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**BUILDING  
AND  
LOCATING**

**B A C K Y A R D**  
**BIRDHOUSES**

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# **Building and Locating Backyard Birdhouses**

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## Building Birdhouses

### *Do:*

- Build birdhouses for specific bird species
- Use ¾-inch-thick wood for best construction
- Drill drainage holes in the floor
- Drill ¼-inch ventilation holes in the sides near the roof
- Provide an overhanging roof of at least 2 inches
- Use rustproof nails or screws with waterproof glue
- Enclose the floorboard within the sides, recessed about ¼-inch
- Cut an entrance hole of recommended size for specific birds
- Install a hinged roof, floor, or side for easy cleaning
- Install predator guards on birdhouse support poles
- Place birdhouses along habitat “edges”
- Use standing dead trees by excavating a cavity inside the tree trunk

### *Don't:*

- Use wood preservatives or pressure-treated wood on birdhouses
- Install a perch to attract starlings and house sparrows
- Use tin cans, milk cartons, and metal containers for birdhouses
- Place birdhouses in noisy areas, human disturbance areas, or near areas of easy access by house cats and squirrels
- Hang a birdhouse by nailing it directly to a living tree

## Introduction

Each year thousands of wildlife habitat acres are lost in rural and urban areas because of more efficient agricultural practices, intensive forest harvest activities, and construction of city subdivisions, shopping centers, and parking lots. This type of human encroachment also impacts cavity-nesting birds that depend on trees for suitable housing requirements. These cavity-nesters will adapt to using birdhouses when trees are cut for urban development or increased agricultural production. In addition, many cavity-nesting birds lose nesting sites to more aggressive species such as house sparrows and European starlings. Increased populations of domestic cats and squirrels (especially in urban areas) make it difficult for cavity-nesting birds to find safe nesting sites.

Birds provide numerous environmental benefits that are not readily apparent to most people. Their high-energy demands for activities such as flying, reproduction, and generating body heat during winter require eating many pounds of wild weed seeds and insects. Studies of sparrows indicate that they consume one-fourth of an ounce of plant seeds per day. Without birds, the cost of applying herbicides and pesticides would increase along with the added risks of environmental contamination.

Building birdhouses also provides hours of recreational opportunities for adults and exciting learning experiences for boys and girls. Birdhouses attract songbirds to backyards and offer hours of fun viewing bird behavior.

A properly constructed birdhouse is a great way to help compensate for the loss of natural habitat for cavity-nesting birds as well as provide recreation and educational opportunities to the builder. There are many species of cavity-nesting birds in Wyoming (Table 1) that will use birdhouses. Depending on the location in Wyoming, birdhouses will attract a variety of these natural wildlife species.

**Table 1 – Cavity-nesting bird species found in Wyoming\***

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Wood duck	Downy woodpecker
Common goldeneye	Black-backed woodpecker
Barrow's goldeneye	Three-toed woodpecker
Bufflehead	Ash-throated flycatcher
Hooded merganser	Violet-green swallow
Common merganser	Tree swallow
Turkey vulture	Purple martin
Grackle	Black-capped chickadee
Red-naped sapsucker	Mountain chickadee
American kestrel	Plain titmouse
Barn owl	White-breasted nuthatch
Screech owl	Red-breasted nuthatch
Northern pygmy owl	Pygmy nuthatch
Boreal owl	House wren
Northern saw-whet owl	Bewick's wren
Chimney swift	Eastern bluebird
Northern flicker	Western bluebird
Red-headed woodpecker	Mountain bluebird
Lewis's woodpecker	European starling
Williamson's sapsucker	House sparrow
Hairy woodpecker	

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\* Data from: Scott et. al. 1977

## **Guidelines for Building Birdhouses**

### ***Construction Materials***

Wood of ¾-inch thickness is the best material to use for building birdhouses for a number of reasons. First, it can easily be cut, drilled, and shaped in a variety of ways. Second, it provides good insulation against temperature changes and noise. Third, it is widely available in a number of price ranges or may cost nothing. Finally, properly constructed wood birdhouses are durable and accept a variety of different finishes that blend with their natural surroundings.

The type of wood to select depends on availability, price, and working characteristics of the wood desired. For example, pine is relatively inexpensive and easy to work with, making it suitable for building small birdhouses. Cedar, redwood, or cypress may weather better and is more durable for building larger birdhouses. However, cedar, redwood, and cypress are more expensive. Cypress is especially hard to nail. Plywood is convenient for laying out and cutting birdhouse designs, but be sure to select an “exterior” grade that uses waterproof glue. All cut edges of plywood should be sealed to prevent moisture absorption.

Do not use chemical wood preservatives or pressure-treated woods. Chemicals may be toxic to nestlings. For example, many commercially available woods with a green-colored stain are treated with a copper-based preservative that produces poisonous vapors when exposed to water. Likewise, do not apply pentachlorophenol (penta) or creosote as a wood protective coating. Pine or plywood materials can be treated with a wood stain on the outside only for protection against rotting. The back panel of a birdhouse should receive several coats of stain because this side will be oriented towards the prevailing weather for protection of the nestlings. A properly constructed and treated pine or plywood birdhouse should last 10 to 15 years.

Use proper nails or screws in building houses to avoid rusting and loosening. Galvanized nails can be used to avoid rusting. However, they will eventually loosen as wood expands and contracts with changing seasonal temperatures. Concrete nails or ring shank nails can be used to avoid loosening, especially with redwood or cedar materials. Deck screws can be used in place of nails to prevent premature loosening due to temperature changes. These can be tightened periodically to ensure a solid birdhouse.

Exterior finishes are a matter of personal preference. Unfinished houses made of redwood, pine, spruce, or exterior plywood will turn gray from natural weathering. If a colored house is desired, use a semi-transparent oil-based stain that penetrates the wood or a dull natural-colored lead-free paint. A single coat will last at least three years on a smooth surface and longer on rough surfaces. Do not paint the interior of a birdhouse or the exposed entrance rim. Again, avoid stains that contain penta preservatives.

Wood purchased at local lumber yards is not the only source available for building birdhouses. Some of the most natural and beautiful birdhouses are made from locally available branches and logs of dead trees. Five-inch or larger-diameter logs can be chiseled out to make sturdy birdhouses. These can be found where storms down trees, at construction sites where trees are cleared, or as driftwood on lake shores. Wooden packing crates and discarded wood pallets are often available at local warehouses. This rough-cut lumber, used to protect large, heavy items during shipment, can be used to construct birdhouses.

There are numerous types of birdhouses on the commercial market built from novelty items such as coconut shells, gourds, flower pots, old cowboy boots, and cement-coated wire mesh. However, never use tin cans, milk cartons, or metal when constructing birdhouses. These heat up in direct sunlight, which may cause overheating of eggs and mortality of young birds from heat exhaustion. Commercial plastic birdhouses are acceptable provided they are located in shady spots.

### *Roof Designs*

Birdhouse roofs should be designed with three requirements in mind. They should: (1) shed water efficiently to prevent drainage into the nest box, (2) provide a tight seal on all exposed joints to prevent water leakage, and (3) provide an adequate overhang over the entrance hole for protection against predators and wind-driven rain or snow.

To provide adequate runoff of rainwater on birdhouses, the roof should be sloped and sealed against water penetration with an impervious material. Some builders protect the roof by overlaying the wood with a strip of tin, aluminum, or roofing material such as house shingles. Avoid making the roof entirely of metal or asphalt shingles to prevent heat buildup. Adequate ventilation or an insulating wood layer beneath the outer roof shell can counteract some heat absorption. If there is some doubt about the amount of heat buildup inside the birdhouse, place a thermometer inside the house to check the temperature before erecting the birdhouse.

To protect against water leakage at exposed roof joints, make sure the cut joints fit well together and seal them with a waterproof glue or non-toxic caulking compound. The simplest and safest roof design is a one-piece roof with no joints to leak.

The top front edge of a birdhouse roof should overhang at least two inches to protect the entrance hole from wind-driven rain or snow and to prevent predators such as cats from reaching in the nest box from above. Always orient a birdhouse with the entrance hole away from the prevailing winds to provide further protection against harsh weather.

### *Floor and Interior Design*

When building a birdhouse, enclose the floorboard within the sides to protect against water seepage through the joints. Be careful not to have exposed nails inside the nest box when nailing the sides of the birdhouse to the floor because they could cause injury or death to the nestlings. Also, recess the floorboard approximately ¼-inch up from the bottom of the sides to help reduce deterioration of the floorboard from accumulated moisture.

Natural cavities used by nesting birds have rough-surfaced interiors with plenty of foot holds. It is especially important for fledgling birds to be able to climb out of the nest box. Use rough-cut wood on the inside wall of the birdhouse beneath the entrance hole. Hardware cloth, cleats, a narrow incline, or wood dowels glued flat against the inside wall surface can also be installed to provide footholds. A series of horizontal grooves cut into the wood below the entrance hole can accomplish the same purpose. Make sure that birdhouses built with smooth, finished lumber have these modifications for footholds.

### *Drainage and Ventilation*

Drainage holes in a floor of a birdhouse are necessary to keep water from collecting inside during a heavy or extended rainstorm. Water can also accumulate if the roof develops a leak or when the roof does not extend far enough beyond the entrance hole to keep out blowing rain. At least four ¼-inch-diameter drain holes should be drilled in the bottom of the floor to eliminate water.

Ventilation holes are also necessary, especially for small birdhouses, to prevent heat buildup inside the nest box. On large birdhouses, heat can build up when large surface areas of the nest box are exposed to the sun or when the entrance hole is well below the roof peak. Drill at least two ¼-inch holes near the top of the right and left side walls above the level of the entrance hole. Some builders shorten the left and right sides of the house by ¼ inch, allowing side-to-side ventilation just under the roof.

### *Entrance Holes*

The size and shape of an entrance hole is probably the most critical part of birdhouse design. Different species of birds require different entrance hole sizes and birdhouse dimensions (Table 2). If the entrance hole is too large, it will attract undesirable, aggressive birds that out compete smaller cavity-nesters or allow predators to enter the nest box. Entrance holes 1 3/8 inches in diameter or larger will permit house sparrows to enter while holes larger than 1½ inches in diameter will admit European starlings. Closely follow prescribed entrance hole dimensions in Table 2 when constructing birdhouses to exclude these two pests.

Before drilling an entrance hole, make a paper template of the required hole size. Using this template, orient the hole location near the roof of the birdhouse and trace around the edge of the template with a pencil. Drill the hole from the outside wall to avoid splintering the wood on the outside surface.

Table 2 goes here

### *Interior Access Design*

All birdhouse designs should have a detachable or hinged roof, floor, or side to permit easy annual inspection and cleaning of accumulated debris. This feature reduces the chances of a disease or parasite being transmitted from one breeding season to the next. It also permits easy removal of nesting materials from unwanted tenants such as house sparrows, European starlings, mice, bees, wasps, and other small animals.

**Table 2 – Birdhouse dimensions for some cavity-nesting birds found in Wyoming\***

Species	Floor length/ width (in.)	Box height (in.)	Entrance height above floor (in.)	Entrance hole diameter (in.)	Placement height above ground (ft.)
Eastern and western bluebirds	5x5	8-12	6-10	1½	4-6
Mountain bluebird	5x5	8-12	6-10	1½	4-6
Black-capped and mountain chickadees	4x4	8-10	6-8	1 1/8	4-15
Plain titmouse	4x4	10-12	6-10	1¼	5-15
Ash-throated flycatcher	6x6	8-12	6-10	1½	5-15
Pygmy and red-breasted nuthatch	4x4	8-10	6-18	1¼	5-15
White-breasted nuthatch	4x4	8-10	6-18	1 3/8	5-15
Purple martin	6x6	6	1-2	2¼	6-20
Tree and violet-green swallows	5x5	6-8	4-6	1½	5-15
Downy woodpecker	4x4	8-10	6-8	1¼	5-15
Hairy woodpecker	6x6	12-15	9-12	1½	8-20

**Table 2 – Continued.**

Species	Floor length/ width (in.)	Box height (in.)	Entrance height above floor (in.)	Entrance hole diameter (in.)	Placement height above ground (ft.)
Lewis's woodpecker	7x7	16-18	14-16	2½	12-20
Northern flicker	7x7	16-18	14-16	2½	6-20
Red-headed woodpecker	6x6	12-15	9-12	2	10-20
Bewick's and house wrens	4x4	6-8	4-6	1¼	5-10
Barn owl	10x18	15-18	4	6	12-18
Screech owl and American kestrel	8x8	12-15	9-12	3	10-30
Saw-whet owl, pygmy owl, and grackle	6x8	10-15	9-13	2½	10-20
Wood duck	10x18	10-24	12-16	4	10-20
Bufflehead	6x8	10-15	9-13	2½	10-20
Common and Barrow's goldeneyes, and hooded and common mergansers	10x12	25	20-23	4x5 oval	10 minimum

\*Data from: U.S. Fish and Wildlife Service 1991.

Rustproof hinges can be commercially purchased from hardware stores or devised from flexible pieces of leather, rubber, or tough fabric. Non-metal hinge materials should only be used for roofs or sides where the weight of birds is not against the hinge to cause failure under stress. For a hinged floor, use brass screws to hold the bottom to the sides. Screws can be easily removed for annual cleaning and inspection.

When raccoons are prevalent, avoid fastening hinged sides or roofs with hook-and-eye attachments. Raccoons can easily figure out how to open these attachments. Instead, use paired roofing nails with large heads, placing one nail on each side of the roof and the other nail on the upper edge of each wall side. Wire the nails together to hold the roof down.

Another design that permits easy access to the birdhouse interior is called the open-back method. This involves attaching a birdhouse without a back to a mounting board using brass screws. The mounting board serves as the birdhouse back where the birdhouse can be unscrewed for annual cleaning and inspection. A mounting board can be a smooth wall of a garage or shed under the protecting eaves of the garage or shed roof. The outer edge of a birdhouse should be caulked to prevent leaks, and a birdhouse may be painted to match or blend with a garage or shed wall used as a mounting board.

## **Additional Construction Tips and Techniques**

Avoid installing perches on birdhouses. These attract house sparrows and European starlings, which compete with other birds for available houses. Perches also encourage predators including domestic cats. Perches should be removed from any existing birdhouses and replaced with a slab of wood, with the bark attached, under the house entrance hole. This will provide easy landing areas for birds and still discourage use by house sparrows and European starlings.

Use both nails and waterproof glue when assembling birdhouses to ensure a strong, long-lasting box. Nails will hold birdhouse pieces tightly together while the glue is drying. The joints will be stronger and sealed better against rain and melting snow. Brass screws can be substituted for nails for an even stronger design.

When working with wood that splits easily, pre-drill holes a few sizes smaller than the nails to be used. Pre-drilled nail holes should also be used when using softer, non-rusting aluminum nails in heavy or dense woods. Aluminum nails can be purchased at hardware stores, building supply stores, or where aluminum siding products are sold.

Some drill bits and wood types tend to cause splintering when entrance holes are drilled. To prevent splintering, drill entrance holes from the front or outside side to the interior side and place a block of scrap wood under the exit point area.

When building natural log houses, thoroughly air dry the material and carefully split or saw the log down the middle of its length. Hollow out each log half using wood chisels or gouges and reassemble with rustproof nails or brass screws and waterproof glue.

Use quality exterior-grade paints, stains, or varnishes to protect the exterior of birdhouses. Dull browns, greens, and grays will blend in better with natural surroundings and attract more birds. The natural instinct of birds is to seek inconspicuous nest cavities to raise their young. Do not use any finish on the interior of a birdhouse. This practice is unnatural to cavity-nesting birds, unnecessary, and potentially toxic to nestlings.

Cavity-nesting birds do not care about aesthetically pleasing birdhouse designs. They seek houses that provide protection from predators and weather in locations that are inconspicuous and have minimal disturbances during nesting.



Figure 1. A well-constructed birdhouse should include ventilation holes, a roof overhang, an enclosed floorboard, a hinged roof, and no perch.

## Site Selection and Placement

### *Site Selection*

There are two basic requirements for attracting any particular species of bird to a constructed birdhouse: (1) the bird species must be a permanent or nesting-season (summer) resident of a particular area in Wyoming; and (2) the habitat where the birdhouse is located must match the requirements of the selected species. A good field guide to identifying birds will include a distribution map showing where each bird species can be found during the nesting season. Information on preferred habitat should also be available in good field guides. For each habitat type in Wyoming, there are specific species of birds associated with each area. For example, mountain chickadees and nuthatches are commonly found in forest and farm woodlots; wood ducks, common and Barrow's goldeneyes, and buffleheads select woodlots and forests bordering water bodies; and tree swallows, robins, and house wrens inhabit urban areas.

A few birds such as European starlings and house sparrows nest almost anywhere and in any available space. All birds, however, select preferred habitat that provides for specific requirements of abundant food, protective cover, water, and nesting sites. Once these habitat requirements are satisfied, the style and size of a birdhouse will further determine which bird species use the nest box. Following is a list of some common bird species and preferred birdhouses associated with general habitat types in Wyoming:

**Agricultural and Native Shrub-Grasslands:** Birds commonly observed include the American kestrel, saw-whet, barn, and screech owls, hairy and red-headed woodpeckers, tree swallow, black-capped chickadee, house wren, common grackle, and mountain and eastern bluebirds. In these areas, birdhouses can be attached to fence posts, trees in hedge rows, or placed on pole tops.

**Farm Woodlots, Shrublands, and Forests:** All of the species mentioned previously are observed plus the pygmy and screech owls, northern flicker, Lewis's, downy, black-backed and three-toed woodpeckers, Williamson's sapsucker, ash-throated and willow flycatchers, mountain chickadee, plain titmouse, red-breasted, white-breasted and pygmy nuthatches, Bewick's wren, and western bluebird. In these areas, birdhouses should be attached to trees.

**Woodlots and Forests Bordering Water Bodies:** Common bird species include Barrow's and common goldeneyes, bufflehead, hooded and common mergansers, and wood duck. Birdhouses attached to trees or posts near or in the water are most effective.

**Urban Areas:** Birdhouses in this area commonly attract the tree swallow, black-capped chickadee, and house wren. Nesting ledges in urban areas are preferred by the barn swallow, blue jay, and robin.

**Houses, Barns, and Other Buildings in Rural Areas:** All the species listed for urban areas use birdhouses around buildings plus the hairy and downy woodpeckers, violet-green and cliff swallows, common grackle, Say's phoebe, ash-throated flycatcher, and mountain and eastern bluebirds.

Each species has a specialized niche or place of residence in the environment. Some birds may adapt to niches and environments that are less than ideal. However, the more closely a site matches a bird's natural environment, the more likely the desired bird will be attracted to constructed birdhouses.

### *Birdhouse placement*

Once birdhouses are constructed for species occupying selected sites, nest boxes must be carefully placed in strategic locations. Many bird species prefer edges where two or more vegetative types adjoin one another for nesting. Edges of clearings in forests, shorelines of ponds or rivers, the forest edge near an open meadow, and the shrubby border of a backyard are all examples of habitat edges. Place birdhouses just in front of or within the edge of one of these border areas. Face the house entrance hole toward the more open habitat type such as the meadow, yard, or pond. Generally speaking, partial shade is preferred over heavy shade or full-sun areas. If hot summers are typical, face the entrance holes north or east to avoid overheating problems. Select placement areas where there is a shortage of acceptable natural tree cavities.

Consider territorial behavior when placing birdhouses. Most bird species establish specific nesting territories and aggressively chase out other birds trying to nest within these boundaries. For example, the nesting territory of robins may be only 3/10 of an acre and for tree swallows as little as 7 feet while the white-breasted nuthatch requires 25 to 30 acres for nesting and foraging. Many experts suggest that the "bluebird lane" method of birdhouse placement be adopted for many species. This concept suggests placing birdhouses at 100-yard intervals along habitat edge areas to minimize territorial conflicts. In small backyard areas, try to use several different birdhouses designed for noncompeting species to increase the chances of at least one house being used.

Following are a few simple rules to remember when selecting placement locations for birdhouses:

- Avoid placing birdhouses where cats, squirrels, or other natural predators will be a threat. In areas where predators may be a problem, supply adequate protection such as cat and squirrel guards.
- Avoid placing birdhouses near noisy automotive traffic areas or sites subjected to constant human disturbances. More timid bird species will be discouraged from using the birdhouse.
- Do not place birdhouses near feeders. Disturbance from other birds around feeders will discourage the use of birdhouses.
- Ensure that birdhouses are placed at the correct height for attracting the desired species. Birdhouse placement must mimic the natural habitat requirements of desired species for optimum effectiveness.
- Clear all obstructions from around the entrances to birdhouses to allow easy access to and from the nesting boxes.
- Securely fasten birdhouses to trees, fence posts, or other structures to prevent wind damage. Use wire instead of twine to suspend hanging birdhouses and attach a piece of old garden hose or tire rubber under the wire to protect living tree limbs from bark damage.

## Methods for Hanging and Supporting Birdhouses

The best method of support for a birdhouse is a post, pole, or pipe because the builder can select the exact height and location required for each species (Table 2). Place birdhouses at heights that can be reached for maintenance yet still provide protection from predators.

Wood posts are usually four-by-fours of pressure-treated lumber, which resists rotting. Posts can be buried in the ground with two-by-four-inch cleats nailed at the base to prevent the post from pulling out. A better method is to tamp gravel under and around the post or metal pole to allow water to drain away. Ideal installation for wood posts, metal poles, and pipes is to set a post or pole on a layer of gravel in a three-foot hole and fill it with concrete. The



Figure 2. Birds prefer nest boxes placed along habitat edges such as the shorelines of streams or ponds.

concrete can be mounded and shaped at the top to slope away from the base, thus draining water from the structure.

When hanging a birdhouse, use a vinyl-coated clothesline wire to prevent rusting, and attach it to an eyebolt installed in the roof of a birdhouse. If the wire is looped over a tree limb, use rubber or heavy vinyl such as an old garden hose as a sheath to prevent the wire from rubbing or cutting into the bark. Bungee cords may also be used to attach birdhouses to tree trunks with no injury to the tree.

The worst method of hanging a birdhouse is to nail it directly to a living tree. Not only is the tree needlessly injured, but a tree large enough to support a birdhouse is usually too large to allow the effective uses of cat or squirrel guards.

## Predator Guards

To prevent squirrels and cats from climbing birdhouse supports, attach a piece of sheet metal in the form of an inverted cone to the support post or pole. Place this guard high on the support post or

pole to prevent leaping animals from reaching birdhouses from a nearby tree or shrub.

Another method to deter squirrels and cats is to wrap a long section of sheet metal around wooden post supports and tack it in place. The sheet metal does not allow squirrels or cats to use their claws for footholds when they are trying to climb the support posts.

Some birdhouse builders install an extra block of scrap wood having the same hole diameter as the entrance hole on the inside wall. This addition, called a “predator block,” extends the depth of the entrance hole to make it more difficult for predators to harass birds inside the box. Attach these blocks with screws and waterproof glue on the inside wall before drilling the entrance hole. This will provide a uniform entrance hole diameter and provide added protection to nestlings and adults inside the box.

Houses mounted on metal poles are the most difficult for predators to reach. Smearing the poles with a petroleum jelly and hot pepper mixture provides added protection against persistent advances by determined predators.

## Maintenance

After erecting a birdhouse, periodically inspect and clean out residue to prevent disease spread, transmission of parasites to future inhabitants, and removal of unwelcome guests trying to establish residency. Necessary repairs can be completed during the winter months.

Remove nests of unexpected tenants such as mice, squirrels, bees, wasps, and other small animals before they become permanently established. These unwanted tenants should be removed quickly to avoid having to provide additional houses for desired residents.

Remove wasp nests from birdhouses promptly. If wasps invade a birdhouse, remove the wasp nest and spray the interior with a disinfectant such as Lysol to discourage future use. A can of aerosol insecticide may be necessary to avoid being stung during this process. Also, coat the inside roof of a house with bar soap to prevent wasps from attaching their nests.

Eliminate blowfly eggs and larvae in the spring and fall. Oftentimes blowfly eggs and larvae are found in bluebird nests. Blowfly larvae will suck blood from young birds, which may result in weakness or death. To remove blowfly eggs and larvae from a nest, lift the nesting material and gently tap to dislodge eggs and larvae. Remove this debris from the bottom of the birdhouse before replacing the nesting materials. Insecticides known to be safe around birds, such as a 1-percent rotenone powder or pyrethrin spray, can be used to eliminate problem insects and parasites.

Discourage house sparrow and European starling invasion. Repeated removal of house sparrow and European starling nests from birdhouses (at least six times) will eventually discourage further nesting attempts. House sparrow nests can be identified by messy structures of grass, assorted litter, and garbage. Starling nests are similarly untidy structures of stems and leaves.

A birdhouse should be cleaned each fall. This reduces the chance of harboring disease and parasites and increases the longevity of the box.

It may be useful to annually place some wood shavings, dried grass, pine needles, or other suitable nesting material into waterfowl or birds-of-prey houses. Do not use sawdust because it packs down when wet and retains moisture. Species that prefer lining materials include the screech, barn, and saw-whet owls, American kestrel, wood duck, hooded and common mergansers, common goldeneye, northern flicker, and hairy woodpecker. The exception to using sawdust is the northern flicker because this species likes to dig out its own hole from a sawdust-filled cavity.

Following the nesting season, leave the roof, side, or bottom of a birdhouse open throughout the winter or seal the entrance hole to prevent winter residency by deer mice or squirrels. If left unchecked, mice will establish winter nests and vigorously defend “their houses” against returning songbirds the following spring. Songbirds trying to enter these houses may be killed by resident mice. Prepare birdhouses for residency in the spring by unsealing entrance holes or closing the roof, floor, or sides. Do this only when nesting by the desired species is expected. This will restrict early nesting by starlings and house sparrows.

## Acknowledgements

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