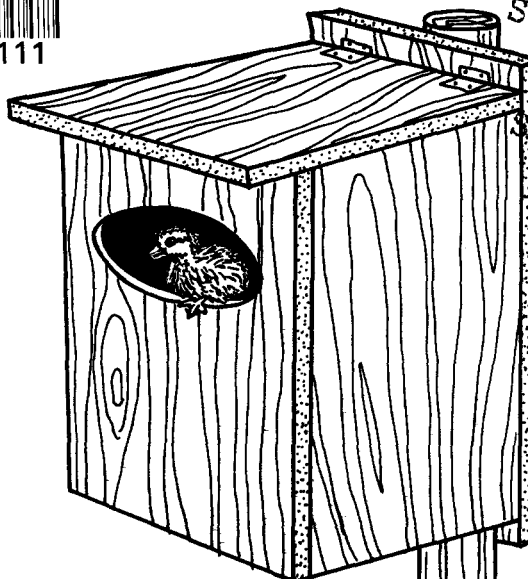




# Homemade Nest Boxes For Cavity-Nesting Ducks

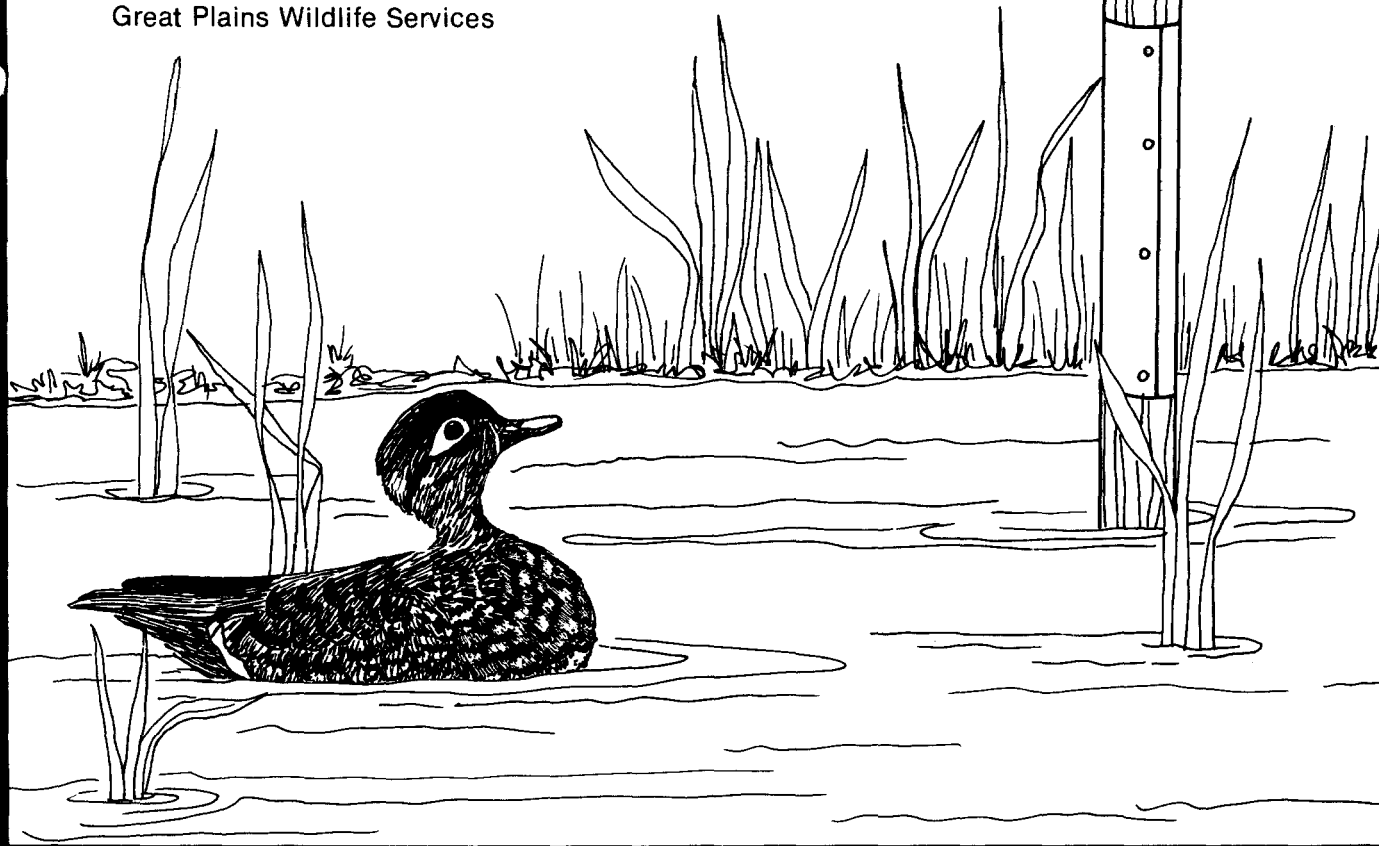


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Four species of ducks normally nest in tree cavities in North Dakota. They are the wood duck, hooded merganser, common goldeneye and bufflehead. While these birds are of lesser importance as game species, they are beautiful birds that add much to our enjoyment of the natural environment.

When natural cavities are scarce or absent, these ducks may not reproduce successfully. Fortunately, they readily accept and nest in a variety of homemade nest boxes. Actually, homemade nest boxes have the potential of providing safer nesting sites than do natural cavities because they can be made predator-proof.

This circular contains information and plans for construction, predator proofing, placement and maintenance of one metal and two wooden types of nest boxes for cavity-nesting ducks. The advantages or disadvantages of each type are discussed. In addition, there are a number of commercially available nest boxes on the market. A list of addresses is provided for those who wish to purchase nest boxes.

## Life Histories

Wood ducks, hooded mergansers, common goldeneyes and buffleheads occur locally throughout the state along streams, lakes and reservoirs which have wooded shorelines. Although North Dakota is on the fringe of the range for these widely distributed ducks, people can do much to increase the productivity and abundance of these species by providing nesting boxes in suitable habitats.

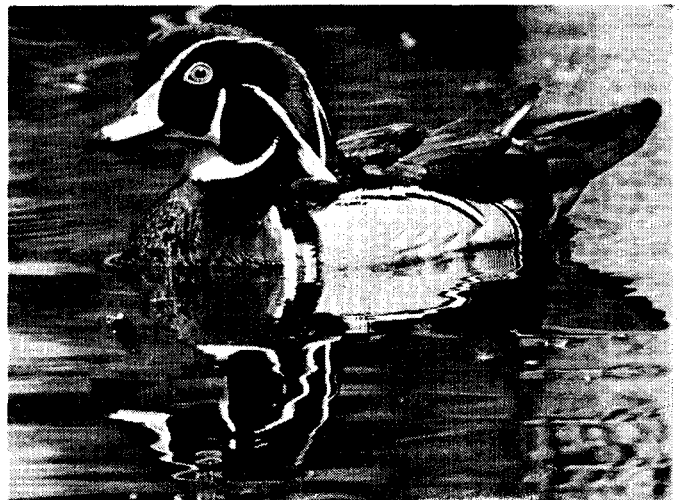
Banding studies have shown that the hens have a pronounced homing tendency and will return to nest in the same general area where they were raised. Newly hatched ducklings, during the first few hours after emerging from the egg, obtain a lasting impression of certain aspects of their environment through a rapid learning process called imprinting. Ducklings are imprinted to know the calls of their mother and it is likely that they are also imprinted to the type of nest in which they hatched. Females hatched in a nest box will, therefore, tend to seek similar sites when they reach nesting age. Once a female has successfully nested in a nest box, she tends to return to the same box the following year.

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## Wood Duck

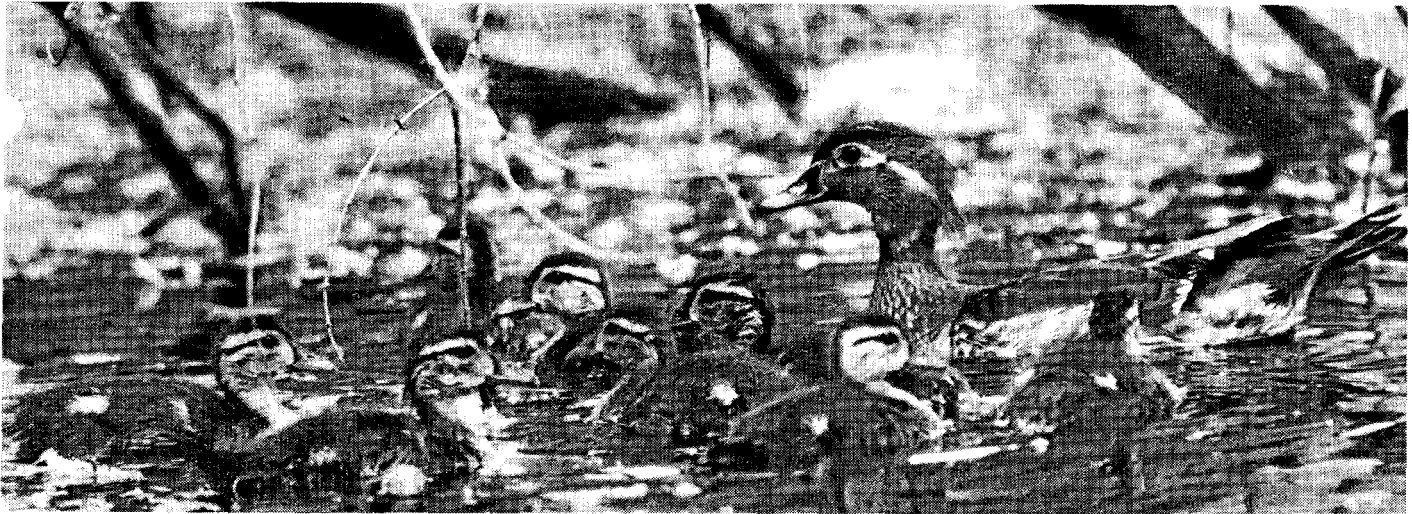
The adult male wood duck in spring plumage is beautifully and elaborately marked. The crested head is metallic green with purple and white markings. The throat is white, the bill red at the base, and the eyes bright orange-red. Its glossy purplish-brown chest fades into the white of the breast. The back and rump are a rich bronze-green and the sides are pale buff. The adult female is rather plainly marked and is a grayish-brown duck with a crest and a conspicuous white eye-ring. Both sexes have whitish-tipped flight feathers (primaries and secondaries). In flight, these birds can be readily identified by their long square tails and high-pitched squeaky voices. During the fall male wood ducks in North Dakota are found in varying degrees of molt; some resemble the female and others are colored much like the male in spring. Average weights are 1 to 1¾ pounds.

The wood duck is native only to North America, with the United States containing the bulk of the breeding population. In North Dakota, the wood duck breeds mainly along wooded streams and rivers from the Missouri River east to Minnesota. They are early migrants with most leaving North Dakota by early October. Large numbers of wood ducks spend the winter in Arkansas, Alabama, Mississippi and Louisiana.



**The adult male wood duck in spring plumage is one of our most elaborately marked waterfowl species.**

Wood ducks often feed along the banks of wooded streams, lakes and ponds where they find seeds and fruits of trees, shrubs and herbaceous plants. They frequently forage in wooded areas for nuts and berries. While acorns are a favorite food, wood ducks also like corn.



Female wood ducks have sole responsibility for raising her ducklings. Once the young leave the nest she will spend the next six to 10 weeks moving her brood on and between suitable water areas.

Wood ducks are adept at perching and pairs may be seen sunning themselves on tree branches. They are very capable flyers and fly with surprising speed and agility.

In spring, the male often perches on a branch while the female moves about looking for a suitable nesting cavity. Wood ducks, like all ducks, do not carry nest material to their nests.

The female constructs the nest among the pieces of wood, bark, or other debris found in tree cavities and subsequently lines it with down plucked from her belly during egg laying and incubation. From 10-15 dull white eggs are laid, one each day, generally in the morning. The female begins the four-week incubation period in earnest when the last egg is laid. The male usually stays nearby until the eggs start to hatch.

When the ducklings are about 24 hours old, they are ready to leave the nest. The hen calls softly from a nearby limb, the ground or water to entice the young from the nest cavity. The ducklings respond by peeping and jumping toward the entrance. The hen never carries ducklings and they must reach the entrance through a combination of jumping and climbing with their needle sharp claws. Sometimes they perch at the nest entrance before jumping or they may emerge and spring suddenly through the opening. In either case, the fall, even from great heights, does not seem to harm them and they promptly join the hen and their nest mates.

Once all young have left the nest, the female will spend the next six to ten weeks moving her brood on and between suitable water areas. Wood duck broods are very secretive and tend to select water areas with overhanging woody vegetation.

## Hooded Merganser

The adult male hooded merganser in spring plumage is a beautiful black and white bird with rufous-brown sides. The crested head has a large fan-shaped white patch bordered with black. The female is mostly brown and carries a crest of reddish-brown. A white wing patch is present in both sexes.

In early fall the male resembles the female but gradually develops the characteristic white-and-black feather pattern, and by October some have the full breeding plumage. The hooded merganser is similar in size to the wood duck and average



The adult male hooded merganser in spring plumage is easily recognized by a large fan shaped white patch on its crested brown head.

weights range from 1¼ to 1½ pounds. It is considerably smaller than both the red-breasted and common mergansers which migrate through North Dakota each year. The hooded is the only merganser which  **nests**  in North Dakota.

The hooded merganser breeds along wooded lakes, streams and rivers over much of the United States and southern Canada. It winters in southern United States and Mexico and along the Atlantic and Pacific coasts. North Dakota counties in which hooded mergansers have been known to nest recently include McHenry, Barnes, Stutsman and Ward. However, they may nest or be induced to nest in other areas of the state where suitable habitats are found.

Like the other mergansers, the hooded is an excellent diver, and with its serrated and hooked bill is able to capture fish, its most important food. It also feeds on a variety of other foods, including crayfish, snails, frogs and aquatic insects.

Unlike wood ducks, hooded mergansers are not known to nest until two years old. Hooded mergansers, like wood ducks, nest in tree cavities. These cavities may be as high as 60 feet above the ground. The nest is made among the pieces of wood, bark or other debris found in the cavity and is lined with down the female plucks from her belly during egg laying and incubation. From 10 to 12 pure white eggs are laid, one each day. The hen begins full time incubation after the last egg is laid. At the start of the four-week incubation period, the male leaves the female.

Hooded merganser ducklings remain in the nest about 24 hours and then leave in a manner similar to wood ducks. The female remains with the ducklings for the next eight to ten weeks until they can fly. During this period, most of the time is spent on water. At first, ducklings eat mostly aquatic insects. As they mature and are better able to dive, fish, crayfish, and frogs become more important.

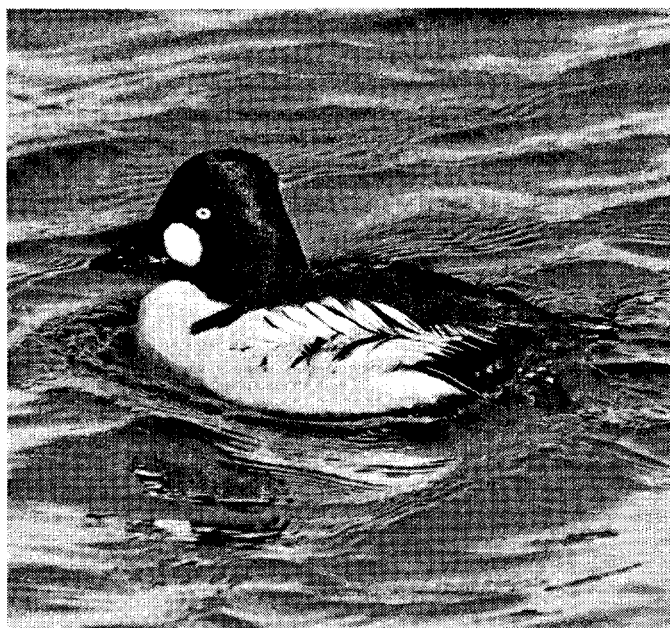
## Common Goldeneye

The adult male common goldeneye in spring plumage is a handsome bird that appears predominantly white while on the water. Head and neck are blackish and highly glossed with metallic green. There is a round white cheek patch between the bright yellow eye and the base of the black bill. Its back and rump are black and the neck, breast, belly and sides are white. Males do not acquire this full breeding plumage until the second year. Yearling males may show traces of the white cheek patches and in most respects resemble the adult female.

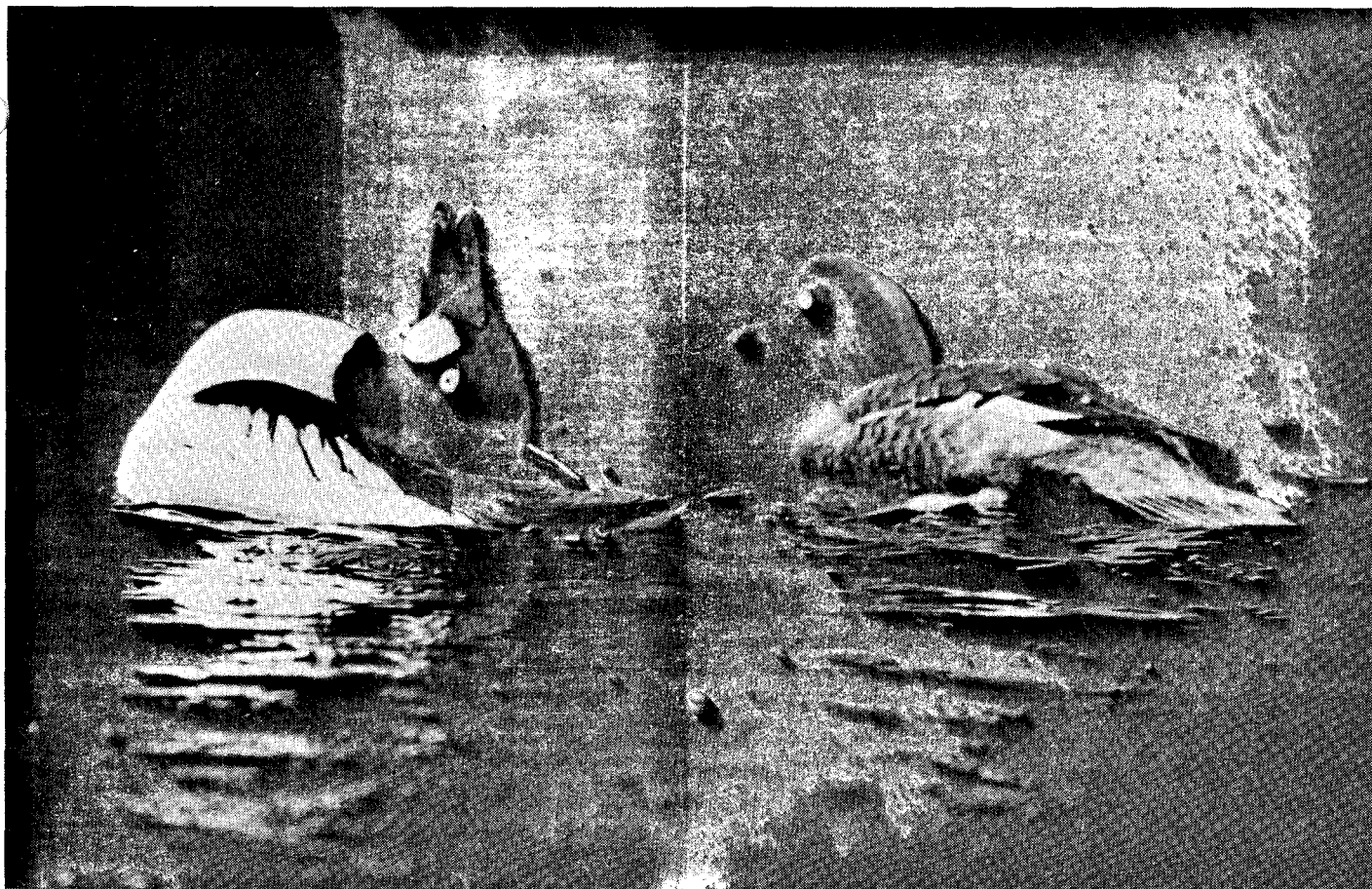
The adult female has a brown head with contrasting white eye and a grayish body. The bill is dusky gray, becoming tipped with yellow in the spring. Both sexes have conspicuous white wing markings, which along with a distinct whistling sound of the wings help to identify these birds in flight. The feet are yellow-orange in both sexes. Average weights are from 1¾ to 2 pounds. They are very hardy ducks and are among the last to leave in the fall and the first to arrive in the spring.

Goldeneyes winter in North America on the Atlantic and Pacific coasts and inland as far north as water remains open. Several hundred regularly winter on the Missouri River in North Dakota.

The common goldeneye breeds across the continent in Canada and in the northern states from the Atlantic Coast to North Dakota ranging north to the edge of the tundra. In general, it is a breeding bird of the forested areas.



The adult male common goldeneye in spring plumage is easily distinguished by a round white cheek patch located between a bright yellow eye and black bill.



During the breeding season, common goldeneyes can be seen engaged in elaborate mating displays in which head throwing rituals are commonplace.

North Dakota is on the fringe of the common goldeneye's breeding range. The North Dakota breeding population is largely restricted to the Turtle Mountains where they nest in limited numbers. Prior to 1920 goldeneyes nested in the Devils Lake area and in Griggs, McHenry, Nelson and Ramsey counties. Generally they prefer nesting near permanent type lakes with large mature trees. In spring, goldeneyes may be seen on lakes and rivers throughout the state. They eat mainly animal matter including crustaceans, aquatic insects, mollusks, fish eggs and small fish.

Common goldeneye tree cavity nests have been found as high as 60 feet above the ground and as far as a mile from water. The nest consists of a depression in the debris at the bottom of the tree cavity and is lined with down plucked from the female's breast during egg laying and incubation. From six to 14 olive green eggs are laid, one each day, and the four-week incubation period begins full time after the last egg is laid. Shortly after incubation begins, the male abandons the female. After hatching, goldeneye ducklings remain in the nest 24-48 hours. They leave the nest in a manner similar to wood ducks.

The newly hatched ducklings feed on the surface of the water but they soon become proficient divers and secure their food in this manner. Like the young of other ducks, their food is largely animal matter. The young grow fast and are usually able to fly in eight weeks. The mother abandons the young shortly before they can fly.

It is interesting to note that common goldeneye ducklings are usually raised on large water areas where they use emergent vegetation, such as cattails and bulrushes for cover. This is the only cavity-nester of those discussed in this circular that has this preference. The other ducks discussed prefer to raise their young on small wooded ponds, streams and rivers close to protective vegetation.



## Bufflehead

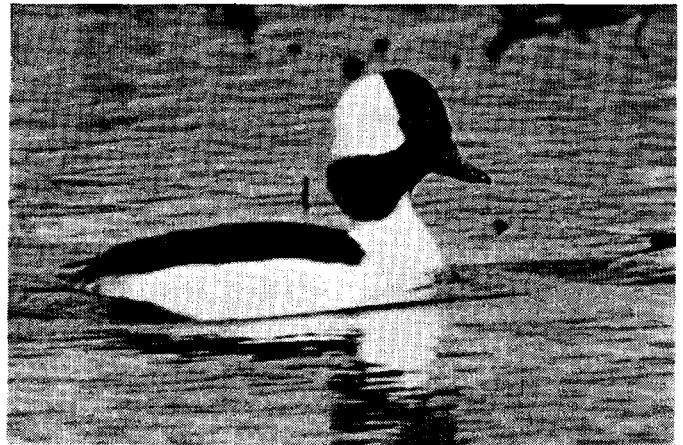
The bufflehead is one of our smallest and most beautiful ducks. Adult males have a puffy purple and greenish-black head with a large, white, wedge-shaped patch extending from the eye to the back of the head. Neck, underparts and sides are white. The wing is black with a large white patch and the feet are pink. The female is a much duller bird with a grayish-brown head, back and wings, and gray underparts. White coloration is restricted to a small spot behind the eye and the wing patches. The feet are brown. Yearling males closely resemble females. Average weights range from 12 ounces to one pound.

Buffleheads generally winter on the Atlantic and Pacific coasts as far north as New England and British Columbia. They may also be found wintering on the Gulf Coast, in northern Mexico and inland in the United States to the ice line. Buffleheads are observed throughout North Dakota during both spring and fall migrations. Flock size is usually small and often only one or two birds are seen on a lake. They arrive early in spring but are one of the last to leave in the fall.

The bufflehead breeds primarily in the wooded regions of western Canada and eastern Alaska. Breeding is associated with woodland ponds and streams and the parkland transition zone between the prairies and the forest.

North Dakota is on the southern edge of the breeding range. The nesting population is limited to the Turtle Mountains (Bottineau County) and along the Souris River (McHenry County) within the J. Clark Salyer National Wildlife Refuge.

Animal matter comprises a high percentage of the bufflehead's diet. Items eaten include aquatic insects, snails and particularly fish in winter. Buffleheads also eat seeds of aquatic plants.



**A large white wedge-shaped patch extending from the eye to the back of the head is characteristic of the adult male bufflehead in spring plumage.**

Some of the bufflehead nests recorded in the Turtle Mountains have been in old flicker nest cavities in dead trees. The nest usually consists of a depression in the loose material at the bottom of the tree cavity and is lined with down plucked from the hen's breast during egg laying and incubation. From six to 14 dull light buff color eggs are laid, one each day, with most nests having from eight to ten eggs. The four-week incubation period begins full time when the last egg is laid. The male abandons the female when full time incubation begins.

After hatching the ducklings leap from the nest like wood ducks, and the brood then follows the female to water. Once on the water, the young feed mainly on aquatic insects, taking larger food items as they mature. The female remains with the brood for seven to eight weeks until the young can fly.



**Buffleheads, like other diving ducks, patter along the water surface for some distance prior to take off.**

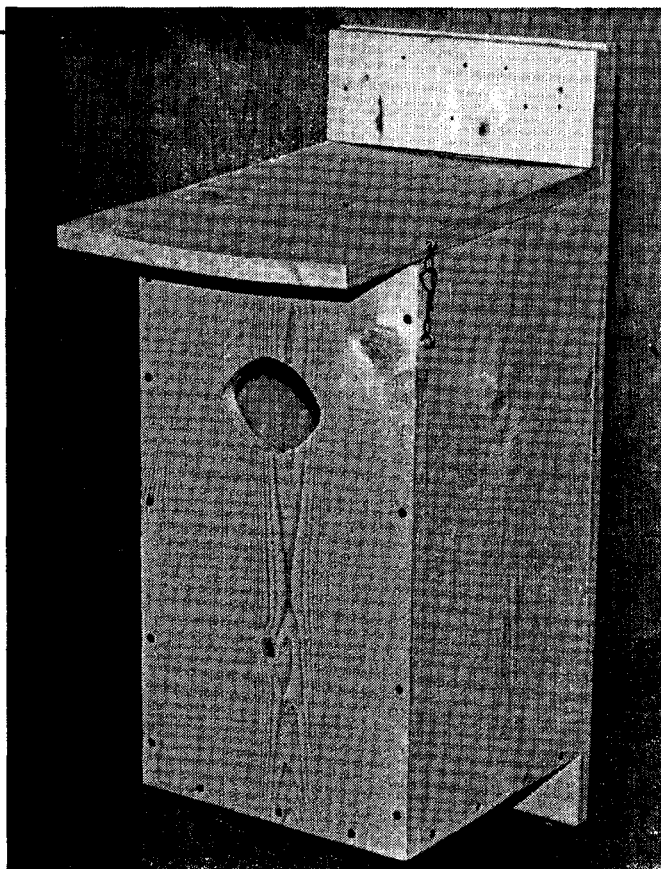
## HOMEMADE NEST BOXES

A variety of materials have been used to construct homemade nest boxes. Most nest boxes have been made out of wood or metal, each having certain advantages and disadvantages. The wood nest box is sometimes more readily accepted by wood ducks, but the metal nest box can provide a safer nest site. While the metal box tends to be predator proof, additional measures will need to be taken to deter predation of nests in wooden boxes. (See predator guards pages 19 and 20). The wood nest box is easy to build, while sheet metal required to build the metal nest box can be hard to work with and may require special tools. The wood nest box generally blends in well with the natural landscape. Squirrels tend to avoid metal boxes while both squirrels and starlings prefer to nest in wood boxes. The metal nest boxes will last 10 to 15 years while the life-span of the wood nest box may be considerably shorter depending on such factors as types of wood used, quality of construction and weather.

Whether you use wood or metal to build your nest box, you must remember that **ducks do not carry nest material to the nest**. Therefore, suitable nesting materials such as coarse sawdust, wood chips, or shavings must be provided in the bottom of every nest box. It is important to include some wood chips or shavings since sawdust alone tends to pack. Even the best built nest boxes will not be used if nesting material is not provided.

### Single Compartment Wood Nest Box

The single compartment wood nest box shown (Figure 1) is simple and easy to make. Sufficient lumber for one nest box is contained in a 1-inch x 12-inch x 12-foot board. The wood should be well-seasoned and can be either dressed or rough-cut. The box should be made of good lumber to avoid light and water leaking in through knotholes and cracks. Redwood and cedar are considered best but fir, pine and other kinds of lumber are satisfactory even though they may not be as weather resistant. It may be desirable to treat the wood with some type of non-toxic wood preservative. Treated structures should be dried for several weeks before they are put out for ducks to use. In addition to treating the wood, the outside can be painted or stained with a natural color to blend in with the environment. **The inside should not be painted.**



**Figure 1. The single compartment wood nest box is easy to build. If properly placed and maintained, these boxes can provide secure nest sites for the cavity nesters in your area for many years.**

#### Materials needed

Lumber	one 1-inch x 12-inch x 12-foot board or suitably sized pieces
Nails	25 8- or 10-penny, ribbed or hot dipped galvanized
Hardware cloth	one 14-inch strip ¼-inch mesh cut at least 3 inches wide (smaller nails or staples can be used to attach the cloth)
Nest material	enough sawdust, wood shavings, woodchips, or similar type material to form a 3- to 5-inch deep nest base in box.

#### Construction

When constructing the nest box (Figure 2), it is advisable to use nails that are long enough to hold securely despite rough handling and weathering. Hot dipped or ringed galvanized 8-penny or 10-penny nails are best. Depending on the condition of the wood used, it may be necessary to drill pilot holes to avoid splitting the wood.

It is important to bore four ¼-inch drain holes through the bottom of the nest box. The floor of the box should be recessed ¼-inch up from the lower edge of the sides to retard rotting.

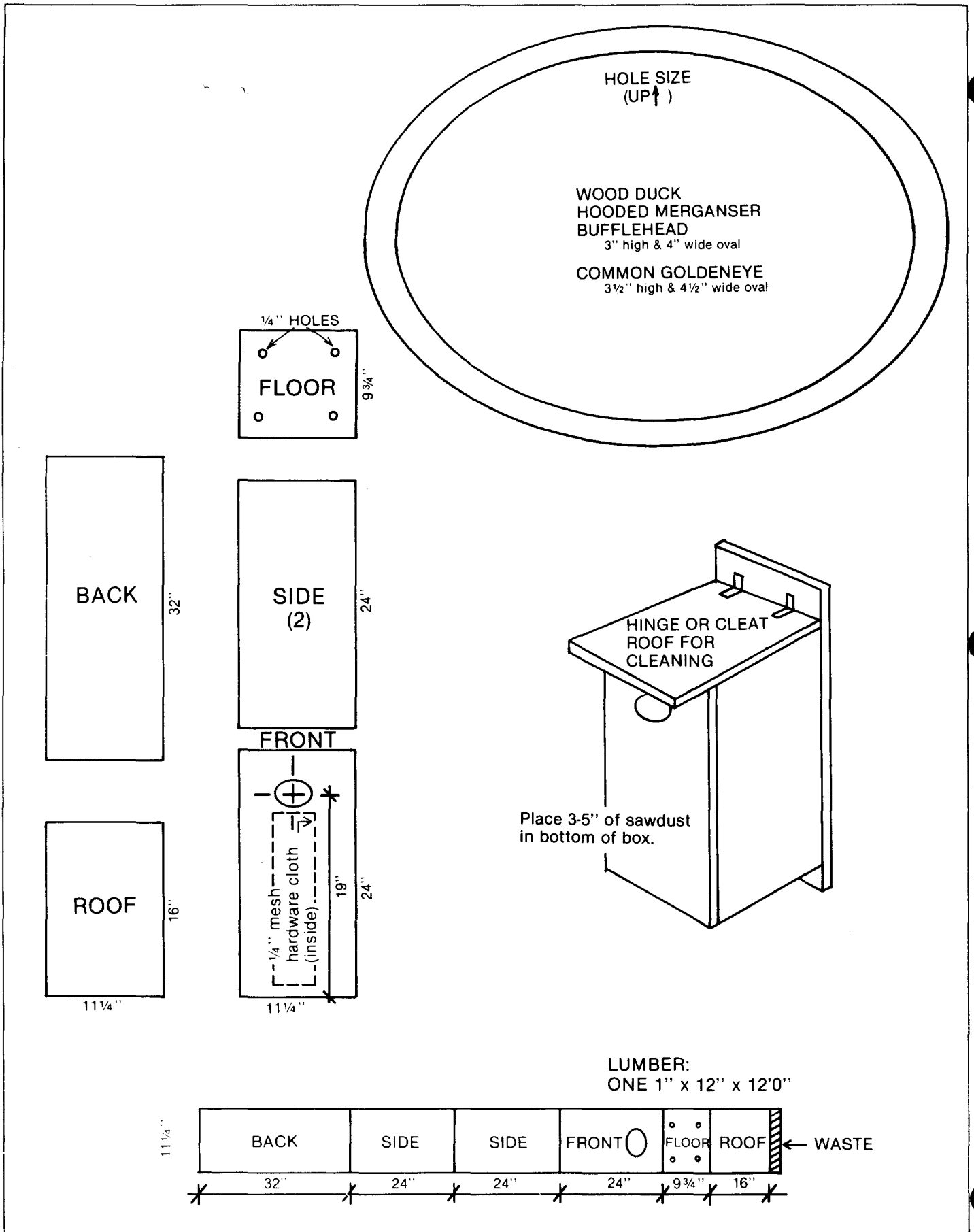
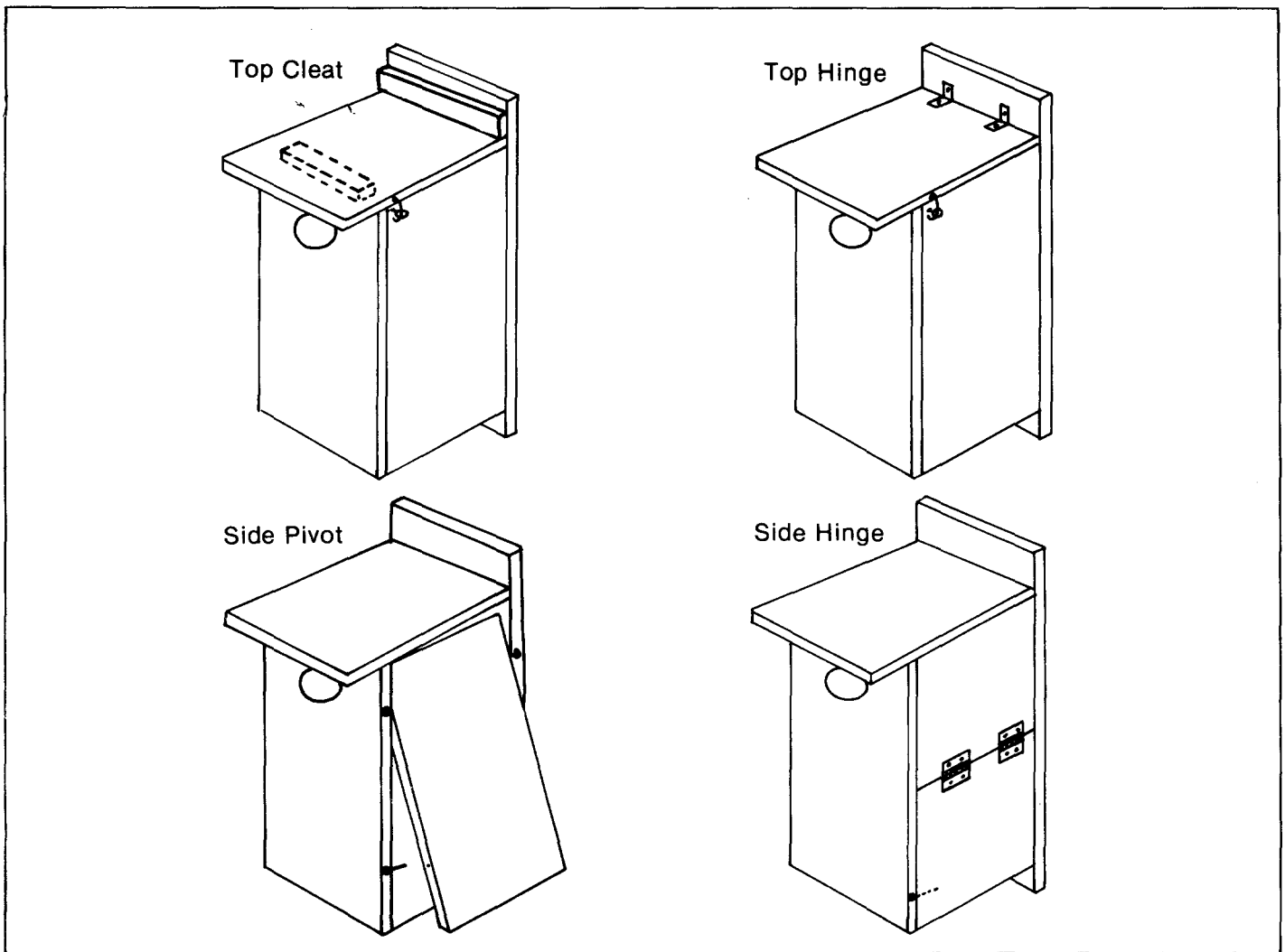


Figure 2. Sufficient lumber for one single compartment nest box is contained in a 1-inch x 12-inch x 12-foot board.

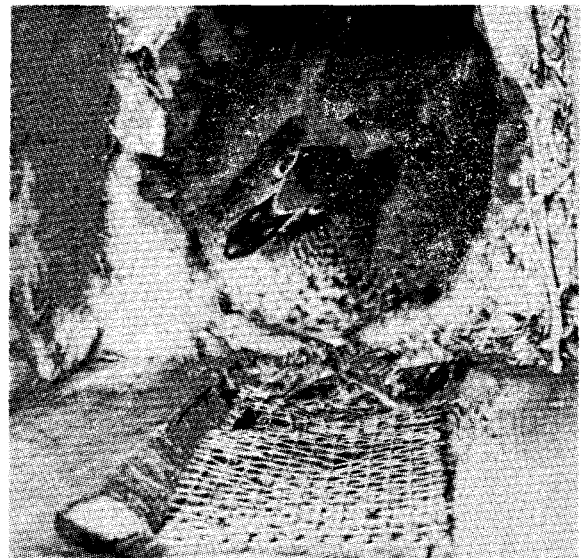




**Figure 3. It is essential to provide easy access to nest boxes for maintenance purposes. Four design variations commonly used as the top cleat, top hinge, side pivot and side hinges.**

Figure 3 shows four design variations which can be used to provide easy access for inspection, cleaning and general maintenance. These variations are a top hinge, a top cleat, a side hinge and a side pivot design. The two variations employing side door opening designs should be used in situations where it would be either difficult or impractical to service the nest box from above.

As shown in the plan, the entrance hole should be an oval, 3 inches high and 4 inches wide for wood ducks, hooded mergansers and buffleheads, and 3½ x 4½ inches for common goldeneyes. This hole excludes most raccoons. The hole should be centered about 19 inches above the floor. A 3- to 4-inch x 14-inch strip of ¼-inch hardware cloth should be attached inside the box under the entrance to function as a ladder when the newly hatched ducklings leave the box (Figure 4).



**Figure 4. A 3- to 4-inch x 14-inch strip of ¼-inch hardware cloth attached to the inside of the box under the entrance hole serves as a ladder to assist newly hatched ducklings in leaving the box.**

## Double Compartment Wood Nest Box

The double compartment wood nest box (Figure 5) is similar in design and construction to the single compartment nest box. Sufficient lumber for a double nest box is contained in a 1-inch x 12-inch x 18-foot board. Nesting boxes should be made of well-seasoned wood, either finished or rough. Rough cut lumber is generally preferred since it is cheaper and the rough surfaces provide toeholds for ducklings as they attempt to exit the box.

To further assist ducklings in making their escape, a hardware cloth ladder must be attached to the interior of the box beneath each entrance hole to provide an additional climbing surface (Figure 6). Redwood and cedar are considered best, but fir and pine are satisfactory as long as they are not full of knotholes and cracks. The outside of nest boxes may be painted, stained or treated with a non-toxic wood preservative to blend in with natural surroundings. The inside of the box should not be painted or stained.

### Materials Needed

Lumber	one 1-inch x 12-inch x 18-foot board
Nails	50 8- or 10-penny hot dipped or ribbed galvanized
Hardware cloth	two 14-inch strips $\frac{1}{4}$ -inch mesh cut at least 3 inches wide
Nest material	enough sawdust, wood shavings, woodchips or similar type material to form a 3- to 5-inch nest base in each box.



Figure 5. Double compartment wood nest boxes offer an additional opportunity to attract two nesting hens to a single location, thus doubling wood duck production potentials.

### Construction

The double compartment nest box construction is similar to the single compartment wood box. An important aspect to remember is the use of the proper nails. It may be necessary to drill pilot holes to avoid splitting the wood. It is also important to drill four  $\frac{1}{4}$ -inch drain holes through the bottom of each nest box compartment (Figure 7).

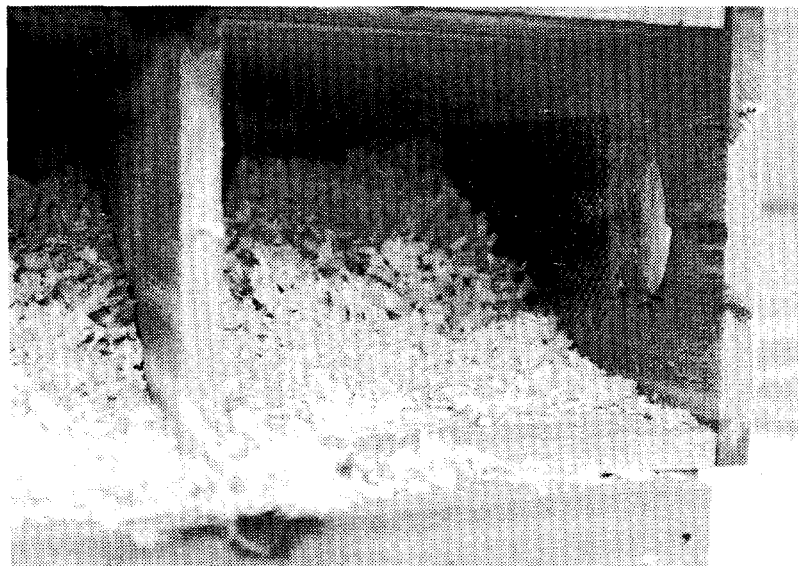


Figure 6. As with the single compartment wood nest box, each section of the double compartment wood nest box must have a  $\frac{1}{4}$ -inch hardware cloth mesh ladder fastened below the entrance. In addition, 3 to 5 inches of nest material must be provided in each compartment.

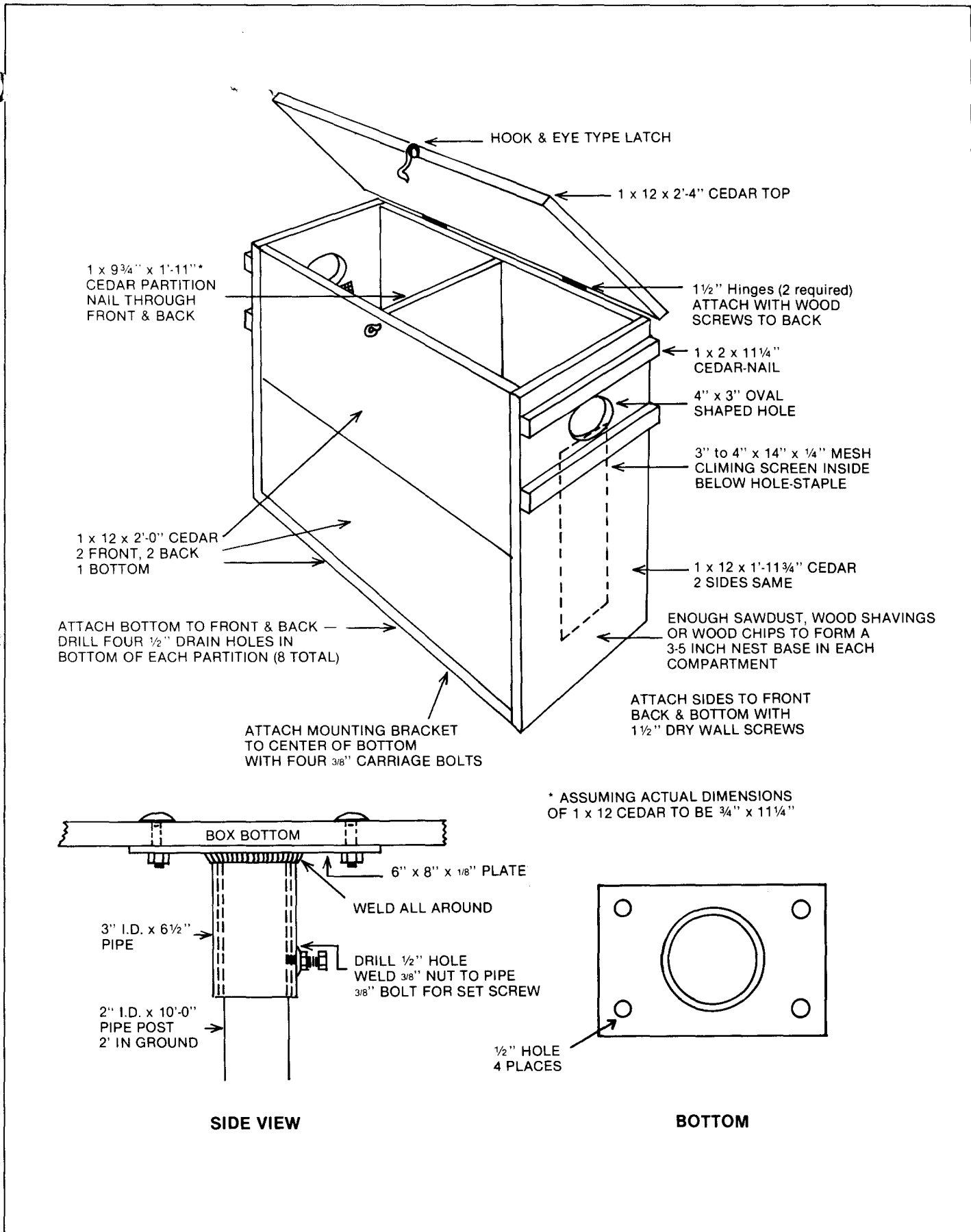


Figure 7. The double compartment wood nest box is similar to the single compartment wood box. If properly placed and maintained, it can double the wood duck production potentials of an area at less cost.

The double compartment nest box plan shows design variations which can be used to provide easy access for inspection, cleaning and general maintenance. These variations, in addition to the top hinge shown in Figure 7, are the top cleat with wing nut and side hinge (Figure 8).

Again all entrance holes should be patterned after the guidelines established for the single compartment nest box. The entrance hole should be an oval 3 inches high and 4 inches wide for wood ducks, hooded mergansers and bufflehead. Also, it is important to remember to attach a 3- to 4-inch x 14-inch strip of 1/4-inch mesh hardware cloth to the inside of each box under the entrance (Figure 4).

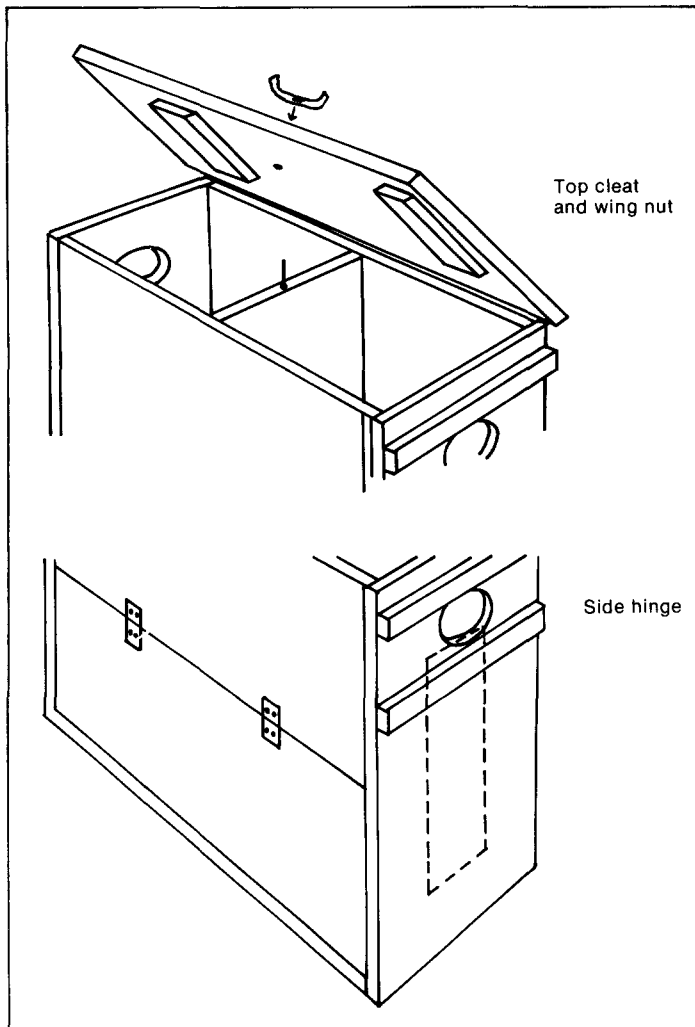


Figure 8. The above cut away shows the wing nut and side hinge variations.

## The Metal Box

The North Dakota Game and Fish Department has constructed and distributed substantial numbers of a metal nest box that is relatively easy to make. The entrance hole is located well below the rim of the metal cone to reduce the chance of a raccoon or a squirrel being able to reach the entrance from the top of the box (Figure 9).

### Materials Needed

Metal	one 46-inch x 33 3/4-inch metal sheet of 26-gauge galvanized sheet metal (body of the box)
Metal	one 28-inch diameter circular piece of 26-gauge galvanized sheet metal
Wood	one piece pine, cedar or plywood 1 inch x 3 inches x 6 inches (inside brace)
Wood	one circular piece of 3/4-inch exterior plywood 14-inch diameter (floor)
Wood screws	eight 1-inch round head wood screws (for mounting the floor)
Pop rivets	18 1/2- x 1/8-inch
Washers	four 1/8-inch diameter washers to fit 1/2- x 1/8-inch pop rivets (used in fastening the hardware cloth)
Hardware cloth	one 14-inch 1/4-inch mesh strip cut 4 inches wide or similar type material
Nest material	enough sawdust, shavings, wood chips or similar type material to form a 4- to 5-inch nest base in box.



Figure 9. Metal nest boxes have been distributed throughout North Dakota by the Game and Fish Department. These boxes afford cavity nesters relatively secure nest sites. The security of the nest box is enhanced by locating the entrance hole well below the metal cone top as pictured above.

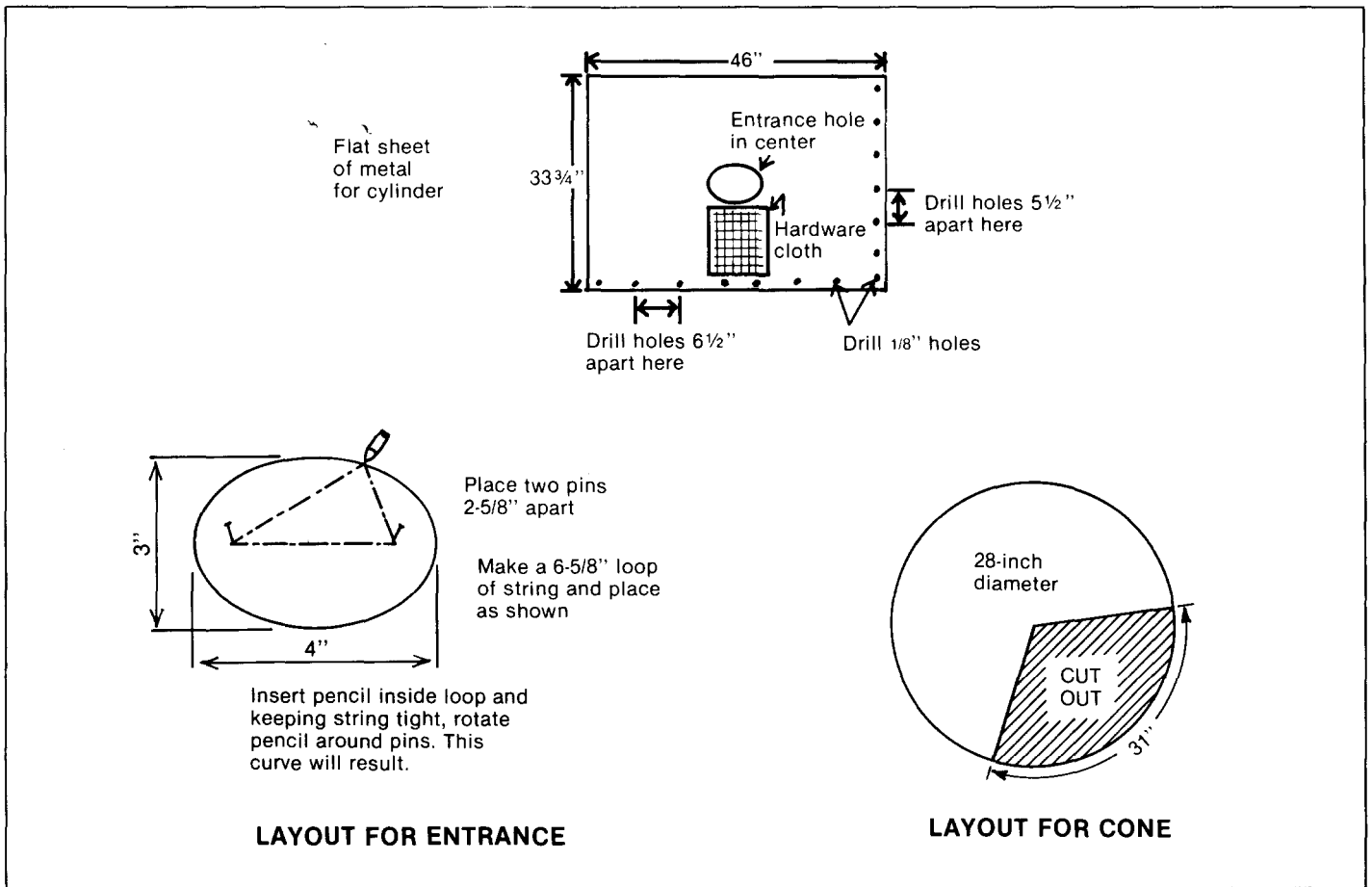


Figure 10. Construction of the metal nest box cylinder, cone and entrance hole.

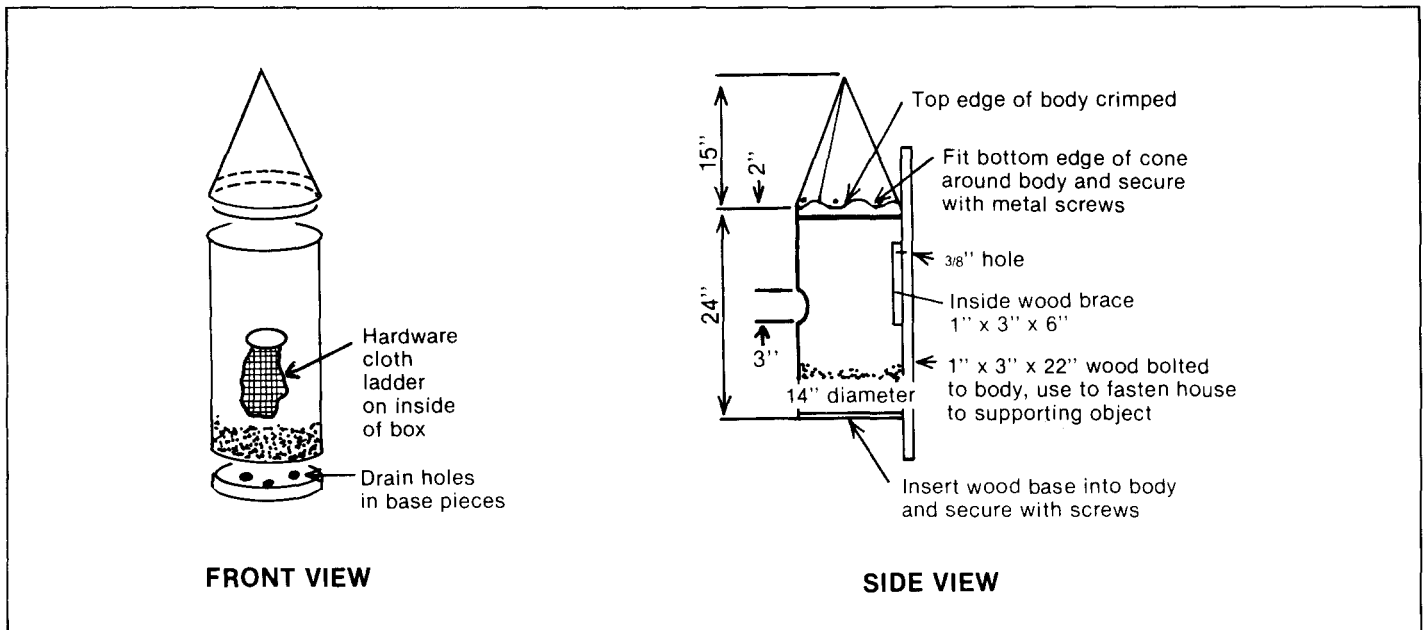


Figure 11. Assembling and mounting the metal nest box.



## Construction

Start with the flat 33<sup>3</sup>/<sub>4</sub>- x 46-inch piece of sheet metal. Cut the entrance hole of appropriate size (Figure 10) in the center of the sheet prior to bending.

Next, attach a 14-inch x 4-inch piece of 1/4-inch mesh hardware cloth just below the entrance using pop rivets and washers. Then drill 1/8-inch holes for base screws and rivets in one side of the piece of sheet metal. These holes are 6<sup>1</sup>/<sub>2</sub> inches apart on the bottom and 5<sup>1</sup>/<sub>2</sub> inches apart on the side (Figure 10).

The base piece has a diameter of 14 inches and is made of 3/4-inch exterior plywood. Four or more 1/4-inch drainage holes should be drilled in the base. When assembling the structure, make sure the hardware cloth is on the inside. Starting with the undrilled side, attach the sheet metal to the wooden bottom with the eight 3/4-inch screws rolling the base as you go. It is advisable to extend the metal walls about 1/2-inch beyond the bottom.

After the body has been attached to the wood bottom, the sheet metal will overlap. Bend and shape the sheet metal to form a cylinder with the same overlap at the top as at the bottom. Drill holes as necessary in the inside flap using the previously drilled holes as a guide. Rivet the top of the seam first using pop rivets, smooth side out. Finish shaping the seam by drilling and riveting the overlap using six rivets.

The top is made from a 28-inch diameter circular piece of sheet metal. A pie-shaped piece using 31 inches of the circumference is cut from the metal disc and discarded. The large remaining piece is then bent to form a cone and the edges are overlapped and riveted, smooth side out. The cone has a circumference which allows about an inch to overhang the cylinder. To complete the job, the cone is placed on the cylinder, then the overhang is bent down at three or four places, holes are drilled and the cone is fastened to the cylinder with two pop rivets. To facilitate mounting, one bend of the cone should be at the back of the box where it will be attached to a tree or post.

The metal nest structure is now ready to be mounted on a tree, pole or pipe. Instructions for placement are similar to those provided for other types of nest boxes. The usual method of attachment to a tree or wood pole is to insert a 4- to 6-inch lag bolt through a 1-inch inside brace board in the back of the box opposite the entrance (Figure 11). An additional lag bolt should be used at the bottom of the cylinder for added rigidity.

## Nest Box Enhancement Considerations

Use of nest boxes by cavity-nesting ducks can be greatly increased by giving proper consideration to entrance holes, placement, method of attachment, the use of predator guards, selection of nesting material, and annual inspection and maintenance.

### Entrance Holes

It is important to make the entrance hole large enough to accommodate the largest cavity-nesters found in your area. In most cases, an oval entrance hole 3 inches high by 4 inches wide will be suitable for wood ducks, hooded mergansers, and buffleheads. If common goldeneyes are found in your area, an oval entrance 3<sup>1</sup>/<sub>2</sub> inches high by 4<sup>1</sup>/<sub>2</sub> inches wide is needed (Figure 12).

### Entrance Placement

In North Dakota, cavity-nesting ducks are found along streams, lakes and reservoirs which have wooded shorelines. Nest structures erected in ponds in open country far from trees are not likely to be used by cavity-nesting ducks. On the other hand, nest boxes placed on ponds near wooded streams may be used.

Wood ducks tolerate some human activity and will often nest in boxes placed in trees in towns and cities which are located along a river or stream. All the cavity-nesters discussed have been known to nest in trees as far as one-half mile from a stream or lake. In general, however, nest boxes placed closer to water are more likely to be used and are considered safer because they reduce the distance newly hatched ducklings must travel to water.

Cavity-nesting ducks usually do not object to others of their kind nesting nearby. For this reason two or more boxes placed together may be used successfully in the same season. In general, it is recommended that one to six nest structures be placed in an area during the first year. Houses should be placed in the best locations at least 50 to 100 feet apart. If the nest boxes are used successfully, and the population increases, more structures can be added in the area.

Because some cavity-nesting ducks begin to nest in North Dakota in late April or early May, it is advisable to have the houses in place by late March.

Nest boxes may be placed either over water or over land. Generally speaking, structures over water receive more use by cavity-nesters than those far from water. Overwater structures can be supported by trees or snags surrounded by water, or by poles or pipes driven into the pond or lake bottom.

When placed over land, nesting structures are attached to trees, wood poles, metal pipes or posts. If nest boxes are placed close to water's edge, extra precautions must be taken to ensure that raccoons can not reach the nests. Raccoons travel along the shoreline, and boxes placed there are more likely to be found and the nests destroyed. Those nest boxes placed a distance back from the shore are less likely to be encountered by raccoons.

In general, nest structures should never be located far from water or trees. Ideally, boxes on

land should be 30 to 100 feet from the water's edge. While nest boxes can be placed up to half a mile from lakes, ponds, marshes and rivers, some precautions should be taken when putting them this far from water. Since the hen must lead her ducklings to water after they hatch, the terrain between the nest box location and the water's edge should be free of major obstacles like highways, fences with small mesh wire, and high street curbing. When hatching occurs away from the water, the female will immediately lead the young overland to water. At that time the ducklings are extremely vulnerable to predators. These factors should be carefully considered in the selection of nest box sites.

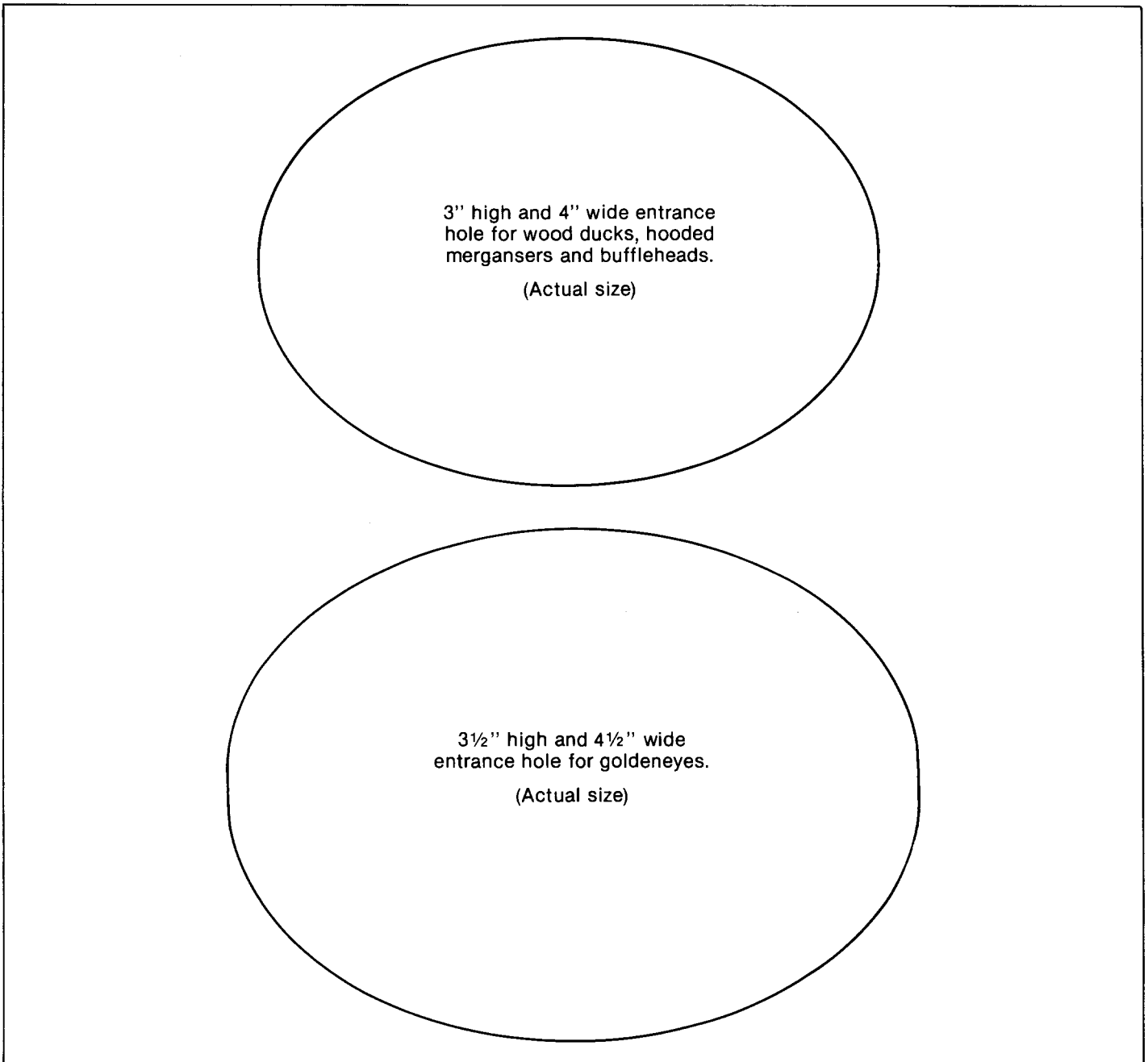


Figure 12. The above templates can be used to insure your entrance holes are of the proper dimensions.

Nest boxes placed over land on trees or on poles or other supports should be at least 8 feet above ground. It is recommended that the box entrance face the water, and that there be no branches or other obstacles for at least 30 feet in front of the entrance. Place the house so that the entrance is clearly visible, with no limbs or branches obstructing the ducks' view or flying approach. Hens tend to avoid selecting houses that are shielded by saplings or overhanging branches. It appears that nest boxes placed in comparatively open stands of mature trees with large spreading limbs are more likely to be used than houses placed in dense stands of young trees. Cavity-nesting ducks prefer to fly to their nests through a relatively open canopy and to perch on large, horizontal limbs near their nests. In some situations, dead trees provide a satisfactory place to locate nesting boxes. Boxes should not be placed on or near trees where they are vulnerable to predators that may reach the box from above by means of branches or other trees.

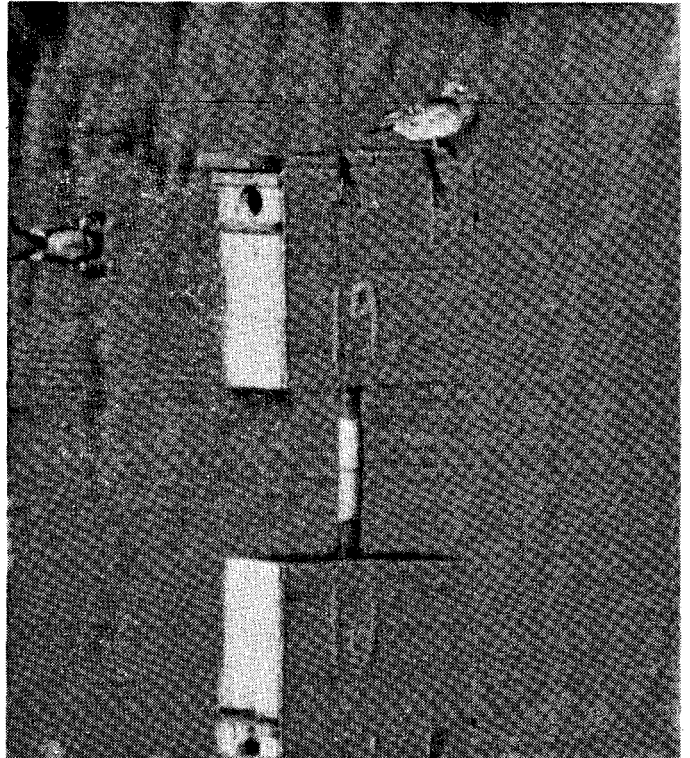
## Attachment

The nest boxes can be attached to trees or artificial supports in a variety of ways. The simplest and cheapest way to mount a nest box is to attach it to a tree. However, in many circumstances it will be necessary to use wood or steel supports in order to place the box over water or at other favorable locations. Support poles should be cedar, redwood or treated wood either 4- x 4-inch square or 4- to 6-inches in diameter. Generally speaking, it is more difficult to predator proof nest boxes attached to trees than those mounted on wood or metal poles. In all cases, the boxes and support poles should be securely installed so as not to sway in the wind.

The usual method of attachment to a tree or wood pole is to insert a 4- to 6-inch lag bolt through a hole bored in the back of the box, opposite the entrance, and turn the bolt until the box is drawn firmly against the tree or post. Drill or punch a small hole into the tree in order to get the lag bolt started. Large washers should be used between the head of the lag bolt and the box. With a lag bolt the strain imposed on a box by a growing tree can be readily relieved every few years by a few loosening turns of the lag bolt. If heavy steel pipe or posts are used, it may be necessary to drill one or more holes in the pipe or post to bolt the box in place. The nest box should be fastened to its support so that it has a slight forward tilt. A backward tilt may prevent ducklings from climbing out and may also allow rain to enter.

When placed over water, structures should be high enough so that they will not be flooded. Four to 6 feet above the water's surface is acceptable to

cavity-nesting ducks and also permits easy inspection and maintenance from a boat (Figure 13). It is best to place posts in water areas where they will not be destroyed by spring ice action.



**Figure 13. Support piles and pipes driven in to the marsh bottom should provide several feet of free space between the bottom of the nest box and the surface of the water.**

Poles for over water nests can be placed in winter when the ice is thick enough to safely support a person and/or vehicle (see chart). A hole slightly larger than the pole is cut through the ice with an auger or chisel. A special attachment for the auger blade is available which makes it possible to drill the hole into the frozen bottom of the lake. After the hole is drilled, a metal pipe or a 14-foot 4-inch x 4-inch wooden pole, with one end sharpened, is placed in the hole and forced by hand into the bottom as far as possible. The pole can be driven deeper into the marsh bottom with a post driver; several feet of the pole or pipe should extend above the high water level.

Guidelines for determining when ice is thick enough to support humans and vehicles.

Ice Thickness	Permissible Load
Less than 2"	STAY OFF!
2"	One person on foot
3"	Group in single file
7½"	2 ton truck gross (car or snowmobile)
8"	2½ ton truck gross
10"	3½ ton truck gross
12"	8 ton truck gross

If the ice is soft and slushy you will need twice the ice thickness to insure safety. Beware of crossing rivers, beaver lodges and lakes at their inlets and outlets since the flow of water under ice impedes freezing.

## Attachment Using A Mounting Board

Top and bottom extensions of the back piece of the single compartment wood nest box allow for easy attachment to trees or poles (Figure 14). If the back piece does not leave extensions, a piece of 1-inch lumber 32- to 36-inches long and 4- to 12-inches wide can be attached to the rear of the nest box for this purpose.

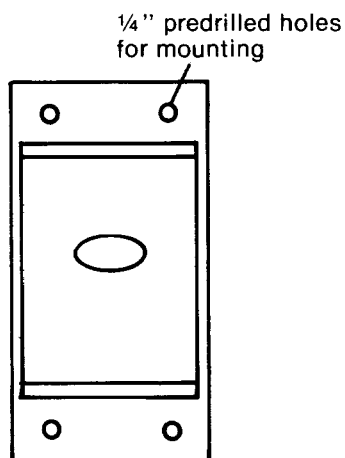


Figure 14. Front view of single compartment wood nest box showing holes for mounting.

## Attachment Using A Pipe Mount Floor-flange Assembly

Another method for mounting either wood or metal nest boxes is to use a floor flange-pipe assembly. A floor flange is bolted to the bottom piece of the nest box. The bottom piece of the nest box must be sturdy. Four holes are drilled in the center of the bottom piece to match the holes in the pipe flange. The pipe flange is then bolted in place with small bolts and washers of appropriate size. For the metal box, the floor flange should be bolted in place before the components of the nest box are assembled.

### Materials needed

Pipe	one 7- or 8-foot length of 1½-inch inside diameter pipe
Pipe	one 2-foot length of 1-inch I.D. pipe which is threaded to screw into the floor flange
Flange	one 1-inch floor flange
Capscrew	one 3/8-inch x 1-inch N.C.
Bolts	four bolts with nuts and washers to attach floor flange

### Construction

A 2-foot piece of pipe, threaded at one end, is screwed into the flange (Figure 15). The size of the

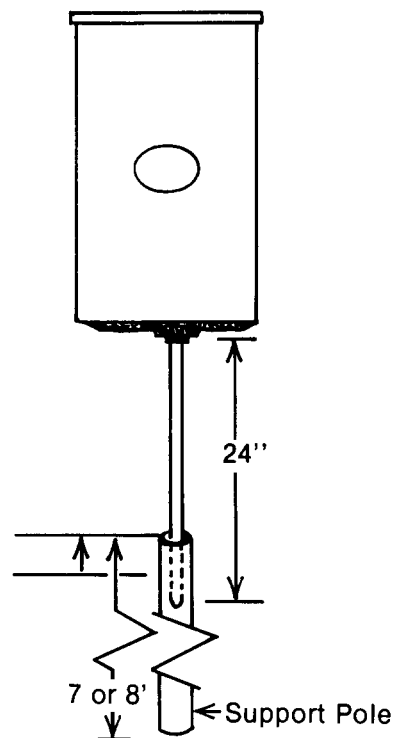


Figure 15. The pipe flange assembly offers an easy method of attaching nest boxes to supports. This method allows the boxes to be removed for maintenance.

flange depends upon the pipe available. A satisfactory combination is a 1-inch floor flange into which is screwed a 2-foot length of 1-inch ID pipe. The 1-inch pipe telescopes into a 1½-inch ID pipe which is driven into the marsh bottom or ground with a post driver. A 5/16-inch hole is drilled 2 inches from the top end of the 1½-inch ID pipe and is threaded with a 3/8-inch N.C. tap and fitted with a 3/8-inch N.C. capscrew. This method of support can be used to place nest boxes either over water or land at many of the same sites previously recommended for wood or metal poles. A simpler method involves screwing the floor flange directly to a threaded pipe driven into the ground.

## Predator Guards

Nest boxes, especially those made of wood, whether on trees or on wood or metal support poles or over land or water, should always be protected from below by a metal shield to prevent raccoons, mink, squirrels and other animals from getting to the box. Raccoons are responsible for the destruction of many duck nests in both natural cavities and homemade nest boxes. Proper precautions must be taken to keep them away from the nest. Raccoons are found throughout North Dakota, so precautions must be taken to keep them away from nest boxes placed in any suitable habitat throughout the state.

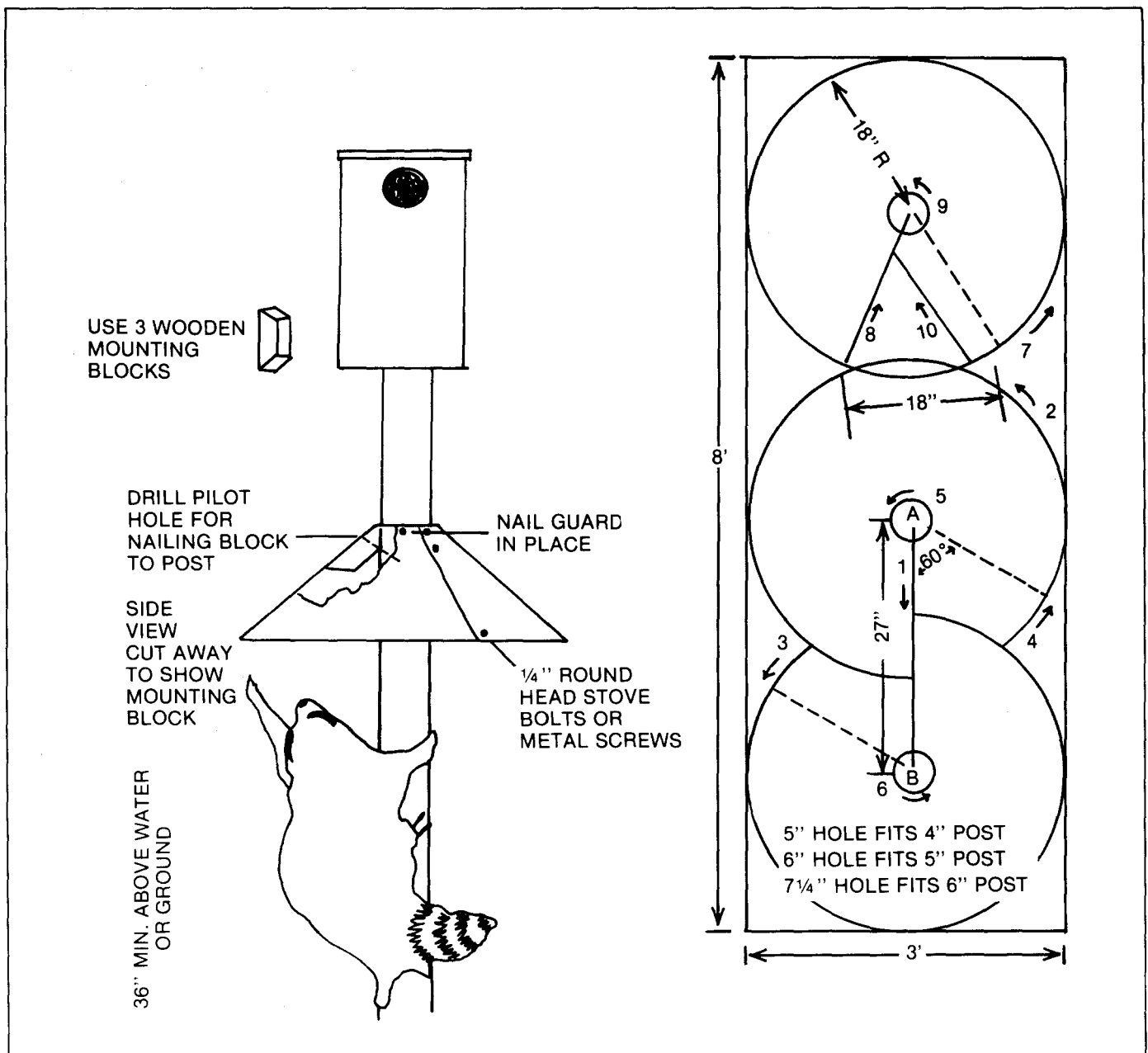


Figure 16. The cone-shaped sheet-metal predator guard offers protection from ground predators such as raccoons to cavity nesters using nest structure.



## Materials needed

Sheet metal	one 3-foot x 8-foot sheet of 26-gauge sheet metal (for three predator guards)
Wood mounting blocks	Three
Stove bolts or metal screws	Three
Nails	six (for nailing mounting blocks and predator guard in place)

## Construction

The following plan (Figure 16) shows how to construct a cone-shaped, sheet-metal guard for protecting nest structures from predators. The diagram shows how to cut three predator guards from a 3-foot x 8-foot sheet of 26-gauge galvanized metal.

When installing the guard, overlap the cut edge to the dotted line. The sequence of numbers on the solid lines is provided to facilitate cutting. Make circular cuts in a counter clockwise direction. The initial cut on line A-B can be started by making a slot at A with a chisel. Then proceed with a tinsnips. **Be sure to wear gloves.**

These cone-shaped predator guards work best on trees or wooden poles with a trunk diameter of up to 6 inches. As is shown in the plan, the cone-shaped predator guard is secured to the pole or tree with wooden mounting blocks and galvanized nails. The lower edge of the cone should be at least 36 inches above the ground or water.

Trees with a diameter over 6 inches can be guarded with a 33-inch band of sheet metal about 3 feet high which completely encircles the trunk. This type of guard can be attached with a nail and flat washer at appropriate places on the overlap. The band should be loose enough to allow for growth of the tree. This "wrap-around" type of predator guard is an option that can be used on any size tree and wood or metal support poles (Figure 17).

## Nest Material

The importance of placing nesting material in constructed nest boxes cannot be overemphasized. Even the best built nest boxes will not be used if nesting material is not provided (Figure 18).

Whether you use wood or metal to build your nest box, you must remember that **ducks do not carry nest material to the nest.** Therefore, suitable nest material must be maintained in the bottom of every nest box. As a guideline, place from 3 to 5 inches of coarse sawdust, shavings, wood chips or

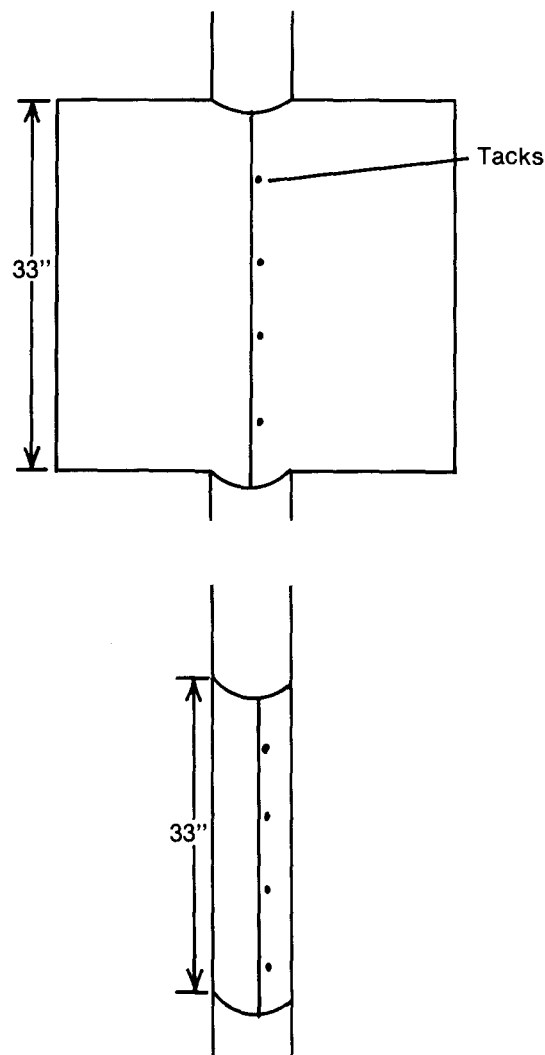


Figure 17. Sheet metal "wrap-around" predator guards can be used to protect nest boxes placed in trees with diameters of greater than 6 inches.

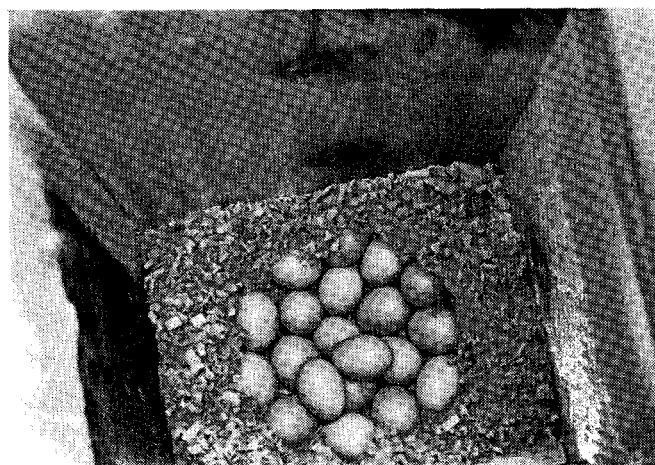


Figure 18. Cavity nesters do not carry nest material to nest boxes. Therefore, 3 to 5 inches of suitable nest material must be provided for them.

rotted wood in the bottom of the nest box. It is important to include some shavings or chips since sawdust alone tends to pack. Most of these materials are readily available at any carpentry or mill-work shop. In addition, pet stores and farm and ranch supply stores often carry wood chips suitable for bedding materials.

Landscaping wood chips from any nursery or garden store will also work well. Another option is to use natural materials found at the placement site such as bark, chips or rotting wood.

## Maintenance

Nest boxes must be checked at least once each year, preferably in late March, shortly before the birds return to nest. At this time repairs can be made, debris cleaned out, sawdust and shavings loosened, and fresh material added. Also, the nest

box contents can be examined for evidence of egg shells, membranes and down indicating use in the previous year (Figure 19). One may find the house filled with nest material carried there by other animals or birds such as squirrels, starlings or sparrows. Each box should be opened, cleaned, thoroughly inspected and refilled with fresh material.

In some areas, starlings and house sparrows may occupy boxes, making them unavailable to cavity-nesting ducks. Whenever this happens, it is advisable to promptly remove the nest and eggs. The starlings and house sparrows are the only songbirds which are not federally protected.

## Other Nest Boxes

The enterprising or innovative naturalist may improvise suitable nesting boxes by utilizing materials at hand. For example, plastic pail nest boxes have been made from two 5-gallon plastic pails attached by fitting the open ends together. Undoubtedly, there are many such potential innovations.

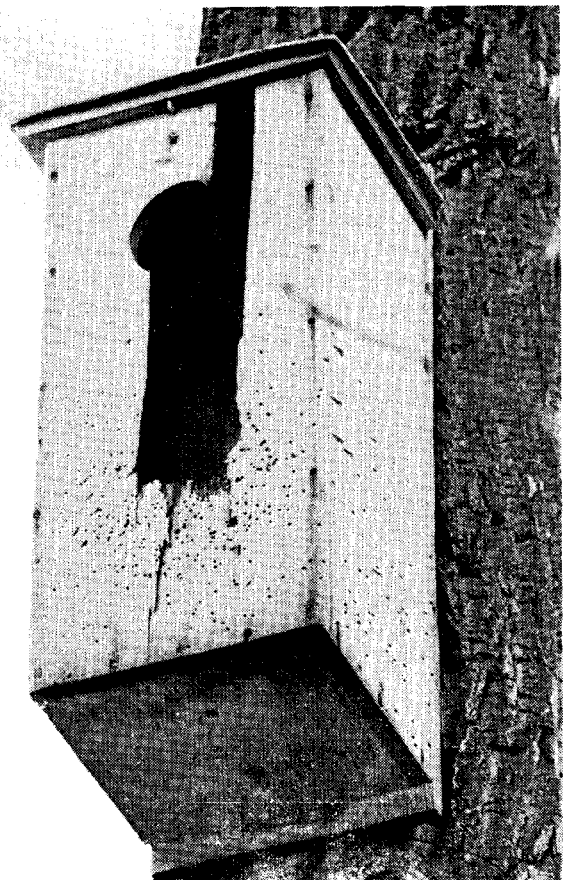
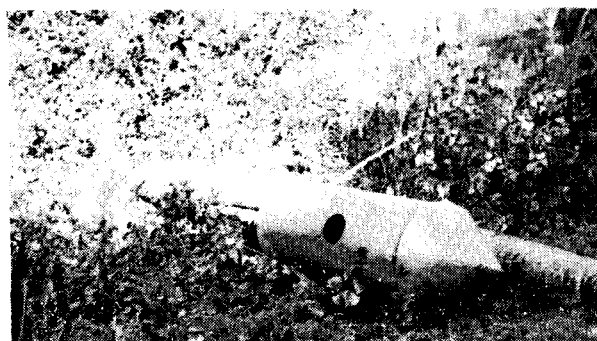


Figure 19. Sometimes even the best plans for mounting nest boxes in trees can go awry. The above picture depicts the fate of one metal nest box that was placed in a tree that beavers had other ideas about and a wood box that was vandalized. Annual maintenance is the only way to assure your nest box will be available for use.



Again, all nest boxes must be maintained annually. The contents of each box must be cleaned out and fresh nesting material added.

When developing innovations it is important to adhere to the guidelines recommended here.

The North Dakota Game and Fish Department provides nest boxes to cooperators. Persons wishing to explore this option should contact the Department at 100 North Bismarck Expressway, Bismarck, N.D. 58505.

Nest boxes are also available from a number of commercial outlets. Some of these are:

Robbinsdale Farm and Garden  
4125 Railroad Avenue North  
Robbinsdale, MN 55422  
(612) 533-2244

H.N. Gilman and Associates, Inc.  
15702 105th Ave. North  
Maple Grove, MN 55369  
(612) 425-5740

Double "T" Tanks  
791 West Ninth Street  
San Jacinto, CA 92283  
(714) 654-1004

Minnesota Valley Nature Center  
6601 Auto Club Road  
Bloomington, MN 55431  
(612) 944-1423

River Cities Chapter, Ducks Unlimited  
P.O. Box 309  
Fulton, IL 61252  
(815) 589-4230

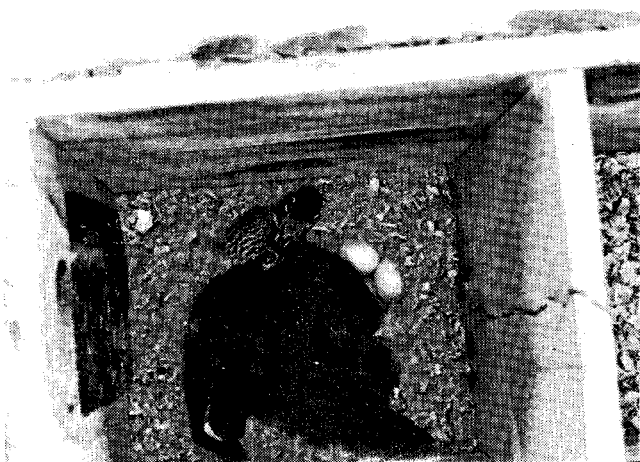
Dakota Waterfowl Nesting Structure, Inc.  
P.O. Box 251  
Jamestown, ND 58402  
(701) 252-0927

## Summary

Don't be disappointed if ducks do not use your nest box the first year, for it may take a year or two for them to do so. If the box still has not been used after 2 or 3 years, try moving it to another location. **Remember, however, once you have put a box out, you have made a commitment to maintain it annually. If you fail to do this, you will have just wasted your time and done nothing for the cavity-nesters in your area (Figure 20).**

Only about 1 percent of North Dakota is forested. Most of this forest occurs along the state/river valleys. Although we have the lowest percentage of forest lands of any state, we still have a tremendous potential for increasing the abundance of our cavity-nesting waterfowl.

By engaging in the projects described in this circular, you can establish cavity-nesters in areas where none have nested before. Once you get birds established, you are well on your way to building local populations that will readily accept and use your safe homemade nest boxes.



**Figure 20.** The end result of your efforts to build, properly place and maintain your nest boxes is that cavity nesters will use your boxes to lay, incubate and hatch a clutch of eggs. Above, a wood duck hen incubates her eggs in a double compartment wood nest box provided for her along the James River south of Jamestown, N.D.

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