or if level, or nearly so, you should cut a groove across the under face of the overhanging part (fig. 1, A) to prevent water from draining back into the interior of the house.

The overhang should extend an inch or more to protect the entrance hole from driving rain. You may wish to bore the opening of the nest cavity itself at an upward slant to aid in keeping out water. A strip of metal or roofing paper often helps to make the ridge of the

nest box thoroughly waterproof; flat roofs should either be wholly covered with some such material or else heavily painted.

In latitudes where freezing weather is the rule in winter, nesting houses will last longer if you recess the bottoms about $\frac{1}{4}$ inch, thus draining off water that otherwise might freeze in the crack between bottom and sides and wedge them apart. To provide for drainage and ventilation drill a few small holes in the bottom.

Protection From Heat.—If attention is paid to the principle of cool construction, the suffering of adults and nestlings during periods of excessive heat may be lessened. Boards of $\frac{3}{4}$ inch thickness or greater are recommended. Wood is in itself a fairly good insulator; but remember that the interior of the average nest box is small, and a single opening near the top permits little ventilation. One or two small auger holes through the walls near the top of the box will give limited circulation of air without producing drafts. A double roof or a compartment above the nest proper will serve as an excellent insulator. In the colony houses built for martins this feature can be easily included, and the added comfort and safety afforded the nestlings will more than repay for the extra work.

Accessibility.—All bird houses should be placed so as to be readily accessible and built to be easily opened and cleaned. However, houses placed closest to man's dwellings may more readily attract undesirable species, such as starlings and house sparrows, rather than native cavity nesters. To those interested in studying the life history of nestlings, a readily opened box is a great aid. A number of arrangements may be used to permit inspection of the nest, several of which, as applied to simple houses, are illustrated in figure 1. A pane of glass sliding in a groove just beneath the removable side will allow observations without subjecting the birds to exposure or disturbing the nest material. Caution: too frequent inspections may increase the chance of the nest failing, due to increasing the risk of predation, disrupting the incubation of the eggs, or keeping the adults from feeding the young! Opening the box when the young birds are nearly old enough to leave the nest may cause them to prematurely fledge, usually with disastrous consequences. This is more likely to occur in the side and front opening box styles because opening these causes more nest disturbance than the top opening nesting box.

Entrances.—Since entrance holes for bird houses are usually made near the top, the lumber used, if smooth, should be roughened, grooved, or cleated on the inside so young birds can cling to it to feed and exercise their wings before their first flight. Such roughening may also assist them in climbing up to the opening. A textured surface can be made by sawing slots $\frac{1}{8}$ inch deep, punching shallow

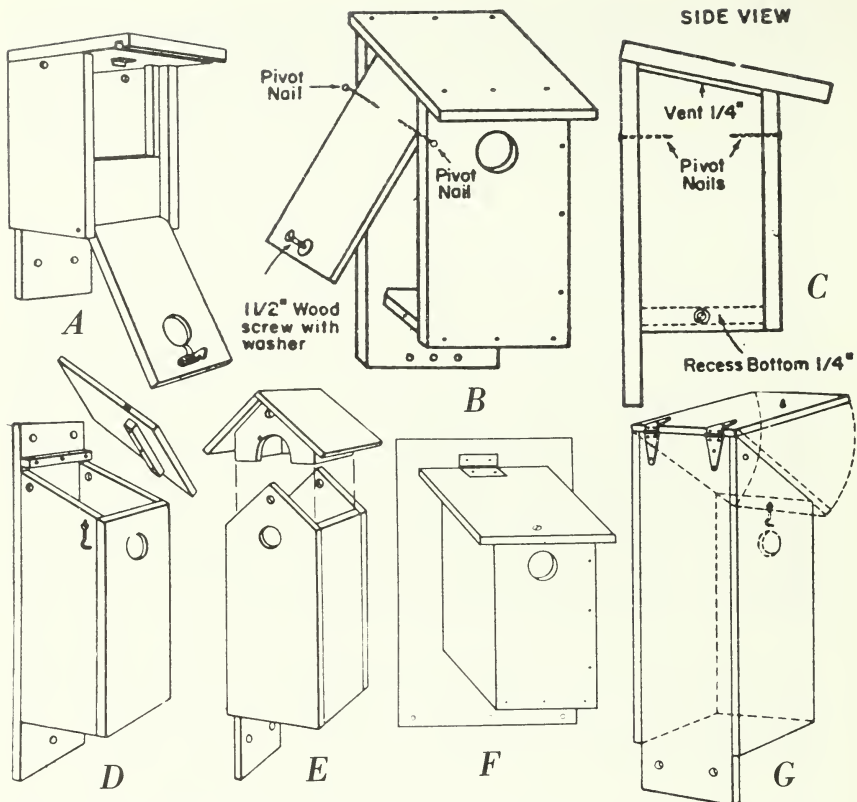


Figure 1.—Accessible nest boxes: A, hinged front held up by a catch; B, side opening box; C, side view of B; D and E, removable tops; F and G, hinged top.

holes with a screwdriver, tacking a strip of $\frac{1}{4}$ inch hardware cloth, or gluing small scraps of wood. Swallows in particular may become trapped in some boxes when they enter if the inside is not roughened to permit climbing out. Houses longer than high are comfortable and convenient and seem to be liked by some species, particularly by wrens (fig. 4, B). Many species prefer entrance diameters of $1\frac{1}{2}$ inches or less, as listed in Table 1. For boxes intended for those species, do not exceed a diameter of $1\frac{1}{2}$ inches as starlings may usurp the nesting box. Perches at the entrances should not be used because they seem more of an assistance to enemies than a requirement for the occupants.

Dimensions and Elevation.—The simplicity of construction of the single-room bird house does away with the necessity of detailed working drawings in most cases. Table 1 gives the proper dimensions for the various species and the height at which the boxes should be placed above the ground. The design may follow any of the types recommended in this pamphlet.

Table 1—Dimensions of nesting boxes for various species of birds that regularly use them, and the height at which they should be placed above the ground.

Species	Floor of Cavity	Depth of Cavity	Entrance above Floor	Diameter of Entrance	Height above Ground or Water(W)	Preferred Habitat Codes ¹
	Inches	Inches	Inches	Inches	Feet	
House Wren	4 × 4	6- 8	4- 6	1-1¼	4-10	2,7
Chickadees	4 × 4	9	7	1½	4-15	2
Bewick's Wren	4 × 4	6- 8	4- 6	1¼	5-10	2,7
Titmouse	4 × 4	9	7	1¼	5-15	2
Downy Woodpecker . . .	4 × 4	9	7	1¼	5-15	2
Prothonotary Warbler .	4 × 4	6	4	1¾	4-12.3W	3,5
Nuthatches ¹	4 × 4	9	7	1¾	5-15	2
Carolina Wren	4 × 4	6- 8	4- 6	*1½	5-10	2,7
Bluebirds	4 × 4	8-12	6-10	*1½	3- 6	1
Tree Swallow	5 × 5	6- 8	4- 6	*1½	4-15	1
Violet-green Swallow . .	5 × 5	6- 8	4- 6	*1½	4-15	1
Ash-throated Flycatcher	6 × 6	8-10	6- 8	*1½	8-20	1,6
Hairy Woodpecker	6 × 6	12-15	9-12	1¾	12-20	2
Great Crested Flycatcher	6 × 6	8-10	6- 8	1¾	8-20	1,2
Golden-fronted Woodpecker	6 × 6	12	9	2	10-20	2
Red-headed Woodpecker	6 × 6	12	9	2	10-20	2
Purple Martin	6 × 6	6	1	2¼	10-20	1
Saw-whet Owl	6 × 6	10-12	8-10	2½	12-20	2
Flicker	7 × 7	16-18	14-16	2½	6-30	1,2
Screech Owl	8 × 8	12-15	9-12	3	10-30	2
American Kestrel	8 × 8	12-15	9-12	3	10-30	1,4
Barn Owl	10 × 18	15-18	0- 4	6	12-18	4
Wood Duck	12 × 12	22	17	4	10-20,6W	3,5
Phoebe	6 × 6	6	(²)	(²)	8-12	7,8
Barn Swallow	6 × 6	6	(²)	(²)	8-12	7,8
Robin	6 × 8	8	(²)	(²)	6-15	7

^{*}Precise measurement required, if diameter over 1½ inches then starlings may usurp cavity.

¹Brown-headed and Pygmy Nuthatches (1¾), Red-breasted Nuthatch (1¼) and White-breasted Nuthatch (1½) will all use the same box. However, the smaller opening sizes where appropriate may discourage use by House Sparrows

²One or more sides open.

¹Preferred habitat codes. The numbers in the last column of Table 1 refer to the habitat types listed here:

1. Open areas in the sun (not shaded permanently by trees), pastures, fields, or golf courses.
2. Woodland clearings or the edge of woods.
3. Above water, or if on land, the entrance should face water.
4. On trunks of large tree, or high in little-frequented parts of barns, silos, water towers or church steeples.
5. Moist forest bottomlands, flooded river valleys, swamps.
6. Semi-arid country, deserts, dry open woods and wood edge.
7. Backyards, near buildings.
8. Near water: under bridges, barns.

Location Of Bird Houses

Often a bird house will go unnoticed the first season you erect it. This may not be an indication that it is faulty in construction or improperly placed. However, if the house continues to fail to successfully attract a tenant then it may be attributable to the following faults: (1) Entrance holes too small for the birds desired; (2) boxes put up in inappropriate habitat (See Table 1, Preferred Habitat Codes, for the optimal habitat type in which to place a box for each species.); (3) boxes placed in trees, and therefore accessible to birds' enemies, especially where tree climbing snakes are found, instead of on posts or poles; (4) box placed nearby a territorial house wren; (5) box placed too close or too high above ground; (6) desired species may not occur in the area; (7) box put up too late in season; (8) more nesting facilities present than the resident bird population can occupy.

For easier access, you should not put bird boxes beyond the reach of an available ladder; those placed higher inevitably will be neglected. Houses on poles and isolated trees can be made safer with guards (fig. 8), or a coating of automobile grease on the lower half of a pipe. The grease is particularly effective against raccoons.

To sum up, you should place most nesting houses fairly low, should choose proper habitat, and remember that houses fastened on poles are safer from predators on poles than those in trees. If possible, you should face the opening away from prevailing winds and place the box so as to avoid the hot rays of the afternoon sun.

Types Of Birds To Attract

Bluebirds.—These are among the most desired bird tenants. Any of the types of nest boxes shown in figure 1 will meet their needs when built to the proper dimensions and well situated. Houses of rustic construction are also acceptable. Suggestions along this line may be found in figure 2. Bluebirds are partial to pastureland, abandoned orchards, old fields, large expanses of turf—especially if the area has many low to the ground perch sites, such as fencerows, wires, hedgerows, or isolated trees, from which it prefers to hunt ground dwelling insects. Avoid placing boxes in areas where house sparrows are abundant. Avoid areas of extensive pesticide use. Avoid brushy and heavily wooded areas as this is the domain of the house wren. Because bluebirds are strongly territorial, pairs will seldom nest closer than 70 yards apart. The most important dimension listed in Table 1 for the bluebird nesting box is the diameter of the entrance hole—1½ inches exactly. Starlings can gain access to the cavity if the hole is only an ⅛ of an inch larger and bluebirds have trouble entering the nesting box if the entrance is ⅛ of an inch smaller than 1½.

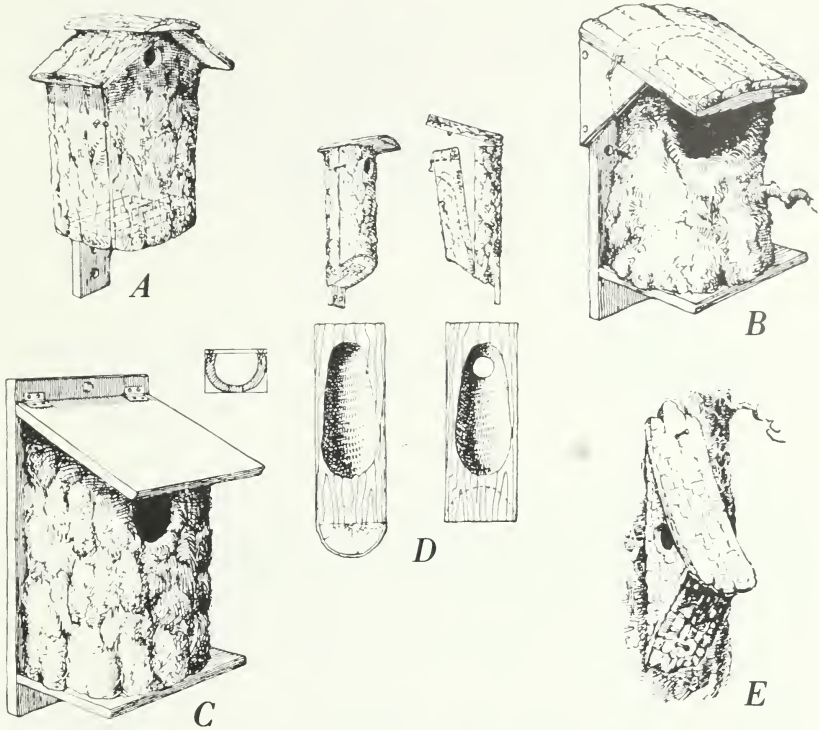


Figure 2—Rustic boxes: A has a removable front; B, a top held by two hooks; and C, a simple hinged top. In D there is a removable top that releases the front half of the cavity in the manner pictured. The principle embodied in B can be applied to the type shown in E, made of rough slabs.

Robins.—Where such natural sites as well-formed crotches are lacking, robins may use nesting platforms erected for them (fig. 3). These should be either of weathered lumber or of the rustic type. They should be placed in partially shaded spots along the main branches of trees or else in the shelter of the overhanging eaves of a shed or porch roof. The birds will gather their nesting material from natural sources, though in periods of dry weather they may be aided by wetting a spot of bare clay nearby to supply the mud used in the foundation of their nest.

Chickadees, Titmice, and Nuthatches.—The needs of chickadees, titmice, and nuthatches are very similar. Being creatures of the woodland, all seem to prefer rustic homes built to simulate their natural abodes, but they will readily accept boxes made of lumber. Any of the types illustrated in figure 1, built to the proper dimensions, will fill the need. Suggestions for rustic houses may be found in figure 2. The borders of woodlands are the favorite hunting

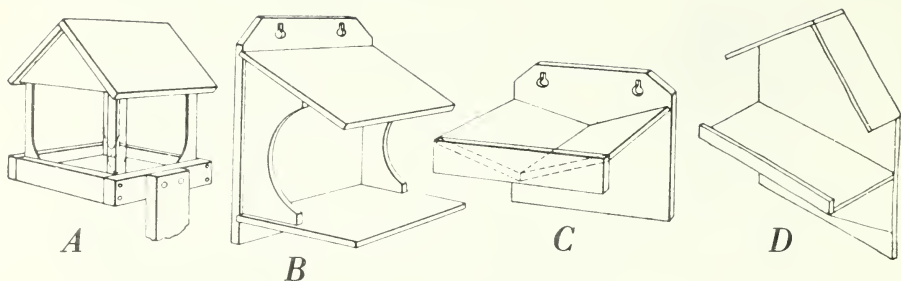


Figure 3.—Nest brackets and shelves for robins and phoebes. Nesting shelves C and D were designed to hang from a wall that is partially protected from the elements.

grounds of these birds, and nest boxes placed there are likely to be investigated. Chickadees often nest within a few feet of the ground, but nuthatches and titmice prefer a site of medium or considerable height. Food stations providing suet and nut meats placed on nearby trees are added inducements to these birds to take up residence, although you should remember that predators might also be attracted and negate the benefit of this practice.

Creepers and Prothonotary Warblers.—Small bark-covered houses closely fitted to the trunks of trees, as suggested in figure 2, E, may be attractive to brown creepers in the far north. Creepers have nested behind curved pieces of bark fastened to the trunk of a living tree. Natural nesting sites for these birds must be decreasing rapidly as the older shaggier-barked trees disappear. Prothonotary warblers nest in the southern swamps and are readily attracted to nest boxes placed over water.

Wrens.—House wrens are the least fastidious of the hole-nesting birds. Almost any sort of cavity will meet their needs, though boxes of small size with a horizontal slot instead of a round hole for an entrance (fig. 4, A and C) are best. Wrens take equally well to houses of smooth lumber or of the rustic type. Longitudinal boxes (fig. 4, A and B) make picturesque and very acceptable homes. Security for nestlings against the house cat may be provided by the structure pictured in figure 4, A, in which a passageway of variable length serves as an entrance to the nest lying below.

Nest boxes of the dimensions recommended in Table 1 are better than larger ones, as wrens fill whatever cavity they select with a jumble of sticks. The slot opening (fig. 4, C) permits the birds to carry in cumbersome material more readily. The slot or hole can well be 1 to 1½ inches in diameter rather than the quarter-dollar size (¾ inch) opening often recommended.

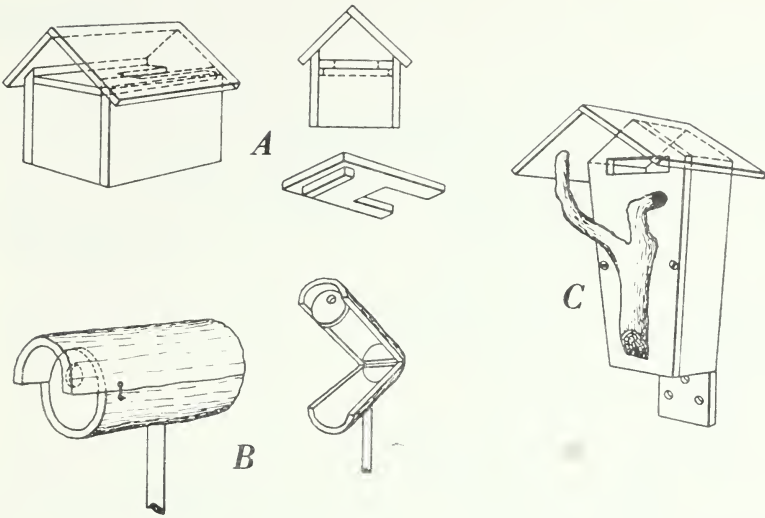


Figure 4.—Nest boxes suitable for wrens. In A the nest cavity is made accessible by removal of a notched board.

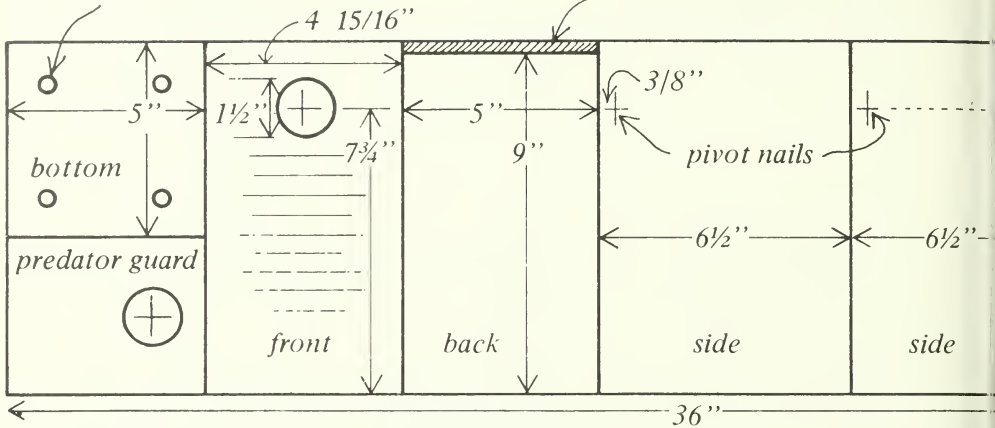
Almost any partly sunlit spot about the backyard or farm is agreeable to house wrens. A supply of slender twigs about 3 inches long handily placed will aid the birds in collecting nest materials. An abundance of wren houses is desirable, as frequently the birds will build 'dummy' nests or leave one or more unfinished nests before completing one to their liking. Bewick's and Carolina wrens are more fussy and usually prefer to pick a crack or crevice or other nest site, but will take boxes.

Swallows.—Tree swallows may be induced to forsake their natural nesting places in old woodpecker holes by the erection of nest boxes in suitable spots. Boxes of the types shown in figure 1 and 2 will suffice very well for these birds when constructed to the proper dimensions. A dead tree is an excellent site for such nests, and a few boxes may be nailed to the same trunk, spaced about seven feet apart. Bodies of water adjacent to fields or open areas hold a great attraction for swallows, and even a small pool in which they can bathe by dipping in flight will assist greatly in efforts toward establishing a colony in artificial homes.

Barn swallows will avail themselves of the open or partly covered nest shelves shown in figure 3, C and D, when these are placed under the sheltering eaves of buildings. Long shelves on brackets capable of supporting a number of nests will satisfy the gregarious tendencies of these birds, and similar shelves under the roofs of barns or sheds will be utilized if openings are provided in the gables.

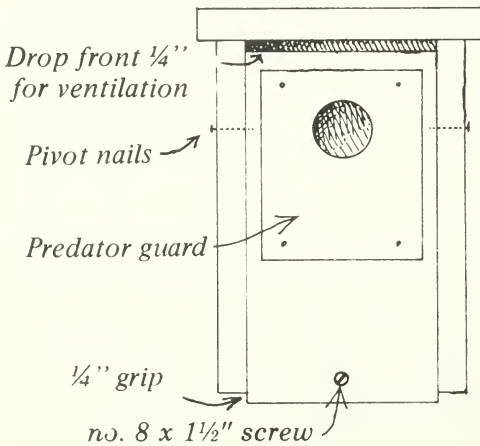
Drill four holes for drainage

Cut off 1/4" for ventilation



The predator guard is simply an extra piece of wood around the entrance hole. The added thickness makes it difficult for intruding beaks or paws to reach the nest. A 1-1/2" entrance hole will keep starlings out.

It takes only pine to make all cuts are straight needed. Use 1 all permanent



WHAT IS A BLUE

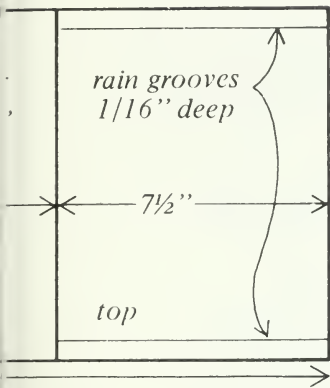
A bluebird trail is five mounted on fence posts or p 100 to 200 yards apart on course. A "bluebirder" to che

DO BLUEBIRDS NE

Today, fencerows have all bu are pruned. The apartments tha by the persistent and dominating starling and house sparrow.

Bluebird boxes are a much-ne eye level can be inspected with mirror...the comeback of the b e the beginning.

Bluebird Trail



feet of 1" x 10" white bluebird nesting box. Since no special tools are needed, only galvanized nails and glue are required.

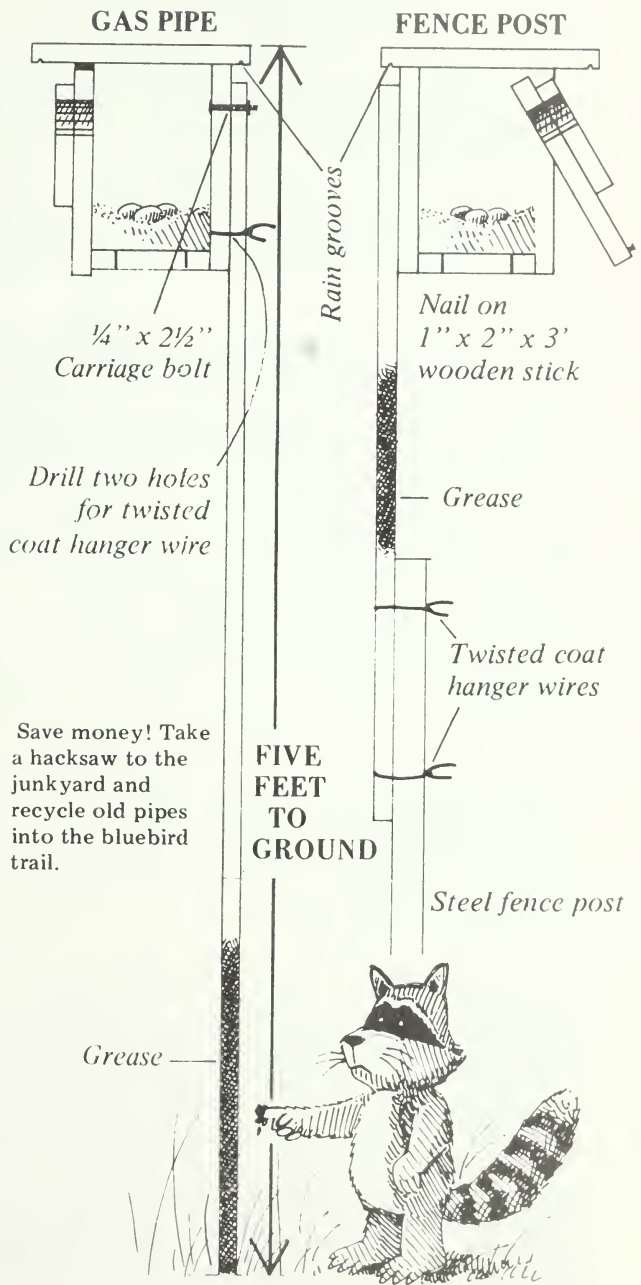
ROAD TRAIL?

More bluebird nesting boxes are needed in the city, park, cemetery, or golf course. Check the trail every week or two to see the progress of the tenants.

DO YOU NEED OUR HELP?

Bluebirds appeared and orchard trees were planted. The main area is usually occupied by European immigrants, the

and housing project. Boxes at the airport and mechanic's shop can be witnessed from



2 1/2' in the ground

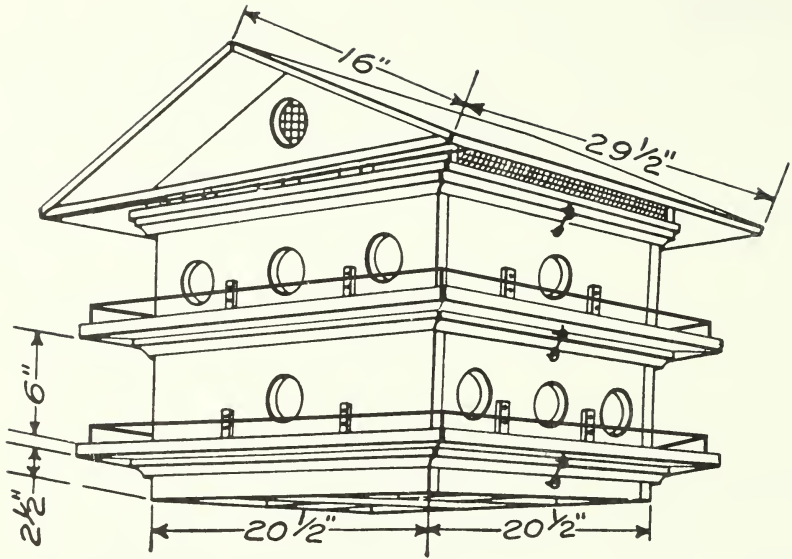


Figure 5.—Martin house in which the foundation, roof, and each story are built as units of uniform lateral dimensions, permitting the addition of more stories as the colony grows and allowing ready access for cleaning. A central air shaft and an elevated roof, permitting the passage of air beneath the eaves, assure a cool temperature for the interior. A cove molding around the under side of the roof and each story holds the parts in alignment and pairs of hooks and screw eyes fasten the units together.

Cliff swallows may be encouraged to nest under overhanging roofs by providing a narrow shelf or cleat of rough unpainted lumber, which will give them a place to attach their mud nests. Providing mud, especially in times of dry weather, will greatly facilitate the making of their nests.

Purple Martins.—The gregarious nesting habits of purple martins afford the builder of bird houses opportunity to employ his skill and ingenuity in construction, and in the matter of design he may let his fancy run free. All too often, however, such fancies are allowed to overshadow the important factors of accessibility and coolness in the structure. Martin houses are always an attraction to house sparrows and starlings, and during the period of the year when the rightful tenants are not present, the entrances to the nest cavities should be blocked or the houses taken down and stored. During the nesting season martins are apt to be successful in maintaining their property rights.

An idea that may be employed to advantage for a growing colony is illustrated in the house shown in figures 5 and 6. Each story is

made as a unit, and the uniform size permits the addition of other stories as needed.

The roof, built to the same lateral dimensions, attaches to the top story, all being held together by hooks and screw eyes. To clean, simply take the house apart and dump out the debris.

The temperature within the house is kept down by air circulating through the passage formed by cutting out the floors of what would otherwise be central compartments. The roof, raised slightly above the top of the upper story, also permits the passage of air from the central shaft.

The entire house with its support may be arranged for lowering in the manner illustrated in figure 7. One problem with this technique

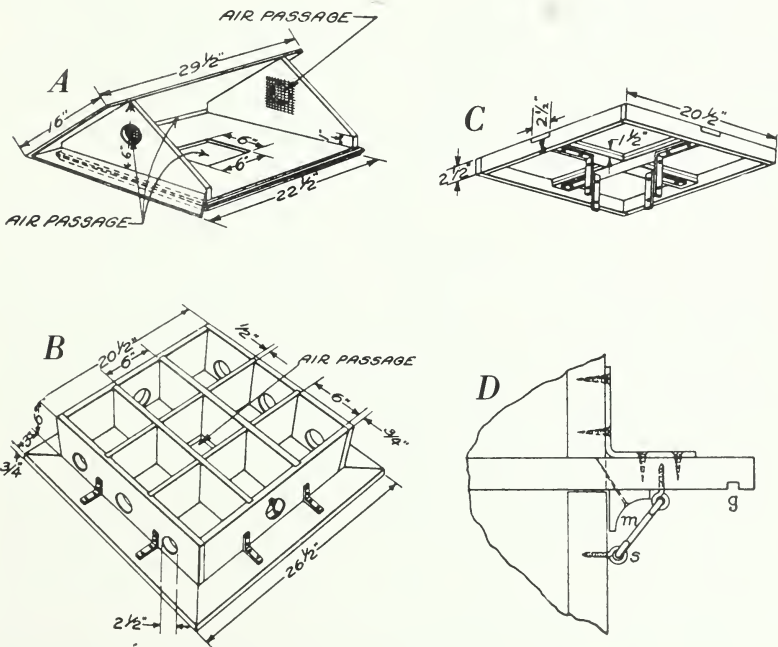


Figure 6.—Construction details of the martin house shown in figure 5: A, Roof with one side removed to show central air shaft. Air also passes through a 1-inch slot under the eaves and through two screened holes in the ends. B, One of the stories. The chambers are 6 by 6 by 6 inches, inside dimensions, and the bottom of the central chamber is cut out. C, Foundation, in which the central cross is built up of double thicknesses of $\frac{3}{4}$ -inch oak and the rest of the frame is of $\frac{3}{4}$ -inch pine. Four heavy angle irons fasten this to the supporting pole. D, Detail of porch when attached with angle irons; the molding *m* fits about the top of the lower story; the screw eyes and hooks *s* fasten the units together; and the groove *g* is made to prevent water from draining inward. A modification of this plan involves the attachment of the floors and porches to the top, rather than the bottom of each story. This will facilitate cleaning at the end of the nesting season but precludes the possibility of evicting objectionable tenants once nesting has started.

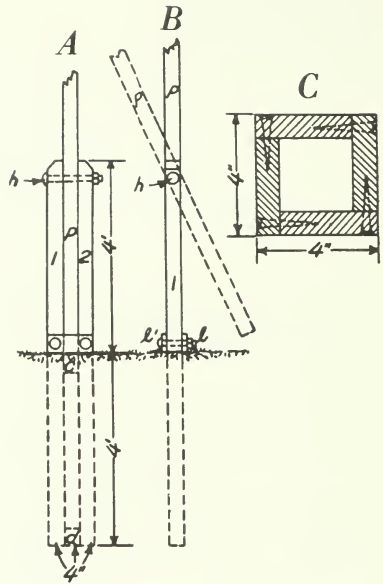


Figure 7.—Martin-house pole. A and B, The supports (1 and 2) are 8 feet long and 4 inches square. They are held in alignment by the 4-inch blocks c and d and are buried 4 feet in the ground. A heavy bolt or section of pipe (h) serves as a hinge, and the base of the pole is held in position by the two hardwood blocks or iron plates (l and l') bolted together. C, Cross-section of pole (p) built of 7/8-inch hardwood. In case of large houses the pole and supporting posts should be 6 inches in outside diameter.

is that tilting the house would break up any active nests present if you lowered it, as to remove house sparrow nests. If the pole is set firmly in the ground, a ladder leaned against it will permit taking down the house section by section. If built of soft pine, a two-story house of this kind will weigh about 65 pounds.

Houses for martins are usually painted white with neat trimming of another color. Like other swallows, these birds are attracted by water, and the probability of their establishing colonies will be increased if a pond or stream is nearby, especially if large fields or open areas are in the vicinity.

The material for the walls and floors should be $\frac{3}{4}$ inch thick and that for the roof and interior partitions $\frac{1}{2}$ inch. Lightweight roofing paper cut into shingles makes an efficient and neat roof covering. When facilities for gluing are available, the 3-inch porches may be made as extensions of the floors; otherwise they may be attached with angle irons as illustrated in figure 6.

A guard rail completely surrounding each of the porches should help prevent young martins from falling before they are old enough to fly. A $\frac{1}{2}$ inch diameter dowel elevated $\frac{3}{4}$ inches above the outside edge of the porch helps keep young martins safe as they move about, particularly on hot days. Martin houses should be located in clearings at least 25 feet from the nearest large tree or building—preferably with wires nearby to perch on.

Phoebes.—In common with certain other highly insectivorous birds, phoebes show a liking for a territory near water. The broad timbers and I-beams beneath a bridge are always an attraction, and once these birds have taken up their abode in such a situation, they are certain to return to it year after year. Away from this favorite environment, nesting sites in the shape of mere shelves (fig. 3, C) may be offered. These may be placed on the wall just within the large open doorway of a barn, or higher along the rafters, and even outside beneath the eaves, where protection may be had from above. Porches and eaves on houses are just as frequently used. These shelves can also be used under bridges and culverts with smooth walls. In more exposed situations nest shelters like those in figure 3, A and B, may be used. Select locations that snakes would find difficult to reach.

Crested Flycatchers.—Very different from the phoebe's needs are those of its relative, the crested flycatcher, whose natural nesting sites are old woodpecker holes and natural cavities in trees. Boxes made of weathered or dull-painted lumber or fashioned from natural stubs or slabs may be substituted for these holes. The rustic types, when placed in typical situations, as in orchards, open woodland, or in trees in pastures, probably have a greater appeal than do homes made of lumber (fig. 1 and 2). Ash-throated Flycatchers are a common western 'crested flycatcher' with similar nesting requirements to its close relatives.

Woodpeckers.—Of all the woodpeckers, flickers respond most readily to the lure of artificial nest boxes and will use boxes of painted or weathered lumber if other conditions are satisfactory. Boxes built to proper dimensions and conforming to any of the types illustrated in figure 1 are acceptable. A roughened interior is preferable to a smooth one, as it permits the growing young to clamber up to the entrance.

A quantity of coarse sawdust, ground cork, or better, small wood chips, should cover the bottom of the box to a depth of 1 or 2 inches, so that the birds may shape a cavity for the eggs. The chips also assist the birds in keeping the nest clean. Should furnishing these be neglected, the birds are likely to mutilate the box in their efforts to produce their own supply.

Flicker boxes should be placed above any immediately surrounding foliage. A dead stub makes an excellent support for the box and even a pole of the desired height will serve the purpose. The erection of boxes for flickers may be a means of preventing the damage caused by these birds when they persist in drilling holes into buildings in attempts to excavate nesting sites. In areas of high starling densities it may be futile to erect nest boxes for woodpeckers, because they both prefer small woodlots and woodland edges.

Red-headed woodpeckers, although preferring nest holes they themselves make, have been known to occupy man-made homes. Those fashioned from a natural stub (fig. 2, D) are most acceptable, although bark-covered boxes (fig. 2, A and E) also will serve the purpose. As with flicker houses, they should be placed above the immediately surrounding foliage. These birds are especially partial to oak groves.

The nesting boxes for downy and hairy woodpeckers are similar and vary only in the slight difference in size of nest cavity and entrance. Boxes of the types shown in figure 1, covered with bark or made from natural stubs or slabs (fig. 2), are sometimes accepted when attached to the trunk of a tree not densely shaded. In the bottom of each box should be placed a small quantity of chips. A bit of open woodland or an old orchard will furnish a desirable site for nests, although hairy woodpeckers prefer to nest deeper in the woods.

Owls.—Screech owls are not at all averse to using nesting facilities provided by man. Boxes of the types illustrated in figure 1, made of weathered lumber, of proper size and stained a dull color or covered with bark, are acceptable. A wooded grove furnishes excellent sites for screech owl boxes. The birds will supply the few bits of wood and feathers needed to form a nest.

Barn owls take readily to man-made structures, often nesting in barn lofts, towers, or offshore duck blinds. Simple wooden boxes (fig. 1) of appropriate dimensions will answer the needs of these owls which will furnish the scanty nest material used. The boxes may be attached to the trunks of rather large trees or may be placed about barn cupolas or in other little-frequented spots on buildings, or even in buildings if a proper opening is present.

Protection From Enemies

Cats.—These pets are one of the greatest obstacles in efforts toward increasing bird life in urban or suburban communities. The mere presence of a cat, even if it not a habitual killer, has a "demoralizing" effect on nesting birds and may entirely defeat the most energetic efforts to attract them and increase their numbers. Young birds just out of the nest are easy prey and may arouse the predatory instincts of the most docile and well-mannered house cat. During the nesting season even well-trained house pets must be kept away from the vicinity of bird nests, and vagrant animals must be carefully guarded against.

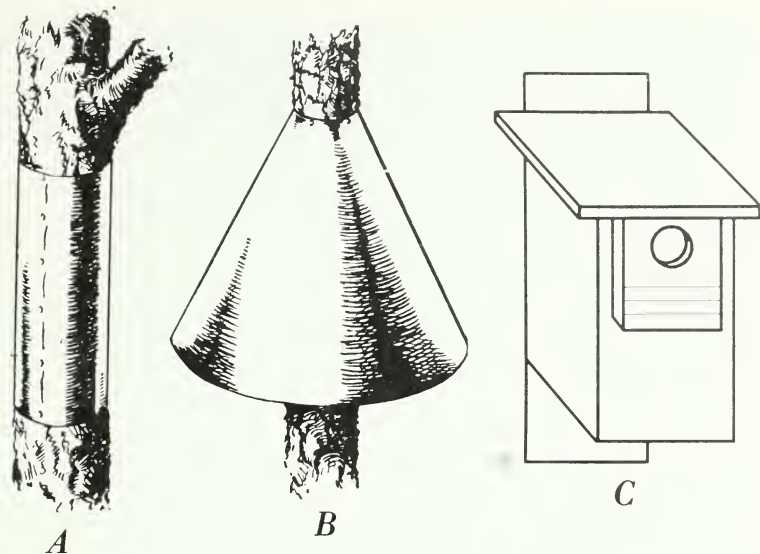


Figure 8. — Predator guards: A and B, sheet-metal; C, raccoon guard at box entrance.

A bird house may be protected by use of a sheet-metal guard encircling the supporting pole or tree. This may be either a cone or a cylinder about 18 inches long, tacked closely to the support (fig. 8), and placed high enough to prevent cats from springing from the ground and gaining a hold above it. Iron pipes as nest supports are catproof. A far-overhanging and sloping roof close over the nest opening also is a partial protection against cats. In some situations wire screen of a mesh large enough to permit the passage of the bird may be used to enclose the box in such a way as to prevent cats from reaching the nest.

Vagrant cats often obtain much of their food during spring and summer from bird life and had best be eliminated from areas where birds are being encouraged. In thickly settled regions, live traps can be used effectively.

Dogs.—These pets are also a hazard to nestlings in spring and summer. But because they kill with one swift bite and because they almost never carry their victim around as the cat does, they usually escape detection. Pet dogs should be restrained during nesting time.

Squirrels.—At times red squirrels become a serious menace to nesting birds. Both eggs and young birds are eaten, and in search for these the squirrels frequently enlarge the opening to the nest box. The sheet-metal guards illustrated in figure 8 will keep squirrels from ascending isolated trees or posts, and circlets of sheet metal placed

around entrance holes will prevent them from enlarging entrances. Metal circlets make it difficult for birds to obtain a footing at the nest hole, but this difficulty can be overcome by fitting them on the inside. See that the circlets have no sharp edges or jagged projections to injure the birds.

Houses suspended on wires beyond jumping range from solid objects are less likely to be attacked by squirrels, cats, and mice and are occupied by some birds.

Raccoons and Opossums.—A cunning and often very successful predator of nesting birds, the raccoon will take the brooding female or the eggs or young—or both! Its habitat includes swamps, river bottoms, or wooded streams and boxes placed near these areas are subject to its frequent inspections. If the entrance diameter of a nesting box is under 4 inches and thus too small for the raccoon to crawl through it will insert its arm into the box and rake the nest, trying to pull out the female and/or any eggs or young. Wood duck nests are a favorite source of food and nesting boxes erected for them without predator guards are highly unsuccessful. Opossums will occasionally pillage bird nests but are not as serious an enemy as raccoons. The telltale sign of raccoon or opossum predation is a disheveled nest, usually with nesting material coming out of the hole. Maurauding raccoons and opossums often can be stopped by the use of sheet-metal guards (fig. 8,A and B). The predator guard (fig. 8,C) in conjunction with a deeper cavity prevents the raccoon's arm from bending and reaching the nest.

Snakes.—In areas where tree-climbing snakes occur bird's eggs and young will be a choice part of their diet. Little can be done to fully protect the nesting box. Several boxes mounted on metal pipes coated with automobile grease have been found with grease around the entrance hole and an emptied nest! Research is being conducted to find a substance that irritates the snake's skin and stops its ascent to the box. The most promising at this date is grease sprinkled with red cayenne pepper. Snakes do not warrant man's persecution as they are natural predators of birds and are useful checks in the balance of nature.

House Sparrows.—These alien, ubiquitous birds are a source of much exasperation to those seeking to attract native birds. House sparrows, which are not really sparrows at all, but imported weaver finches, must be discouraged. Competition of these birds with other hole-nesting species can be prevented effectively only by reducing their numbers. Neither house sparrows nor starlings are protected by law. Persistent destruction of their nests will discourage these birds, but at the slightest relaxation in vigilance, they will re-establish themselves. When sparrows have taken up an abode in a

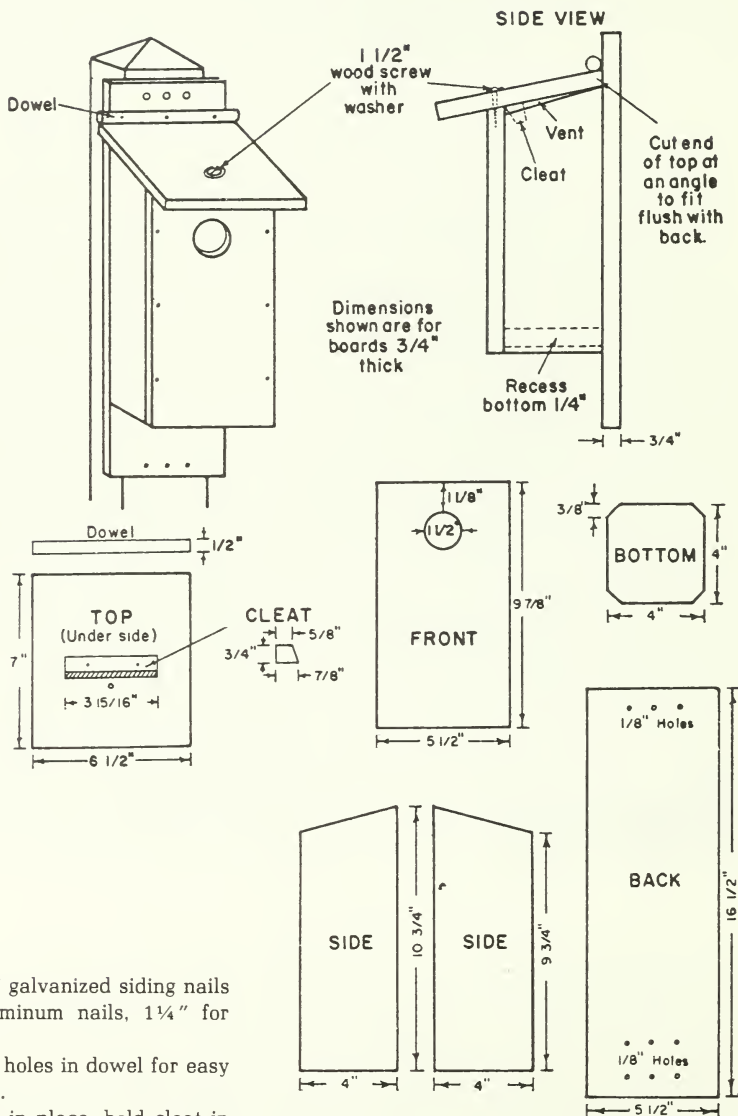


bird house, the female may be caught by closing the entrance during the night. Presently, researchers are experimenting with box designs intended to discourage house sparrows from building.

Solution to the difficulty, however, lies in an aggressive campaign against the sparrow, carried out preferably during the winter months, with the object of materially reducing or eliminating the breeding population for the next season.

European Starlings.—Starlings present a problem somewhat similar to that of the house sparrow in their transgressions against native species. They are extremely persistent when engaged in a controversy over the ownership of a nesting site and are usually victorious. Their insectivorous habits place them in the group of birds

PLANS FOR A TOP-OPENING BLUEBIRD NESTING BOX



Use $1\frac{3}{4}$ " galvanized siding nails or aluminum nails, $1\frac{1}{4}$ " for dowel.

Drill $\frac{3}{32}$ " holes in dowel for easy nailing.

With top in place, hold cleat in exact position for nailing by reaching through bottom of box before bottom board is attached.

Cut $\frac{3}{8}$ " off each corner of bottom board as shown.

that is considered a controlling agency of ground-frequenting insect pests. However, their aggressive behavior and ever expanding population offsets any beneficial side effect of their presence. They should be discouraged from nesting when possible. They usually will not bother boxes that are within 5 feet of the ground.

House Wrens.—Although praiseworthy as to food habits, house wrens sometimes interfere seriously with the nesting operations of other birds, even to the extent of puncturing and thus destroying their eggs. It is possible that these little busybodies have received too much encouragement in some localities.

Other Enemies.—Blue jays, grackles, magpies and crows occasionally destroy eggs and young of other species, but seldom do they interfere with nests inside nesting boxes.

Sanitation Of Bird Houses

The desirability of having all bird houses built so as to be readily opened for inspection is important. The tussock moth, gypsy moth, and other insect pests may place their eggs or cocoons in bird houses. It will be to the advantage of the owner, as well as to the birds, if the boxes are regularly inspected and cleansed of all intruders, including mud daubers and paper wasps, ants, bees, and mice.

The insects can be stupefied, if necessary, by ordinary smoke fumes and disposed of as desired, or killed by spraying with an insecticide not likely to be harmful to birds, such as one containing pyrethrins. The small rodents can be removed in the hope that the birds will take possession before they return.

Houses should be repaired and cleaned just before the nesting season and inspected periodically as long as birds are about. Birds are subject to parasites, such as bird lice or mites, which are usually mere nuisances, though others, as the larvae of certain flies, often are a menace to nestlings.

It is advisable to clean nest boxes immediately after broods have left, even if the parent birds show signs of using the house for another family. Old eggs and dead nestlings will thus be discarded and parasites kept down. The material removed should be placed in a paper and burned. So far as bird parasites are concerned, sanitation of the houses can be profitably supplemented by ample provision for water and for dust or sand baths. These are nature's means of keeping down body vermin. On the whole, clean nest boxes have a better chance of being occupied, and certainly the prospects of rearing the next brood are improved.

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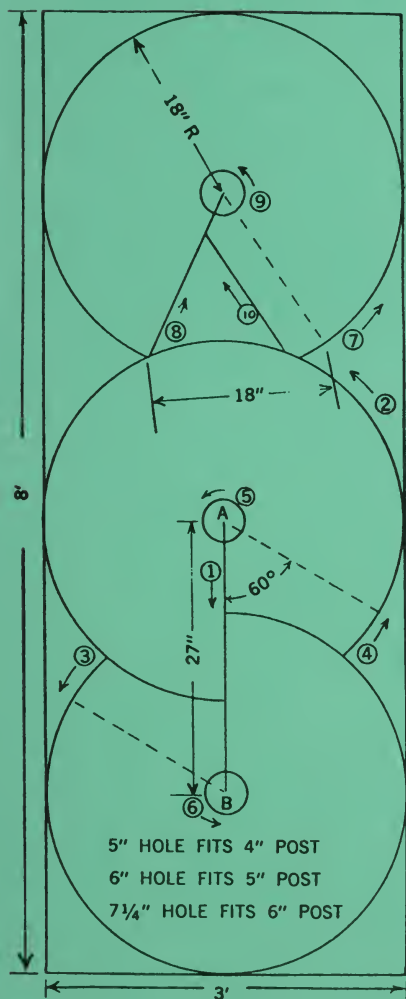
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ASSEMBLY AND MOUNTING INSTRUCTIONS FOR A CONICAL PREDATOR GUARD

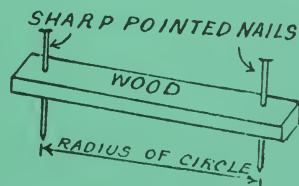
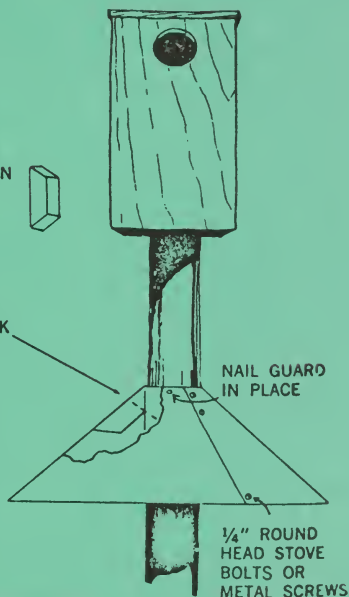


USE 3 WOODEN MOUNTING BLOCKS



DRILL PILOT HOLE FOR NAILING BLOCK TO POST

SIDE VIEW CUT AWAY TO SHOW MOUNTING BLOCK



HOME MADE COMPASS FOR SCRIBING METAL

Cone-shaped sheet-metal guard for protecting nest structures from predators. At left is layout for cutting three predator guards from a 3-by-8-foot sheet of 26-gauge galvanized metal. When installing the guard, overlap cut edge to dotted line. See hole sizes. To facilitate cutting (on solid lines only) follow sequence of numbers. Make circular cuts in counterclockwise direction. To make initial cut on line A-B, make slot at A with a cold chisel for inserting shears.

INFORMATION ABOUT NESTS, EGGS AND NESTING HABITS FOR SELECTED SPECIES OF NESTING BOX USERS. **

	Eastern Bluebird	Carolina Chickadee	White-breasted Nuthatch	House Sparrow	Tree Swallow	Tufted Titmouse	House Wren
Time required to build nest	4 - 7 days	3 - 4 days	3 - 4 days	Can build in one day repeatedly	2 - 14 days	3 - 7 days	M sticks, several days F feathers, cup lining.
Nesting Materials	Grass cup or pine needles	Moss, lined with fur or hair	Bark shreds, twigs, grass hair, fur, etc.	Grass, paper, feathers, with canopy	Grass with many feathers	Moss, hair fur & wet leaf parts	Sticks and thorns with feathers
Eggs	Pale blue, sometimes white	White, pink heavy brown spots	White with brown spots	White, green, with gray or brown spots	Glossy white	White, with small dots	White, with reddish or brown spots
Clutch Size	3 - 7	5 - 9	5 - 9	3 - 7	4 - 6	4 - 8	5 - 12
Broods per year, early nest dates	2, sometimes 3 Early April	1 Mid-April	1 Mid-April	Too many!!! Early April	1 Late May or June	1 Mid-April	2 Mid-May
Incubation Period	F 12 - 16	F 11 - 13	F & M 11 - 13	F & M 12 - 13	F, M at time 13 - 16	F 12 - 14	F 12 - 15
Nesting Period	15 - 20	16	14	10	16 - 24	15 - 16	12 - 18
Other Notes	Open areas, Scattered Trees, perches	Very protective of nest	Hard to attract, likes rough box	Likes buildings	Likes water nearby	Easy to photograph	Likes brushy areas

** Much of the information concerning nest building, number of eggs and incubation and nesting periods is generalized for "average" situations. Weather, food supply, nesting territory and geographical area all influence individual nesting circumstances. This chart is intended to serve as a guide only. F = Female M = Male