



Wildlife in My Backyard: Part 4. Nest Boxes and Shelves

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Most backyards lack dead trees, also called snags, or damaged live trees, which are needed by cavity nesting birds. But many species can be enticed to nest in your backyard by the placement of nest boxes. In this article I will discuss ways of attracting cavity nesters into nest boxes and how to attract some tree nesters to nest on shelves erected against a building. For those of you who live next to lakes and marshes, I have also included diagrams for the construction of Wood Duck nesting boxes.

Nest boxes have become increasingly important due to loss of suitable nesting habitat, and are now critical to some birds' survival. For example, both the Eastern Bluebird and Wood Duck had severely declined, mainly due to suitable nest site loss, and both of these species have increased once again due to nest boxes.¹ Many of the boxes I describe can be either purchased at nature and garden centres, or built by yourself. The best time to start erecting nest boxes is from late winter into early April. One of the joys of installing nest boxes in your yard is watching the birds select the box, start collecting nesting materia, watching the parents raise and feed the young, and hopefully seeing the young birds' first flight.

1. Cavity Nesters and Nest Boxes

There are 86 species of cavity nesters in North America, and of these 30 can be found in the Kingston region, with 23 readily accepting nest boxes (*) and 11 species (+) that are found in most backyards (Table 1). To learn more about the natural history of some of the birds listed in Table 1, and many others, I would suggest finding, or purchasing, a copy of Ehrlich, P.R., Dobkin, D.S. and Wheye, D. (1988), *The Birder's Handbook: A Field Guide to the Natural History of North American Birds*. New York: Simon Schuster Inc. 785 pp.

Table 1: Cavity Nesters of the Kingston Region.²

Turkey Vulture	Northern Flicker*
American Kestrel*	Pileated Woodpecker
Merlin	Brown Creeper
Peregrine Falcon	Black-capped Chickadee*+
Eastern Screech Owl*+	White-breasted Nuthatch*+
Northern Saw-whet Owl*	Red-breasted Nuthatch*
Barred Owl*	House Wren*+
Wood Duck*	Winter Wren
Common Goldeneye*	Great-crested Flycatcher*
Bufflehead*	Eastern Bluebird*
Hooded Merganser*	Tree Swallow*+
Common Merganser*	Purple Martin*+
Yellow-bellied Sapsucker	Starling*+
Downy Woodpecker*+	House Finch*+
Hairy Woodpecker*+	House Sparrow*+

* = accepts nest boxes quite readily.

+ = common bird found in most backyards that will use nest boxes.

A. Buying or Building a Birdhouse

If you are in a hurry, or do not have the knack at building things, many houses can be purchased from hobbyists, nature and garden centres. The way the birdhouse looks on the outside is not important to the birds, but it is the inside that is most important to them, and houses looked upon as lawn ornaments may or may not ever have tenants. There are several things that you should keep in mind when buying, or building, a birdhouse:

(i) Proper Building Materials:

Houses need to be built with insulating quality to protect the eggs and young from heat or excessive cold. Wood, either cedar, pine or plywood, should be 1/2 to 3/4 inch thick, and should be the only material used for a birdhouse, with the exception of purple martin houses which can be built of aluminum (Note: I have found cedar to not get chewed up by squirrels, while my neighbors boxes are made from plywood and are badly chewed by the squirrels). Plastic or metal houses are dangerous as they concentrate the heat and do not breathe. The box should not be constructed of pressure-treated lumber or stained with harmful materials, such as lead-based paint or creosote. The hardware holding the birdhouse together is also important, and many of us have seen walls and doors falling off after a year or two of weathering. Use hardware that is zinc coated, galvanized, aluminum or other weather-resistant material. If you use nails, use the ones with ridges so they will not pull out, or better yet use brass, galvanized, or stainless steel screws.^{2,3}

(ii) Proper Ventilation and Drainage:

There should be good ventilation either by 1/2-inch holes drilled near the top of the sides, or through a slit or crack at the top of the sides in order for air circulation. The roof of the birdhouse should overhang the entrance hole by 1 to 2 inches, which will protect the entrance from rain and sun. There should be 1/2-inch holes in the floor near the sides of the bird house to allow for water drainage.^{1, 2, 3}

(iii) Colour:

Birds perceive colour extremely well, and there have been documented studies using birds that have been colour banded (colourful rings were placed on their legs) where it was shown that males with more colourful bands were preferred by females. Therefore the colour of the box may influence birds. While birds will nest in colourful boxes, these may be more noticeable to predators, and so it is recommended that boxes be of more muted colours, such as brown or green, that blend with their natural environment. It is best not to paint birdhouses, but to just waterproof them using clear mineral wax, or marine varnish. White houses are acceptable for purple martins, as the light colour reflects sunlight. Dark colours such as dark brown or black is not recommended as they attract more sunlight. Do not treat or paint the inside of the birdhouse with any preservative or other chemical. After finishing the box wait 2 to 3 weeks before putting it up, so the fumes dissipate.^{2, 3, 4}

(iv) Inside Grooves and Perches:

Inside the box beneath the hole there should be horizontal grooves, or 1/4 inch galvanized mesh, which will help the young crawl to the entrance. Do not place perches on the outside, and many home made birdhouses come equipped with one which should be removed. Perches make the house more attractive to unwanted species like house sparrows and starlings, is a convenient spot for predators to cling to, and may be a temptation for young birds to venture out before they can fly.^{1, 2, 3}

(v) Right Dimensions:

Different species of birds require different house sizes and entry hole sizes (Table 2). The entry hole size is important for attracting specific species of birds, and is large enough to admit the bird and not so large to admit unwanted species or predators. The interior size is important as this mimics the natural cavity of the bird, and is just large enough for the bird to build a nest. The depth of the box is also important so that predators cannot reach the nestlings inside. If you do not know what species you really want to attract to your nest box you should purchase or build one with a hole size of 1½ inches in diameter, because the greatest variety of birds use such a box.^{1, 2, 3, 4}

Table 2: Birdhouse Dimensions (in inches).^{1,2,3}

Bird Species	Entrance Hole Diameter (inches)	Entrance Hole Height Above Floor (inches)	Floor Dimensions (Box Interior) (inches)	Total Height of Box (inches)	Height above Ground/Water (feet)
Birds of Prey:					
American Kestrel	3	10 - 12	8 x 8 to 9 x 9	14 - 16	10 - 30
Ducks:					
Bufflehead	2½ - 3	17 - 19	6 x 6 to 7 x 7	17 - 19	10 - 20
Common Goldeneye	3½ - 4½	16 - 18	10 x 10 to 12 x 12	24 - 25	10 - 20
Common Merganser	4 x 5	16 - 18	10 x 10 to 12 x 12	24 - 25	10 - 20
Hooded Merganser	3 x 4	16 - 18	10 x 10 to 12 x 12	24 - 25	10 - 20
Wood Duck	3 x 4	16 - 18	10 x 10 to 12 x 12	24 - 25	10 - 20
Owls:					
Barred Owl	6 - 8	14 - 18	13 x 13 to 14 x 14	22 - 28	-
Northern Saw-whet Owl	2½ - 4	10 - 12	6 x 6 to 8 x 8	15 - 18	12 - 20
Screech Owl	2½ - 4	10 - 12	6 x 6 to 8 x 8	15 - 18	10 - 30
Passerines:					
Black-capped Chickadee	1 - 1½	6 - 7	4 x 4 to 5 x 5	9 - 12	6 - 15
House Finch	1 - 2	5 - 7	4 x 4 to 5 x 5	9 - 12	8 - 12
House Sparrow	1 3/16 - 2	6 - 7	4 x 4 to 5 x 5	9 - 12	-
Eastern Bluebird	1½	6 - 7	4 x 4	11 - 12	5 - 10
European Starling	1 - 4	6 - 10	5 x 5 to 6 x 6	13 - 20	10 - 25
Great-crested Flycatcher	1½ - 2½	6 - 7	5 x 5 to 6 x 6	9 - 12	8 - 20
Red-breasted Nuthatch	1 - 1½	6 - 7	4 x 4 to 5 x 5	9 - 12	12 - 20
White-breasted Nuthatch	1 - 1½	6 - 7	4 x 4 to 5 x 5	9 - 12	12 - 20
House Wren	1 - 1½	6 - 7	4 x 4 to 5 x 5	9 - 12	6 - 10
Swallows / Martins:					
Purple Martin	2 - 2½	1	6 x 6	6	15 - 20
Tree Swallow	1¼ - 1½	6 - 7	4 x 4 to 5 x 5	9 - 12	10 - 15
Woodpeckers:					
Downy Woodpecker	1¼ - 1½	8 - 12	3 x 3 to 4 x 4	10 - 14	6 - 20
Hairy Woodpecker	1¾ - 2¾	10 - 14	5 x 5 to 6 x 6	14 - 16	12 - 20
Northern Flicker	2 - 3	10 - 20	6 x 6 to 8 x 8	14 - 24	6 - 20

(vi) Where to Install the House:

The main consideration in placement of your birdhouse is the species that you are interested in attracting and their nesting requirements, which is where knowledge of their natural history is important. The house has to be in the proper habitat for the species you are attracting, and that species present, otherwise the box will not be used. For example: chickadees nest in wooded areas and bluebirds nest in open areas, so you would not be able to attract chickadees to nest in the open or bluebirds to nest in wooded areas.^{2,3}

Boxes should be placed in partial shade, except for martin houses which are in full sun. If you are attracting shy species of birds, you should find a secluded part of your yard away from the house. Other than wrens, most birds do not tolerate swaying birdhouses so mount the box either in a tree, or on poles, or posts, using screws or nails. The direction the box faces should make it (1) easy access to clean annually, and (2) preferably away from prevailing winds to prevent rain from blowing in, usually facing south or east. The height of the box above the ground is also important, and depends on the species, but there is often a wide range in height requirements within each species (Table 2).^{2,3}

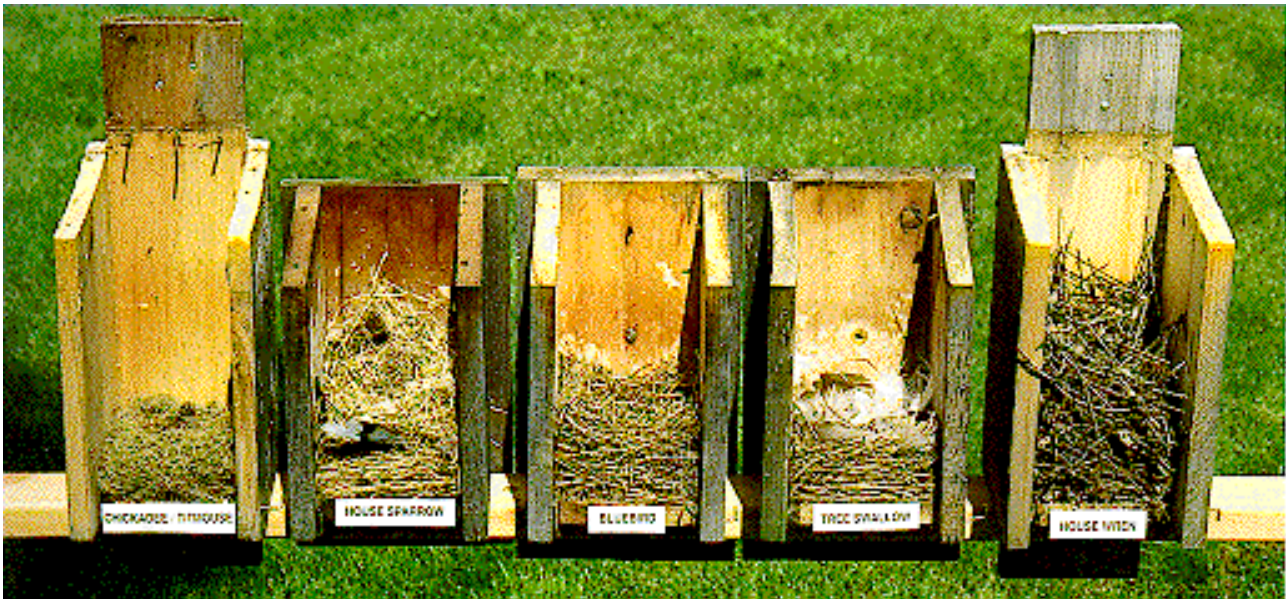
While there is no limit to the number of houses you can place on your property, there may be a limit to the number of birds using them. Nesting birds are usually very territorial, and will fight over nesting sites and territory, which may limit the number nesting on your property. For example, chickadees have territories of 10 acres, and will not allow other chickadees within that territory. Tree swallows do not defend large territories so many pairs may nest as close together as 10 feet. In general, boxes should be spaced at least 30 feet apart.^{1,2,3}

(vi) Cleaning and Maintenance:

It is important to buy or build a house that preferably has a side that opens, since birdhouses require annual cleaning. Some houses have bottoms that fall out, or the roof is hinged, but I have found side opening boxes safest for the birds (hinged roofs can be ripped off by raccoons) and easiest for us to clean. Cleaning is usually done in late winter, or after each nesting if you want birds to re-nest that season. Discard all used nesting material which will prevent a buildup of parasites and mites, which could cause nestlings to die. As well, many birds will not reuse a nest in order to protect themselves from parasites.^{1,2,3}

At cleaning time you will be able to check boxes that you had not monitored during the nesting season, and determine what species nested, and whether their nests were successful.^{2,3} Some of the 5 common passerines that nest in the smaller nest boxes can be readily identified by the type of nest they build: Chickadee nests are made of moss, fur and other downy materials; House Sparrows have feathers mixed in with grass, cloth and other odds and ends; Eastern Bluebirds have a neat nest of grasses and no other materials; Tree Swallows have a grass nest lined with feathers (usually white feathers); and House Wrens have a nest box often stuffed full of solid twigs, sometimes lined with finer fibres.² To check for nest success in waterfowl boxes look for the number of egg skins (these are off-white in colouration and are shrivelled skins with a small slit where the egg shell had broken in two) to determine the number of eggs that successfully hatched.

The holes of some houses need to be plugged over winter, especially purple martin houses, which will prevent mice from moving in, and will deter starlings and house sparrows that might become attached to a box and start adding nesting material during the winter. Unplug the holes in early spring when other birds start looking for nest sites.^{1,2}



B. Bird House Building Plans

There are numerous books and web pages with birdhouse designs available for you to consult, and I have referenced a few of them. Some designs are simple to make even if you are not an experienced carpenter. If you are an experienced builder then you might want to attempt some of the more advanced boxes. All in all, a simple box design will work just as well as a complicated design.

(i) Passerine Nest Box:



These nest boxes are suitable for species that require a 1¼ to 1½ inch entrance hole and hole height above the floor of 6 - 7 inches, such as Eastern Bluebird, Black-capped Chickadee, Great-crested Flycatcher, both nuthatches, Tree Swallow, and House Wren (Table 2).² Box designs can be modified to suit some of the other species by modifying the interior floor dimensions and entrance hole height above the floor as to the specifications listed in Table 2.

- House Wren / Chickadee House Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/houswren.htm>]
- Tree Swallow / Bluebird Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/treeswal.htm>]
- Bluebird Box Designs <http://hometown.aol.com/jimmcl/bbbox/index.htm>]
- Peterson Bluebird House Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/petebblue.htm>]
- Kestrel / Screech Owl House Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/kestrel.htm>]

(ii) Purple Martin House:



The martin is one of the most wanted backyard nesting birds. Historically they nested in tree cavities and woodpecker holes, but have readily adapted to communal nesting "apartment houses," and gourds. Purple Martins are colonial nesters and remain with their colony unless no more space

is available, and so you should check if martins are already in your area, otherwise it could take many years to attract them. This often discourages martin house owners since martin houses are generally very expensive. But, once martins have set up house and nest successfully, they will return annually to re-nest. Martin homes are very attractive to House Sparrows, which will consume an entire apartment house. A martin house needs to be easily accessible, so it can be opened and sparrow nests removed on a weekly basis as needed. Place martin apartments near water, and open fields as they use a "swoop" zone before entering.^{1, 2, 3, 4, 6}

-  Purple Martin House Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/purple.htm>]
-  Purple Martin House [<http://www.tyrell.net/~deadbird/>]

(iv) **Wood Duck Nest box:**

With the decline of Wood Ducks in the early 1900s nest boxes were used to restore their population. Cavity nesting ducks (Table 1) are unable to create or enlarge a nesting hole and are completely dependent on what they can find. Thus requiring large nesting trees close to water (although some will nest up to a mile away), which are often scarce, and limits their breeding location.^{1, 2, 6} Cavity nesting ducks are also known as "dump nesters" where several females may dump their eggs in another nest creating huge clutches, and it has been shown that goldeneye and mergansers will dump in another species' nest (although rare). All the cavity nesting ducks use the nest box for only one day after their young have hatched. Therefore, the interior of these nest box needs ¼ inch galvanized mesh installed below the entrance hole, so that the day-old ducklings can climb out and jump, anywhere from 3½ to 60 feet, to the water, or ground below.^{1, 2} Place 3 inches of wood shavings in the bottom of the box. Place boxes on poles in water, or in a tree where there is an open area where ducks can easily fly into the nest box entrance hole. The box directions in Figure 3 uses ½-inch plywood, and includes usage for one 4x8 sheet of plywood to build 4 boxes. Group 4 to 8 boxes in an area, since there will be a higher nesting success.^{5, 7}


-  Wood Duck Nest Box Plans [<http://www.npwrc.usgs.gov/resource/tools/ndblinds/woodduck.htm>]
-  Wood Ducks [<http://www.ces.ncsu.edu/nreos/forest/steward/www6.html>]

2. Platform Nesters

You can also attract several species to nest in your backyard using artificial nesting shelves (Table 3). These shelves are easily constructed using the same lumber, hardware and construction methods as birdhouses, except that waterproofing the interior of shelves is required.³

Table 3: Nesting Shelf Dimensions.^{2, 4}

Bird	Floor of Shelf (inches)	Depth of Shelf (inches)	Height Above Ground (feet)
Eastern Phoebe	6 x 6	6	8 to 12
American Robin	6 x 8	8	6 to 15
Song Sparrow	6 x 6	6	1 to 3
Barn Swallow	6 x 6	6	8 to 12

 [Robin and Barn Swallow Platform Plans \[http://www.npwrc.usgs.gov/resource/tools/ndblinds/robin.htm\]](http://www.npwrc.usgs.gov/resource/tools/ndblinds/robin.htm)

Many of the species in Table 3 naturally nest of shelflike projections of buildings, including barn rafters, front porch lights, roof gutters, and windowsills. Place the shelves on buildings under an eave where little rain will fall onto the nest and away from direct sunlight, or in an open garage or barn.² Of the birds listed the robin is the easiest to attract. Phoebes often nest near water and are good candidates for lake-side cottages. Barn Swallows are partial to the interiors of barns or garages.

3. Discouraging Predators

Since natural cavities are declining there is often fierce competition for those that remain. This makes it important to take steps to control predators and non-native competitors, like House Sparrows and Starlings.


(i) House Sparrows and Starlings:

These are aggressive, introduced species which have caused the decline of many of our native songbirds, especially bluebirds. They are not protected by law, as is our native birds, and it is legal to disturb, trap or remove them.¹ Starlings can be excluded from birdhouses with entrance holes 1½ inches and less in diameter, but they will often try to enlarge the hole, and an additional piece of ¾ inch wood with a 1½ inch hole is often needed. If starlings are attracted to larger entrance hole nest boxes, you can repeatedly remove their nest material and they will leave.²

House Sparrows are more problematic than starlings, and will nest in any box with an entrance hole larger than 1 inch in diameter. No sure fire method has been found to discourage House Sparrows, but they can be deterred by (1) plugging entrance holes during the winter so sparrows do not claim the birdhouse and get a head start on returning birds; (2) repeatedly removing their nesting material, but they may attempt to renest for weeks; and (3) placing boxes in habitats where House Sparrows don't frequent, like deep woods, or rural areas a mile or more from farm buildings.² If they are a persistent problem, they may have to be trapped and removed (trap the male as it is the male that is attached the site), but this is often difficult.² For persistent problems, or if you only have sparrows nesting, remove the nest boxes for a couple of weeks and then put them up again.

(ii) Raccoons:

This is one of the most common predators that visit birdhouses. Signs of raccoon predation include nesting material pulled from the box and claw marks on the box. Birdhouses mounted on poles are raccoon-proofed using metal cones, and marine grease. To protect Wood Duck boxes mounted on trees, loosely place a 3-foot-wide strip of galvanized metal (painted brown) around the tree, secured with nails.⁷ This will only work if the house is on a lone tree where the canopy does not connect with other trees, so raccoons cannot climb over them.²

 [Predator Guards \[http://www.npwrc.usgs.gov/resource/tools/ndblinds/guards.htm\]](http://www.npwrc.usgs.gov/resource/tools/ndblinds/guards.htm)



Predator guards, like those pictured on the left that are used for protecting bird feeders, can be used for some of the smaller bird houses that are erected on wooden or steel posts. Predator guards can also be constructed out of sheet metal to go around the base of single tree trunks, but remember that some predators can jump from adjacent branches or trees.






(iii) Other Predators and Competitors:

Other predators include cats and snakes. Cats can often be deterred using predator guards. Snakes are also a problem in many locales. Houses mounted on metal poles with a PVC pipe installed often works.³ Competitors include squirrels which chew entrance holes and may eat the eggs and young. Reinforcing the hole with a wooden block will deter them. Ants and wasps may build their nests in birdhouses and this can be prevented by a pyrethrum spray (available at garden centres), or placing a thin layer of Vaseline on the ceiling of the house.²

References

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- ⁷ Anonymous. 1988. Guide d'aménagement pour le canard huppé. Québec: Ministère de loisir, de la chasse et de la pêche. 6pp.

Other Web Pages on Bird Houses

-  Nest Boxes for Birds [<http://www.cws-scf.ec.gc.ca/hww-fap/nestbox/nestbx.html>]
-  Homes for Birds [<http://www.bcpl.lib.md.us/%7Etross/by/house.html>]
-  Houses for Birds [<http://www.bcpl.lib.md.us/~tross/by/house.html>]
-  The Bluebird Box [<http://users.aol.com/jimmcl/bbbox/nestbox/nestbox.htm>]
-  Duncraft bird house page [<http://store.yahoo.com/duncraft/hsb.html>]