

WOOD DUCK BOX CONSTRUCTION AND MOUNTING

By Fred Akers



Photo by J.R. Woodward

Several North American duck species have biological breeding behavior that requires natural tree cavities for nesting, similar to woodpeckers, owls, and cavity nesting songbirds like bluebirds, chickadees and tree swallows. These cavity nesting ducks have claws and feet capable of perching and nesting in trees, and include Wood Duck, Bufflehead, Common & Barrow's Goldeneye, and Common & Hooded Merganser.

Cavity nesting ducks cannot excavate their own tree holes, which means they are totally dependant on large natural holes in trees or holes made by other birds and animals. In areas of ponds or wetlands where trees have been removed for farming or development, these "secondary cavity nesters" may not be able to sustain healthy breeding populations due to lack of breeding habitat.

Artificial manmade cavities have been used successfully for years to provide increased breeding habitat for secondary cavity nesting birds. The dramatic rebound of Wood Duck populations from near extinction due to over-harvesting and habitat loss in the early 20th century is partly a tribute to the successful use of artificial nesting boxes.

There is a bit of science and technology involved in successful secondary cavity nester habitat conservation, and the information included in this report should prove useful to the development of a successful program. The process of building and installing artificial nest boxes can be divided into the three following steps:

- Nest Box Design and Fabrication
- Nest Box Location and Installation
- Nest Box Monitoring

Nest Box Design and Fabrication

There is more than one way to make a nest box, and many styles and plans are available. The criteria for design and fabrication should be selected based on standard dimensions, monitoring requirements, installation procedures, predator protection, and other program variables. In the “Complete Birdhouse Book”, Donald and Lillian Stokes identify the basic dimensions and placement, and if you are anxious to get started, this may be all the information you need:

Basic Wood Duck Box Dimensions and Placement

Entrance Hole (Oval) – 3 inches high, 4 inches wide for Wood Duck.

Height of Hole above floor – 16 to 18 inches.

Inside Floor Dimension – 10 inches x 10 inches to 12 inches x 12 inches.

Total Height of Box – 24 inches to 25 inches.

Placement Habitat – Swamps, shallow lakes, or woods near water, preferably facing water with no obstructions near entrance hole.

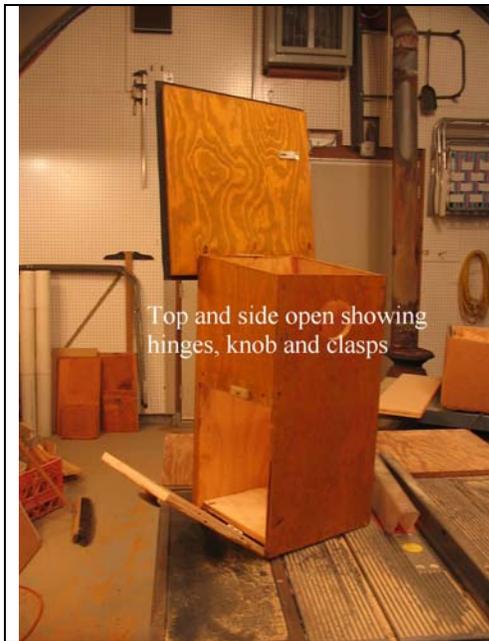
Placement Height – At least 4 feet up when nest box is placed over water and at least 10 feet up when placed over land.

If you want to keep track of the success of your installation through comprehensive monitoring, and the rigors of field installation may be a new experience for you, you may want to design and build the nest boxes with these issues in mind. Weather-resistant construction and predator protection are other important concerns to address.

Nest boxes should be constructed of weather resistant wood. Precious wood species like cedar, cypress, and redwood are often recommended, but new or recycled exterior plywood provides excellent performance and is readily available. 3/4 inch plywood is best for all around use, but a mix of 3/4 inch plywood for the sides and bottom, and 5/8 inch plywood or textured wood siding for the front, back and top, will also work well.

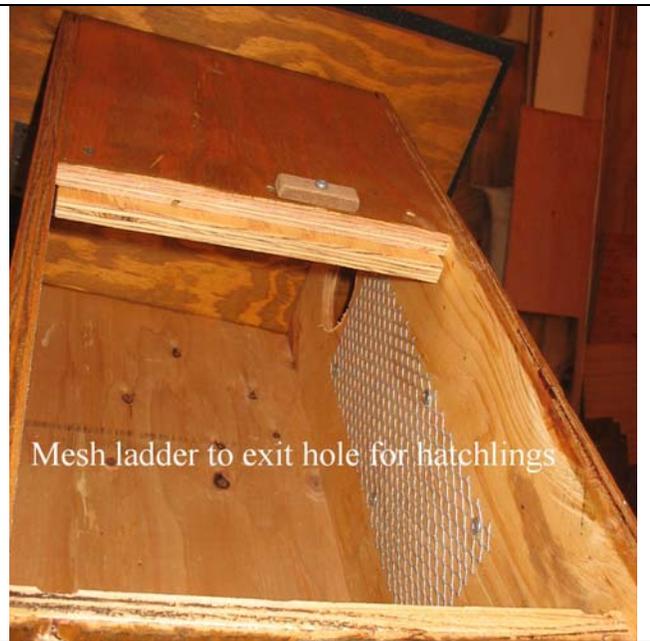
A large sloped roof that overhangs all sides, front and back, with shingles or SBS mineral surfaced roofing will serve well for long term weather protection. Applying exterior stains and paints to the exterior also works well, but avoid painting inside and avoid the use of pressure treated wood.

To provide for optimum monitoring and maintenance, a nest box with a top and side that opens can be constructed. In the field, the birds and the bees don't know that this is a nest box for Wood Ducks, so it is best to be prepared for different users. Several species of wasps can become troublesome if they take over the box with large nests over several years, and the wasps tend to attach their nests to the underside of the roof. Having a hinged roof makes inspection and removal of wasp nests easy, and soap or other slippery bad tasting substances can be applied in this area annually if wasps are a recurrent problem.



Top and side open showing hinges, knob and clasps

Two Door Wood Duck Box



Mesh ladder to exit hole for hatchlings

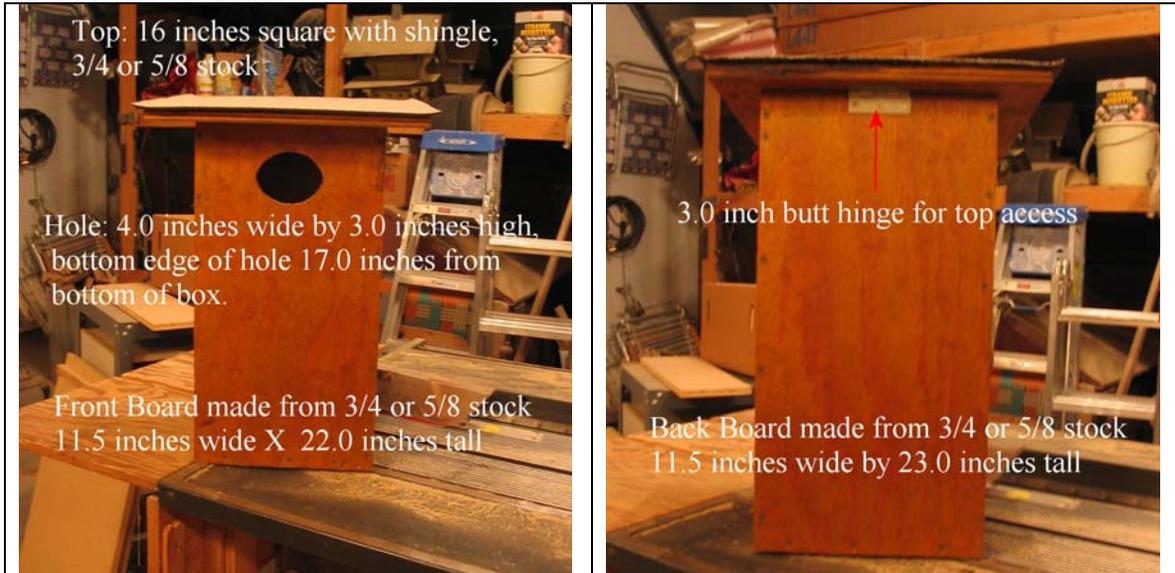
Newborn Wood Duck Escape Ladder

Screech Owls often share the same habitat with Wood Ducks, and can easily select a Wood Duck box for dining or nesting. If Screech Owls move in, it is the least disruptive to make monitoring observations through the top opening, especially when the young are close to fledging the nest. Unlike Wood Duck hatchlings that leave the nest soon after they hatch, Screech Owls feed their young in the nest for several weeks.

A side door is important for installing the wood chips and cleaning out the box periodically, as well as for checking on nesting activity. Ducks and Owls do little nest building, so the addition of fine wood chips or bedding material is important to cushion the eggs. Wood Ducks often leave the nest to forage for food, and they usually make sure the eggs are nestled in the chips and covered with feathers and down. When inspecting for eggs in the nest, if the female is out of the box when you approach, be sure to look carefully under the feathers and down for the presence of eggs.

The basic nest box has a front, a back, 2 sides, a bottom, and a top. The front can be either 3/4 or 5/8 inch stock, and a good size is 11.5 inches wide x 22.0 inches tall. The bottom of the 3.0 inches high by 4.0 inches wide oval entrance hole is 17.0 inches from the bottom of the box.

The back can be 3/4 or 5/8 inch stock at 11.5 inches wide x 23.0 inches tall. The back is 1.0 inch taller than the front to create a slight roof slope for rain runoff.



The sides should be 3/4 inch stock to receive the galvanized attachments (screws or nails) that attach the front and back to the sides. Of the two sides, one is a full stationary board, 10.0 inches wide x 22.0 inches tall at the front of the box and 23.0 inches tall at the rear. The second side with the door requires 2 boards, one fixed panel with the slope at 10.0 inches wide x 10.0 inches high at the front of the box and 11.0 inches high at the rear, and one hinged door panel 10.0 inches wide by 12.0 inches tall.

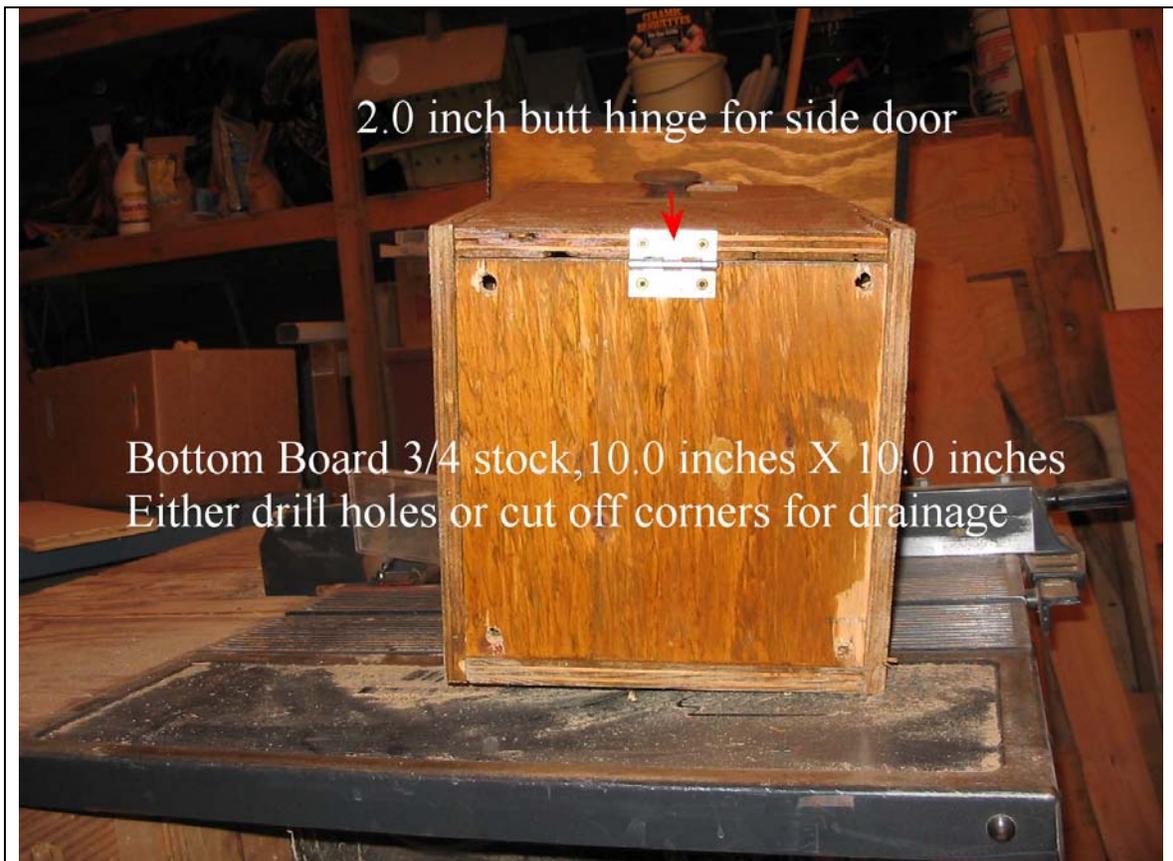


Wood Duck Box Stationary Side

Wood Duck Box Opening Side

The hinged side door requires a 2.0 inches wide x 10.0 inches long door stop cleat, which is attached to the stationary panel with enough projection to stop the hinged door in the closed position. A 2 inch butt hinge is used to connect the side door to the bottom, and a 2 inch x 1/2 inch pivot block made of plastic wood is used as a latch to secure the side door in the closed position. A door knob to pull the side door open is required, and can be a wooden bifold pull or a piece of plastic wood.

The bottom panel should be 3/4 inch stock to receive side and back panel attachments as well as support a bottom mount. Drainage holes are required in case water blows in, and these can either be drilled 1/2 inch holes or the corners of the bottom board can be cut off prior to insulation to allow spaces at the corners.



The top panel can be either 3/4 or 5/8 stock, and is 16.0 inches square with overhang on all sides. A 3 inch butt hinge can be used to attach the roof to the back from underneath, and a square piece of roll roofing or mineral surfaced roofing material size 17.0 inches square can be attached to the roof panel with small corrosion resistant screws or nails. Field experience has shown that a hook and eye latch for the top will vibrate loose, so a hasp arrangement with a hair pin or other positive locking mechanism must be employed to keep the hinged roof closed.

A mesh ladder is required to help the baby ducks exit the box, and this can be stucco mesh, hardware cloth, or a series of grooves cut inside the front to the hole.

Nest Box Location and Installation

Wood Ducks can be very secretive and particular about their habitat. Individual nest boxes should be located in relatively secluded areas where natural cavities would occur, about 600 feet apart, out of sight from each other. Their preferred habitat usually includes wetlands, shallow lakes, or woods near water.

Nest boxes can be placed either on land or over water. Height of hole from water or ground surface minimums, according to various references, call for a minimum of 4 feet over water, and a minimum of 10 feet over land. These heights are based on the need for protection from predators, which are almost exclusively snakes, raccoons and cats in Southern New Jersey. Raccoons and cats are largely ruled out over water, and that accounts for the lower 4 foot minimum height over water.

Water mounted boxes should be placed at least 4 feet above the high water level, and the hole should face open water where possible. Nest boxes placed on land should be 30 feet to 150 feet away from the shoreline and hidden from predators where possible. Since the hen must lead her ducklings to water soon after they hatch, the area between the nest box and the water's edge should be free of any major obstacles such as roads or fences. In addition to minimum heights, either conical or stove pipe metal predator guards should be employed. The efficient mounting of Wood Duck boxes requires a significant level of preplanning, ingenuity and determination.

The mounting locations and height of the nest boxes often present a significant challenge during installation and monitoring. Wetlands and shallow lakes are often difficult to access and have unknown depths to soil that will bear the lateral torque of a Wood Duck nest box during a wind storm. A mounting on land with 10 feet above ground and 3 feet below ground is a challenging mount, especially if there is a long carry required through a difficult access. But this is usually where the birds want to be.

Water mountings with access by boat seem to be more prevalent. A one piece pole sized to equal the sum of the in-sediment bearing depth in the lake bottom, plus the water depth, plus 4 feet, is required to be pounded into place. A 1.5 inch galvanized pipe threaded at one end to screw into a pipe flange mounted to the bottom of the box works well for this. Boat access is usually rather predictable, and the lower minimum mounting over water makes for easier monitoring while standing up in a boat. It is also easier to carry the heavy pipe and box in a boat. Upland ground mountings are somewhat more rigorous given the total mounting length of 12 feet or more, and then getting up to a nest box 10 feet in the air. One piece poles of this length require either ladders or stilts. (Note: Water mountings without a boat are more difficult than land mountings).

Practical matters such as availability of materials, cost, and other application constraints often motivate compromises on the minimum design criteria. For example, if galvanized pipe is used for one piece mountings, the most economical and maximum purchase length is usually 21 feet, threaded on both ends. Cutting this exactly in half creates two, 10.5 foot pieces threaded at one end, which would provide an 8-9 foot

mounted hole elevation. While lower than the design minimum, a ladder or stilts will be required to monitor the box.



While it compromises the overall height of the hole above ground to 8 feet, one method to simplify the mounting process and eliminate ladders for monitoring is to use a 2 piece mounting pole system with some degree of adjustability. Given the fact that the inside diameter of 1.25 inch galvanized pipe is slightly larger than the outside diameter of 1.0 inch galvanized pipe, these two commonly available pipe materials can be employed for a 2 piece adjustable pipe mounting with a reasonable amount of pipe work and material cost. For the land mounted boxes, this system can be installed to 8 feet, and then lowered to 4 feet to monitor inside the box, and then raised again back up to 8 feet.

Metal L-brackets can be attached to the pipe with hose clamps anywhere along the length, and metal predator guards can then be hung from the brackets. Most of the installation procedures can be easily done in the field, except for drilling and threading, which can be pre-planned in advance.



A flow chart of these procedures for an 8 foot ground mount is as follows:

1. Secure a 21ft length of 1.25 inch galvanized pipe, and cut this into 4 mountings at 4 feet ea. and one at 5 feet.
2. Each 4 foot length needs one end to be threaded, which will screw into a 1.25 inch floor flange mounted to the bottom of the box.
3. Measure up 12 inches from the unthreaded end of the 1.25 inch pipe and drill a 1/4 inch hole all the way through.
4. Measure up 10 inches from the unthreaded end at drill and thread a 1/4 inch hole in one pipe wall only.
5. Next secure a 21 foot length of 1 inch galvanized pipe and cut it into 3 pieces at 7 feet each.
6. Pound the 1 inch x 7 feet long galvanized pipe into the ground, using a pipe pounding sleeve and a pipe protector to prevent any mushrooming of the 1 inch pipe.
7. Mount a 1.25 inch pipe flange to the bottom of a Wood duck nest box.
8. Obtain a 6 inch galvanized stove pipe cap and drill a 1-7/8 inch hole in the center.
9. Obtain a 2 feet x 6 inch galvanized stove pipe and connect it to the drilled cap with sheet metal screws.
10. Clamp 4 each 2.0 inch L-brackets 6 inches down from the threaded end of the 1.5 inch galvanized pipe, using a #24 or larger stainless hose clamp.
11. Slide the 4 feet 1.25 inch galvanized pipe over the 1 inch galvanized pipe.
12. Slide the stove pipe assembly over the 1.25 inch pipe until it hangs on the brackets.
13. Screw the Wood Duck box onto the 1.25 inch pipe.

14. Lift the entire assembly up until the through hole clears the 1 inch pipe, and insert a 1/4 inch bolt completely through to support the box 8 feet in the air.
15. Screw a short 1/4 inch bolt into the threaded hole to pin the 1.25 inch pipe from spinning.

Bills of materials:

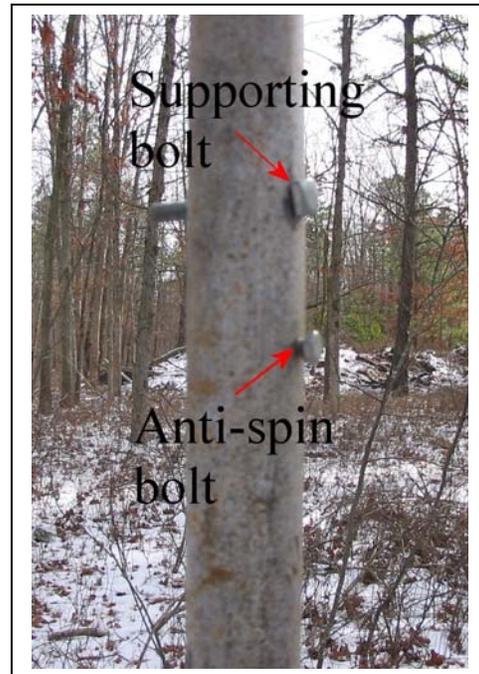
Water mounting (1):

10.5 feet or more of 1.25 inch galvanized pipe, threaded on one end.

- 1- 1.25 inch pipe flange.
- 1- 6 inch galvanized stove pipe cap.
- 1- 6 inch x 24 inch galvanized stove pipe.
- 4- 2.0 inch L-brackets.
- 1- #24 or larger hose clamp.

Land mounting (1):

- 1- 4 foot length of 1.25 inch galvanized pipe.
- 1- 7 foot length of 1.0 inch galvanized pipe.
- 1- 6 inch galvanized stove pipe cap.
- 1- 6 inch x 24 inch galvanized stove pipe.
- 4- 2.0 inch L-brackets.
- 1- #24 or larger hose clamp.
- 1 – 1/4 inch bolt 2-3 inches long.
- 1 – 1/4 inch bolt 1 inch long.



Nest Box Monitoring

While Wood Ducks are highly secretive in selecting nest sites to minimize impacts of nest predators and competition from other Wood Ducks, they can usually tolerate one or two inspection visits during incubation. Mid morning and mid afternoon may work best in cold weather. In the “Complete Birdhouse Book”, Donald and Lillian Stokes offer this Wood Duck Quick Guide:

- Breeding Period: April through June.
- Territory Size: Just the nest site.
- Nest Materials: Wood chips, lined with feathers from the female’s breast.
- Eggs: 11-14, white to pale buff.
- Incubation: 27-30 days, by female only.
- Nestling Phase: 1 day.

Fledgling Phase: 5 weeks.
Broods: 1, occasionally 2 in warm climates.
Migration: Northern birds fly to south.

The U.S. Geological Survey has very concise information on Wood Duck conservation, and their nest box monitoring is quoted as follows:

Before nesting boxes are erected, a maintenance and monitoring plan to ensure the success of the program should be developed. Old nests and those of invasive species such as European starlings must be cleaned out regularly if the boxes are to be used more than once during a nesting season. The monitoring program should ensure that boxes are monitored at least once before the beginning of the nesting season, and should be checked at least once a month during the nesting season if multiple use of nest boxes per nesting season is desired. Boxes should remain out during the winter to provide winter cover sites for screech owls and other resident birds. For Wildlife Habitat Council member organizations, the monitoring program may enroll in WHC's Nest Monitoring Program, useful in WHC's Corporate Wildlife Habitat Certification Program.

All boxes included in a monitoring program should be numbered, and field data sheets should be created and used to record monitoring observations at every monitoring session.

Final Comments

The importance of “monitoring” cavity nest box installation to the breeding success of the cavity nesting birds should not be underestimated. Nature is a fascinating and mysterious world, and only by monitoring bird breeding activity can unforeseen situations be recognized and adjustments be made to improve installation conditions in the field and the ultimate success of a given bird species. Man made cavity nesting programs are an important way to connect people to habitats and their value, and introduce and facilitate citizen science and volunteerism. Other resources and opportunities are available, including cooperating with the Cornell Laboratory of Ornithology’s Birdhouse Network by keeping accurate monitoring data and submitting your data to their data base as well as creating your own.

Cavity nesting bird conservation projects are in no way an ultimate solution to habitat loss, but they can prove to be an effective activity to increase the populations of certain species in affected areas. Building and installing nest boxes is something that many people can do to make a positive difference for the stewardship of our wild bird resources.