



# Nest Box Guide for Waterfowl



Ducks Unlimited  
Canada



Ducks Unlimited Canada (DUC) is the leader in wetland conservation. A registered charity, DUC partners with government, industry, non-profit organizations and landowners to conserve wetlands that are critical to waterfowl, wildlife and the environment.

Wetlands are areas where water and land meet to create a rich habitat for a variety of plants and animals. In some areas of eastern Canada, more than 80 per cent of the original wetlands have been lost and the majority of the remaining wetlands are found on privately owned land. Ducks Unlimited takes pride in its efforts to work directly with landowners to conserve and restore these wetlands.

The value of wetlands is most often measured by their ability to provide homes for wildlife. While offering prime habitat is certainly important, a healthy wetland can also improve the quality and quantity of our water resources. Wetlands can be thought of as living sponges. After heavy rains and snow melt, wetlands hold excess water and release it slowly and safely, helping to avoid the extremes of drought and floods. A healthy wetland can help to control erosion, replenish groundwater, absorb floodwater and purify surface water. More wetlands on the land means more fresh water is available for wildlife and people.

Through your interest in the nest box program for waterfowl you have demonstrated a concern for conservation issues. Through the construction and installation of nest boxes you will be contributing to the restoration of habitat for a great number of waterfowl and wildlife species. To help us evaluate the success of our nest box program we'd like to hear your comments. Please drop us a note at the DU office nearest you and let us know the number of boxes you have built and where you have installed them. In return, we'll send you a DU decal that lets others know that you are a proud participant in this important conservation initiative.

Your support is important and greatly appreciated.

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Ducks Unlimited Canada  
[www.ducks.ca](http://www.ducks.ca)

Ontario Region:

92 Caplan Avenue, Suite 636  
Barrie, Ontario  
L4N 9J2  
phone: (705) 721-4444  
email: [ontario@ducks.ca](mailto:ontario@ducks.ca)

Atlantic Region:

PO Box 430, 64 Hwy 6  
Amherst, NS B4H 3Z5  
phone: (902) 667-8726  
email: [du\\_amherst@ducks.ca](mailto:du_amherst@ducks.ca)

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# Nest Box Guide for Waterfowl

## Why Nest Boxes?

Did you know that there are several species of waterfowl that nest not on the ground, but high up in holes, or cavities, in trees? They are referred to as cavity nesting ducks, of which the wood duck, common goldeneye and hooded merganser are the most common. Appropriate cavity nesting habitat sites are a fundamental requirement for maintaining and increasing the populations of these three waterfowl species. They typically nest in abandoned woodpecker holes or natural tree cavities created by disease, fire or lightning. Unfortunately, human impacts on the forest have reduced the availability of suitable trees, thereby limiting nesting opportunities. Artificial nesting cavities such as those provided by nest boxes can help offset this problem by increasing the number of available, secure nesting sites for these waterfowl.

Numerous other wildlife species also depend on nest cavities. Along with waterfowl, your nest box may attract several species of songbirds and mammals.

This guide will provide you with plans for constructing a nest box that you can easily install, maintain and monitor. It will also help you to identify which wildlife species used your box.

## Constructing Your Nest Boxes

### Nest Box Materials

Although a nest box can be constructed from a variety of materials including plastic pails, sheet metal or wood, a wooden nest box made of 3/4" thick cedar appears to work best as it is naturally resistant to weather and



insects. It will also provide a home to wildlife for many years. You can also use pine or plywood and expect good usage by ducks.

If you use plywood to build your nest box, the exterior should be finished with a dark grey, non-toxic wood preserver to imitate tree bark and increase the life expectancy of the box. Do not apply the finish to the inside of the box.

## Nest Box Dimensions

The size of the nest box entrance hole is critical. It not only improves the odds of waterfowl using the box for nesting, it also reduces chances of predation by raccoons or other wildlife. Our experience has shown that an elliptical opening design of 3 inches (7.5 cm) high X 4 inches (10 cm) wide is ideal for attracting wood ducks and hooded mergansers, and should prevent raccoons from entering the box. Common goldeneye are the largest of the cavity nesting ducks and require boxes that have an entrance hole that is slightly larger at 3 1/2 inches (10 cm) high X 4 1/2 inches (13 cm) wide.

Unless you live in northern Ontario (north of the French River), construct your nest boxes with the smaller entrance hole as common goldeneye rarely nest south of this geographic boundary.

## Procedure

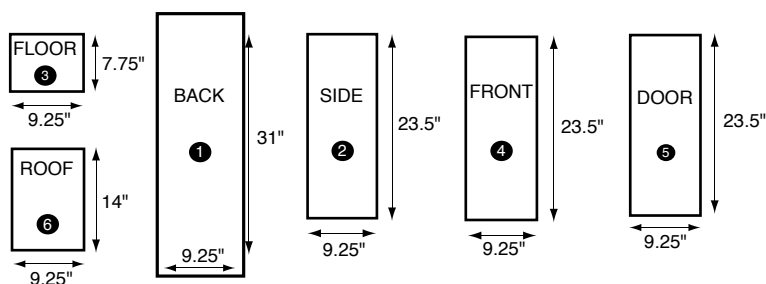
1. Measure and cut your wood to produce the six pieces pictured here. Number the pieces as shown. See material measurements.
2. Attach the back (1) to the side (2) using four 1 1/2" wood screws fastened from the back of the box. See exploded view.
3. Drill five 1/2" drainage holes in the floor (3). Attach the floor by fastening two screws through the back and two through the side.
4. Draw the appropriately sized entry hole on the front (4) using a pencil. Drill a pilot hole and cut out the entry



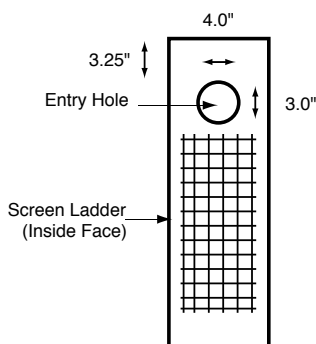
hole using a jig saw. See detailed view.

5. Attach a "screen ladder" (1/4"x1/4" wire mesh) to the inside face of the front (4) using staples. The horizontal mesh will provide footholds when the ducklings climb out. See detailed view.
6. Attach the front (4) using six screws.
7. Round the top, outside edge of the door (5). See exploded view. Fasten the door at the top with one screw from the front and one from the back. The two screws form the hinge and allow the door to open. Pin the door shut with a nail from the front.
8. Attach the roof (6) using four screws from the top and three screws from the back (be careful not to screw into the door). The box is now ready to install.

#### MATERIAL MEASUREMENTS



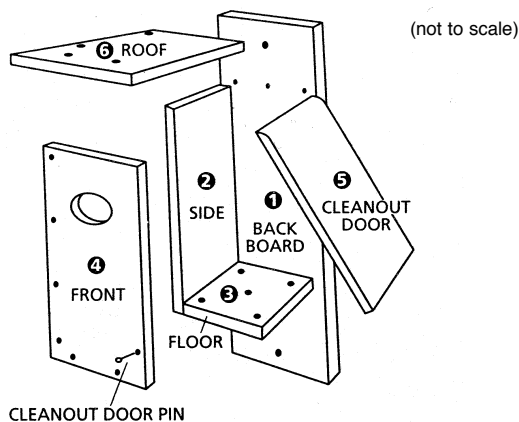
#### DETAILED VIEW







## EXPLODED VIEW



## Installing Your Nest Boxes

Now that construction of your nest boxes is complete, you'll need to decide where to install them.

Nest box location is the most important factor in determining the use, and ultimately the success, of any nest box project. Factors such as the height of the nest box above the ground or water, the distance to water and predator deterrents will influence nest box use and success.

## Choosing A Suitable Site

Optimal habitat for erecting nest boxes are generally shallow, flooded beaver ponds and flooded wooded areas along streams, lakes, rivers and marshes. We have found that nest boxes have the highest use when placed in permanently flooded swamps. Swamps are characterized by containing flooded trees and/or shrubs that may be living or dead. Cattails, reeds, rushes, grasses, floating duckweed and water lilies may also be present. For best results, place nest boxes in close association with this type of habitat.

The following pictures represent habitats used by breeding wood ducks and other cavity dependent waterfowl.



## Key Features For Identifying Suitable Nest Box Habitat

- where you see breeding ducks in the spring
- wetland flooded year round, or at least throughout the summer months
- flooded live or dead trees and/or shrubs
- bright green mat of minute floating water plants known as duckweed (during summer months)
- one acre in size or larger
- along large rivers and undeveloped lake shores.

The occurrence of any of these conditions greatly improves the probability of a successful nest box program.

The winter months tend to offer ideal conditions for nest box installation, especially over water. However, boxes may be erected at any time of the year. Along river and lake shorelines, installation in the spring can be made easier by using a motor boat, especially if spring water levels are higher than normal summer water levels. Boxes installed prior to the spring melt may be selected by breeding cavity nesting ducks for use that year.

Nest boxes should be placed where they will be detected



by nest searching waterfowl. They should be evenly spaced throughout the wetland, visually isolated and separated from one another to reduce problems associated with hen competition, dump nesting (see details on page 18) and nesting interference.

Nest boxes should be located over or near water as they generally receive higher usage. Placing them over water reduces disturbance of the nest by squirrels and raccoons and also improves the survival rate of the ducklings when they leave the box since they will not have to travel over land to water.

Nest boxes can be mounted on tree trunks or steel poles. However, boxes mounted on tree trunks can become easy targets for nest predators such as raccoons, who will climb the tree and disturb the eggs and/or incubating hen. To reduce predation, boxes should be placed on steel poles and a predator guard installed (see details on page 11). Make sure that the poles are fixed solidly in the soil, or marsh bottom, to ensure that the nest boxes are stable.

If you mount your nest boxes on tree trunks, both live and dead trees are suitable. Live trees tend to remain standing longer than dead ones, but live trees may be susceptible to damage by beavers. Avoid putting your nest boxes on poplar or white birch trees as beavers use these trees for food. Try using a soft maple, black ash or other deciduous trees.

Nest boxes receive highest use when placed along the edge of a wetland, among shrubs or dead standing trees, with the hole facing towards the central portion of the wetland or open water. Boxes erected on land should be within 200 metres of water.

Cavity nesting waterfowl will use nest boxes placed as high as 12 metres above the ground, however, boxes should be erected at heights that permit safe future maintenance and monitoring (2-3 metres above water or land). Both boxes and predator guards should be placed above the maximum high water levels to prevent inundation of the boxes during flood periods. All trees and overhanging



branches should be cleared so that there is an unobstructed flight path to the entrance of the boxes. You may also wish to tilt the boxes forward slightly to facilitate the emergence of ducklings.

Boxes should be placed no closer than 50 metres apart and be visually obscured from one another. Even greater distances between boxes will provide birds with a wider selection of habitat conditions. For small ponds (less than 10 acres), install nest boxes at densities of no more than 1 nest box/acre, while for larger ponds, 1 nest box/3 acres is ideal.

Since cavity nesting ducks do not carry nesting materials, you must put 3 or 4 inches (8 to 10 cm) of wood shavings in the bottom of the nest box. Hens will reject boxes without it and if there is too little, eggs could freeze from the bottom during a cold snap. Do not use sawdust. It may cause newly hatched ducklings to suffocate.



## Predator Guards

As mentioned earlier, predators can significantly reduce the effectiveness of nest box programs. Therefore, guards should be used whenever possible and attached a minimum of two feet below the bottom of the box. There are various styles of guards that will prevent predators from disturbing the nest box and its occupants. All of the following designs have been shown to be effective, so you should choose a style that best suits your particular situation and budget.

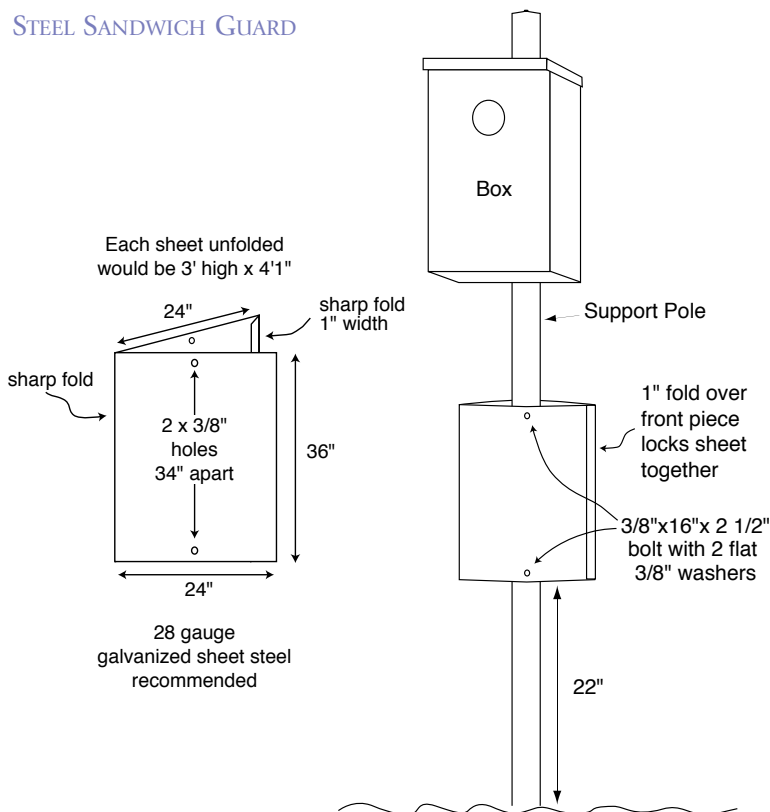


## Types of Predator Guards

### 1. Steel Sheet Sandwich (see diagram)

For this design you will require a 36" x 49" sheet of 28 gauge steel. Along the 49" length, make two 180 degree folds; one at 24" and one at 48". Take the remaining one inch segment and bend it back along the guard face as shown in the diagram. Slip the other edge under the bent over one inch flap. Bend the corners of the one inch flap over onto themselves using vise grips, to "lock" the guard and keep it from opening up. Drill two holes as shown in the diagram. Slip the predator guard over the pole and bolt into place.

#### STEEL SANDWICH GUARD



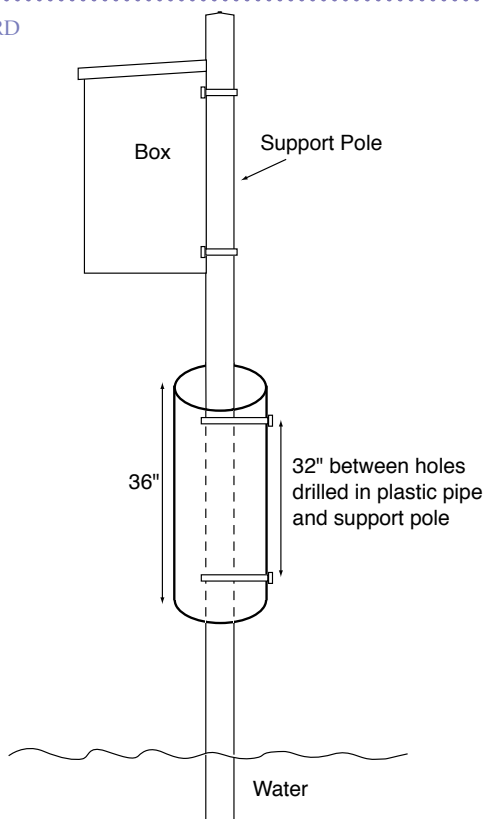


## 2. Plastic Pipe Guard (see diagram)

A 36 in (90 cm) length of 4 in (10 cm) black ABS sewer pipe or grey water pipe, drilled at the top and bottom and affixed to a support pole, makes a suitable predator guard for larger mammals. However, smaller rodents may crawl through. The placement of a crumpled piece of chicken wire may deter these mammals that compete for nests or eat eggs.

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### PLASTIC PIPE GUARD



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## 3. Crazy Carpet Guard (see diagram)

A children's plastic winter sliding toy, commonly known as a "Crazy Carpet" or a similar material may be used to predator-proof dead trees in and along wetlands. Aluminium off-set printing sheets may also work.

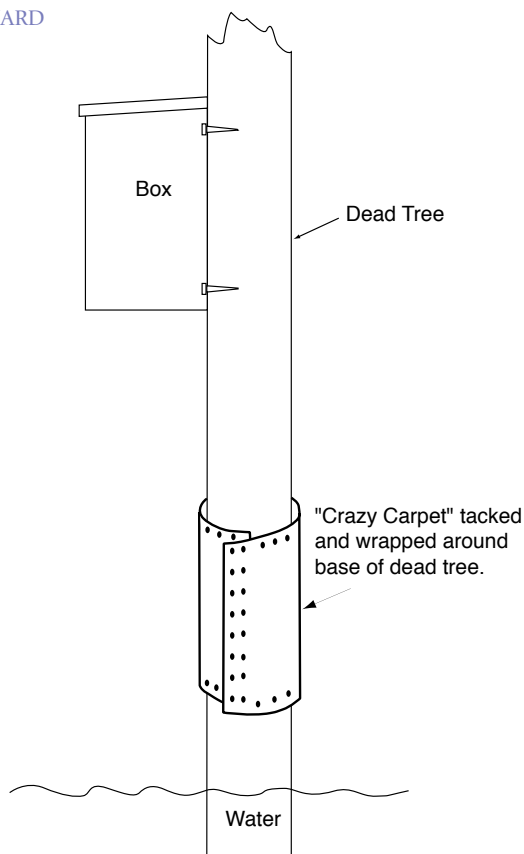




Simply wrap the material around a dead tree and tack it in place. Be sure not to use a tree that is too old or rotten. They have a nasty habit of breaking off when being worked on. Also, don't use a tree that is close to another tree. Raccoons are very persistent and may climb up, over and down to your nest box. This guard may be modified for use on live trees, but it must be affixed in such a manner that it permits the tree to continue growing in diameter.

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#### CRAZY CARPET GUARD





## Maintaining Your Nest Boxes

Breeding populations of cavity nesting ducks can become somewhat dependent on nest boxes, particularly in areas where the availability of natural cavity sites is limited. Therefore, maintaining your nest boxes is critical to their success.

In order to keep your nest boxes functional they should be checked and maintained once a year, after the summer nesting season is finished. Fall and winter are ideal times for monitoring, however, the winter months usually provide the best conditions for accessing nest boxes, especially those installed over water.

In the event that your nest boxes were used, there is some yearly maintenance required. Remove the old nesting material and brush out the inside of the box, making sure that the drain holes in the bottom of the box are clear of debris. It is important to remove the old material and debris from the boxes and replace it with fresh wood shavings. It's at this time that nesting species can be identified by the unhatched eggs, shell fragments or nesting material contents.

Don't worry if your nest boxes aren't used right away - it may take a year or two. The use of nest boxes by ducks will typically be low during the first year after installation but tends to increase in subsequent years as they become more accustomed to them. Be patient. However, those boxes that go unused for a number of seasons should be relocated to another area.

## Determining The Success Of Your Nest Boxes

### Signs Of A Successful Nest

There are several key indicators that the eggs successfully hatched.

1. The presence of light coloured duck down (a soft, fluffy substance that resembles cotton balls), small egg shell fragments and wood shavings all mixed together.





2. Paper-thin, opaque shell membranes detached from the eggshell. An egg cap may also be present as ducklings will chip a "lid" off the large end of the egg when hatching out, but often these caps are trampled into smaller fragments by the hen and ducklings.
3. A mummified downy duckling among the nest box contents may occasionally be found.

#### EGG SHELLS & MEMBRANE



(From left to right, membranes and shells of the common goldeneye, wood duck and hooded merganser).

### Signs Of A Predated Nest

At times, nests are disturbed by predators resulting in its loss. In eastern Canada, the main nest cavity predator is the raccoon, although squirrels can also be destructive. Predation can be a significant problem when a predator guard is not used in conjunction with the box (see page 11).



The most evident signs of predation are:

1. Egg shells broken in large pieces rather than tiny fragments, with yellow yolk and/or dried blood lining the inside of the egg shell pieces.
2. The protective papery membrane is still attached to the inside of the eggshell pieces.
3. Claw marks and pieces of hair may be found around the entrance hole of the box.
4. Whole eggs with small holes pecked through the shell.

#### PREDATED NEST



## Signs Of An Abandoned Nest And Dump Nest

### Abandoned Nest

Sometimes the hen may abandon the nest box after initiating a nest for reasons that include:

1. Disturbances from predators, or humans, during the egg laying/incubation period.
2. Death of the hen.
3. Disturbances from other cavity nesting species such as squirrels and other birds.

This results in all of the eggs that a hen had previously laid (5 to 14) in the nest box remaining unhatched and often buried in down. It should be pointed out that often



during a successful hatch, one or more whole, unhatched eggs may also be present as a result of them being infertile or death of the embryo.

### Dump Nest

In certain nest boxes, you may encounter an interesting phenomenon known as “dump nesting”, a similar situation to the abandoned nest. There may be 15 to 50 eggs found in the same nest box. Some or no eggs may hatch, depending on the degree of incubation. Dump nesting most frequently occurs with wood ducks and usually results from one of the following two scenarios:

1. One hen incubates the eggs in the nest box, but one or more additional hens lay their eggs during her absence. When the first hen returns, she sits on all the eggs in the nest box. All or some of the eggs may hatch.
2. Many hens are in competition for the same nest box and they come there to lay their eggs. Occasionally, more than one species of duck lay eggs in the same box. None of the eggs are incubated and none hatch.

The hatching success of a dump nest is usually low. This is due to the difficulty of properly incubating such a large number of eggs, and the disturbances caused by the coming and going of many hens.





# Identifying Wildlife Species That Use Your Nest Boxes

## Waterfowl Species

There are several species of waterfowl that will use cavity nest boxes for nesting.

*Note: The presence of duck feathers in the nest does not necessarily indicate that a duck used the nest box.*

*Some wildlife species will construct their nest on top of remnants left by nesting waterfowl. If you find a non-waterfowl nest in your box, always carefully check that there isn't a duck nest underneath.*

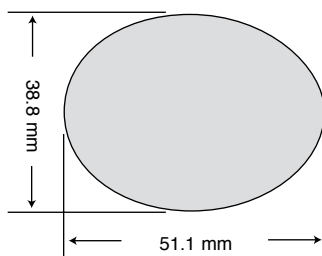






## Wood Duck (*Aix sponsa*)

10 to 15  
eggs  
per  
nest

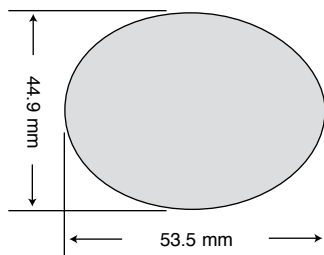


The wood duck egg is oval in shape and ranges from creamy white to pale buff in colour. The shell is smooth, quite thin and delicate and is somewhat glossy. Typically 10 to 15 eggs are laid in a nest lined with whitish down from the female's breast. Egg shell fragments are easily broken up into very tiny "squares" when squeezed flat between your finger tips. The internal contents can be partially seen through the shell of unhatched eggs.



## Hooded Merganser (*Lophodytes cucullatus*)

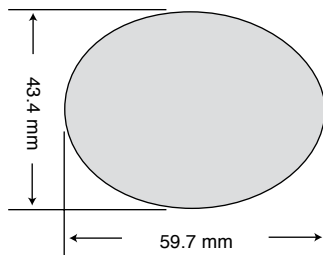
10 to 12  
eggs  
per  
nest



The hooded merganser egg is more spherical than the wood duck egg and is pure white in colour, like a domestic chicken egg. The shell is relatively thick, has a smooth texture and is very glossy. An average clutch of 10 to 12 eggs is laid in a nest lined with pale grey down. Unlike the wood duck, hooded merganser egg shell fragments do not break up into tiny squares when squeezed between your finger tips. Because of the thicker shell, internal contents are not visible through the shell of unhatched eggs.

## Common Goldeneye (*Bucephala clangula*)

5 to 15  
eggs  
per  
nest



The common goldeneye lays a large, oval egg that varies from a bluish-green to an olive green colour.

The egg shell is also smooth to the touch and has a dull lustre. Clutches typically consist of 5 to 15 eggs and are laid in a nest lined with pale grey down.





## Other Bird Species

A variety of other bird species may frequently use nest boxes for nesting.

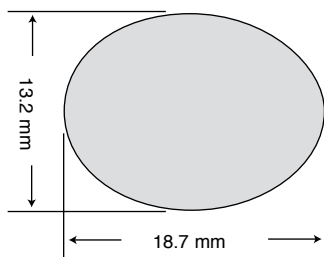






## Tree Swallow (*Tachycineta bicolor*)

4 to 6  
eggs  
per  
nest



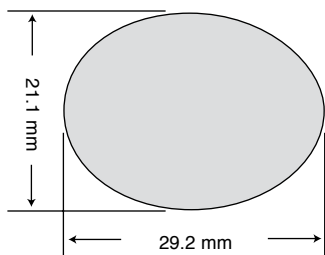
The tree swallow nest is small (typically about one quarter of the area of the nest box) and is almost always situated in one of the corners of the box. It is comprised of dry grasses and is lined with feathers found in the area (often duck feathers, but not duck down).

The tiny oval shaped eggs are pure white in colour and have a smooth, non-glossy shell. A clutch averages 4 to 6 eggs, but the shells are often reduced to a powder after hatching, making egg identification difficult.



## European Starling (*Sturnus vulgaris*)

4 to 7  
eggs  
per  
nest



The European starling is one of the most serious competitors for use of nest boxes, especially those boxes situated in an open wetland.

The nest tends to be a messy array of dry grasses, twigs, other plant matter, feathers and bird droppings. The nest is often dirty and smelly and has a nesting cup formed in the material that is lined with fine grass and feathers.

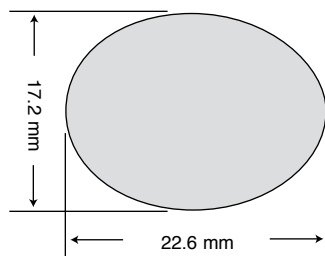
The eggs are oval, slightly glossy, pale bluish to greenish white in colour with a smooth texture and number from 4 to 7.

Starlings may remove all of the wood shavings in a box before they nest in it.



## Great-Crested Flycatcher (*Myiarchus crinitus*)

4 to 8  
eggs  
per  
nest



The nest of the great-crested flycatcher is a bulky mass of twigs, leaves, grasses and mosses and often contains a cast-off snakeskin or piece of cellophane (transparent plastic).

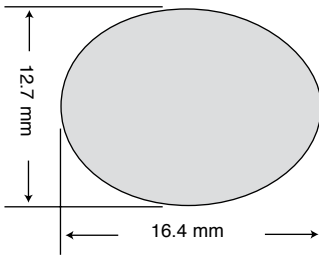
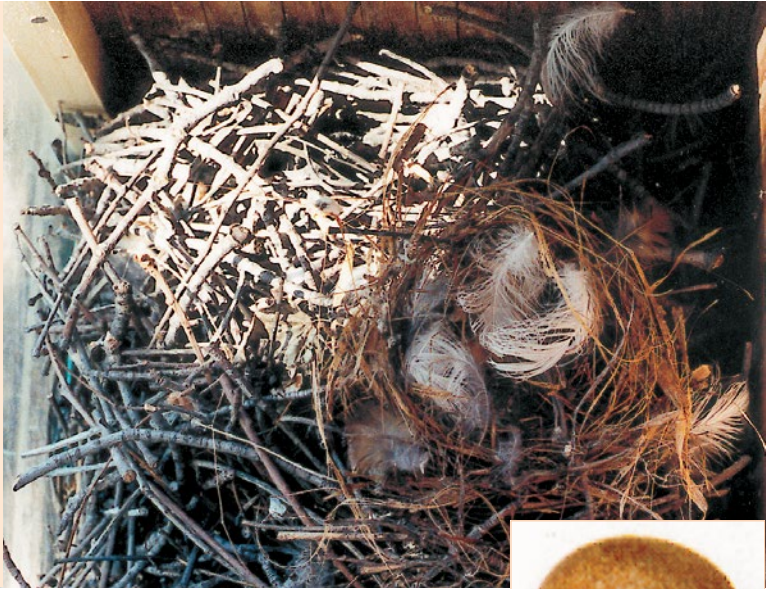
The eggs are elliptical in shape, yellowish to pinkish white in colour with brown streaks and blotches, smooth in texture and slightly glossy in lustre. Typically, 4 to 8 eggs are laid in a small depression made in the nesting material.





## Northern House-Wren (*Troglodytes aedon*)

6 to 7  
eggs  
per  
nest



The northern house-wren builds a voluminous nest of twigs that at times completely fills the nest box. On this base of twigs, a small cup

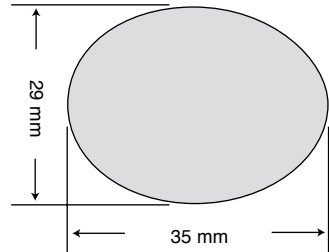
made up of grasses, plant fibres, feather and hair is constructed for the 6 to 7 eggs that are commonly laid.

The egg is an oval shape and is densely speckled with minute cinnamon-brown spots that almost cover the lighter, underlying base colour.



## American Kestrel (*Falco sparverius*)

3 to 5  
eggs  
per  
nest



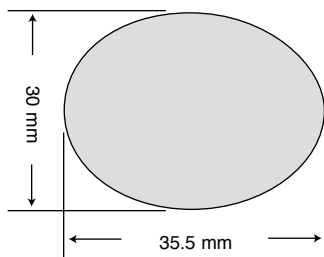
The American kestrel or sparrow hawk does not add nesting material to its nest box. Nest boxes used by this species are easily recognizable by the profusion of whitish droppings, which coat the walls.

The oval shaped eggs range from white to pale pink to light cinnamon in colour and are covered with small speckles and blotches of various shades of brown. These markings are sometimes concentrated at one end or in a ring around the egg.



## Common Screech Owl (*Otus asio*)

4 to 5  
eggs  
per  
nest



The common screech owl lays 4 to 5 white-coloured eggs that are almost round in shape.

Although no nest is built prior to egg laying, an abundance of fur and feathers from prey species will be evident during nest box clean-outs.

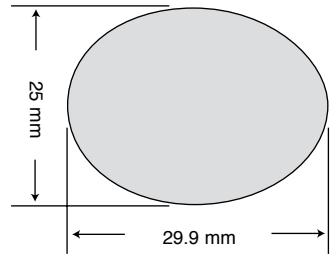
**Note:** The common screech owl often uses nest boxes for shelter and food storage during the winter months. When this is the case, one tends to find regurgitated pellets composed of fur, feathers and small bones and/or corpses of small rodents and small birds in the box. Sometimes the owls themselves are found sleeping in the box during inspections. Let the owl fly off. It will return once the box is replaced.





## Northern Saw-Whet Owl (*Aegolius acadicus*)

4 to 7  
eggs  
per  
nest



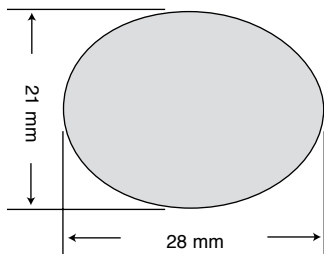
The northern saw-whet owl lays 4 to 7 eggs on material that is already present inside the nest box. The eggs are a pure white colour and nearly spherical.

**Note:** You must pay careful attention because it is difficult to differentiate between the nest of the common screech owl and that of the northern saw-whet owl. The egg of the northern saw-whet owl is rounder and smaller than that of the common screech owl.



## Common Grackle (*Quiscalus quiscula*)

4 to 7  
eggs  
per  
nest



The common grackle is not a common nest box user.

Typically, they build a nest among cattails, in a tall

shrub, or in a tree up to 30ft (10m) high. However, in the shield country of central Ontario, the common grackle regularly nests in wood duck nest boxes. The nest is often mistaken for an American robin's nest. It is a large cup or bowl shape, often constructed out of mud and coarse grasses. Dry, fine grasses and rootlets line the cup. The common grackle lays 4 to 7 eggs, pale blue in colour with brown or purplish blotches, speckling or spotting.







## Mammalian Species

Several species of mammals are also known to use nest boxes.





Red Squirrel (*Tamiasciurus hudsonicus*)  
Northern Flying Squirrel (*Glaucomys sabrinus*)



Both the red squirrel and the northern flying squirrel occasionally use nest boxes as a place for reproduction or for winter shelter. The nest is voluminous, often filling the nest box and is usually made of moss and shredded bark.



## Grey or Black Squirrel (*Sciurus carolinensis*)



The grey or black squirrel also uses nest boxes from time to time for reproduction or as winter dens. Their nests tend to be comprised of twigs and leaves, frequently filling the entire nest box.





## Insect Species

Occasionally, certain insects will make use of nest boxes for reproduction.

*Note:* Always check CAREFULLY that a duck nest is not buried under a wasp or bee's nest.





## Yellow-jacket Wasp (*Vespula vulgaris*)



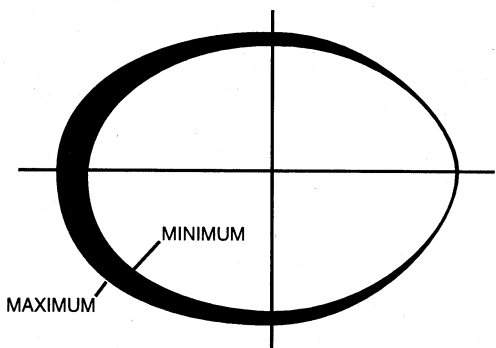
Yellow-jacket wasps will use nest boxes for anchoring their nests, which are spherical in shape and constructed of a grey paper-like material. The papery nests of yellow-jacket wasps do not contain live wasps during the winter months.



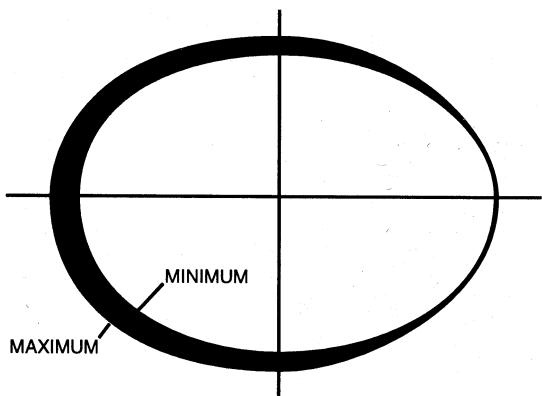
## Honey Bee (*Apis mellifera*)



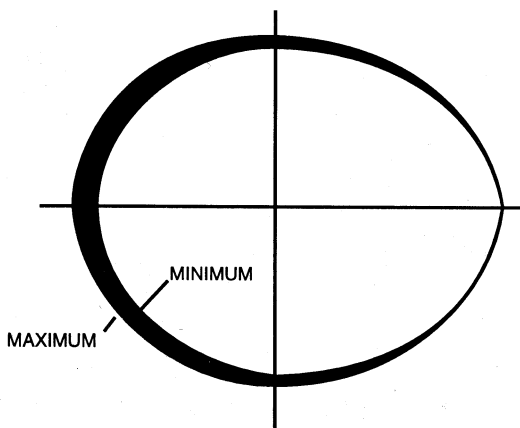
Swarms of honey bees will break away from established hives and occasionally select nest boxes in which to start new colonies. In this case, the nest box may be filled to the brim with yellow wax and honey. In contrast to the yellow-jacket wasps, a bee colony remains active during the winter, even at very cold temperatures ( $-30^{\circ}\text{C}$ ). To avoid being stung, it is necessary to be extremely careful handling a nest box invaded by these insects.



**Wood Duck**



**Common Goldeneye**



**Hooded Merganser**







*North American Waterfowl  
Management Plan*

