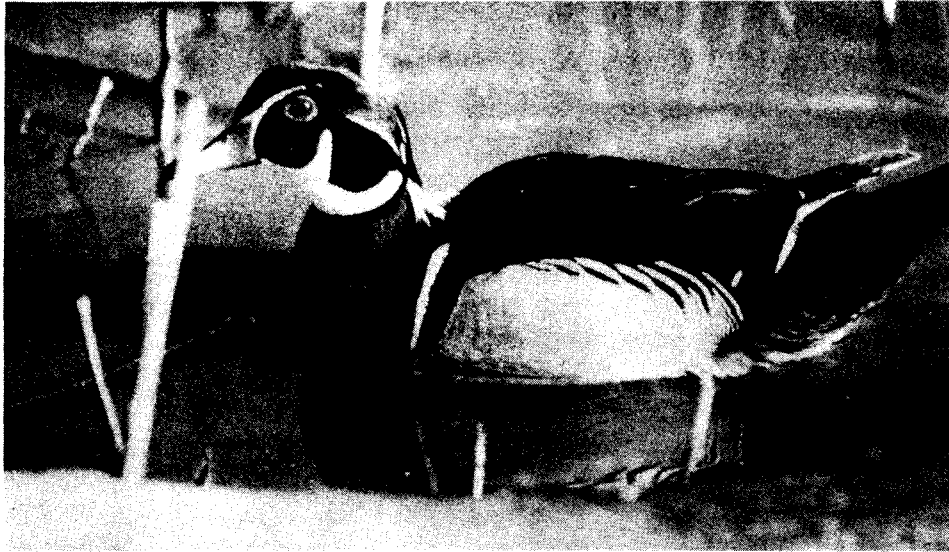




Guidelines for Placement and Management of Wood Duck Nest Boxes in Wetland Habitats



PURPOSE: This technical note provides recommendations for the location and management of nest boxes to supplement natural nest sites in a variety of wetland habitats for wood duck (*Aix sponsa*). The wood duck is associated with forested wetlands throughout much of the United States and is a common resident at Corps of Engineers reservoir projects.

BACKGROUND: Since wood ducks are cavity nesters, they are closely associated with wetland habitats where there is an abundance of snag trees and natural cavities. However, birds will readily accept specially made boxes constructed of wood, metal, or plastic in areas where the lack of suitable nest sites is responsible for limiting increases in breeding wood duck populations. Such settings include reservoir backwater areas, tributary streams, tailwater areas, subimpoundments, abandoned sand or gravel pits, oxbow lakes, and beaver ponds.

Nest box programs have been established throughout the United States with approximately 5 percent of the juvenile component of the fall flight population of wood ducks attributable to production in boxes. Nest box programs have yielded a set of general criteria that will increase the chances of success for a nest box project. These fall into three general categories: (1) nest box placement, (2) predator management, and (3) monitoring and maintenance.

PLACEMENT: Ideal nesting and brood-rearing habitat for wood ducks consists of shallowly flooded areas with an interspersed of flooded trees and shrubs, emergent and floating vegetation, and open water areas. Before implementing a wood duck nest box program, a survey should be conducted to determine the adequacy of natural cavities and to assess brood-rearing habitat. If the current nesting population is high, the efficacy of a nest box program should be questioned. Areas smaller than 4.0 ha are usually considered marginal as brood-rearing habitat if they are separated by more than 46 m

of land. However, complexes of beaver ponds and/or small streamside areas are acceptable if the individual units are interconnected by water corridors.

- **Height.** Nest box height is still debated among researchers and managers. Several studies have shown that nest sites >9 m above ground are more acceptable to wood ducks than are lower sites. However, a recent study in Alabama showed that when wood ducks were given a choice of three boxes at different heights on the same tree, they selected the lowest (2.0 m above ground) 54 percent of the time. Boxes located at heights of 3.8 m and 5.6 m were used at rates of 24 and 22 percent, respectively. The lowest boxes also had higher nest success (60 percent) than the higher boxes (50 percent and 45 percent) in this study. Boxes will generally need to be located higher in areas subject to flooding. Experimentation with box placement to determine the optimum heights to attach boxes may be necessary.

Wood ducks prefer boxes located over water and duckling survival increases the less distance they must travel over land to reach brood-rearing sites. Boxes placed over water are also less subject to predation. If it is not feasible to place boxes over water, they should be located as close to potential brood-rearing habitat as possible.

- **Orientation.** The orientation of the boxes' cavity opening appears to have an effect on wood duck use. Ducks prefer cavities with entrances directed toward the nearest forest opening in both upland and bottomland habitats. Cavities that are readily visible from the path of nest-searching females (in flight or swimming) are apparently used at a higher rate. Placement of boxes with the entrance oriented away from nearby roads should also be considered. This would serve to reduce noise disturbance to the nesting female as well as minimize potential vandalism.

Boxes should be installed out of direct sunlight, since studies have shown that high temperatures can destroy eggs and result in nestling mortality. This is critical if plastic or metal boxes are being used, especially in the southern United States. Cypress boxes are found to be significantly cooler than plastic boxes exposed to the same conditions.

- **Density.** As the breeding density of wood ducks increases, box occupancy, clutch size, and the occurrence of dump nesting increases. Dump nesting (also referred to as nest parasitism) is the condition where a nest site receives eggs from many females (hatching success in these nests is usually zero); the incidence of dump nesting is greatest where there are high population densities.

Dense breeding populations coupled with high box visibility and closely spaced boxes will lead to high rates of nest parasitism. When boxes are installed, they should be placed singly in visually isolated sites, which would reduce the opportunity for females to observe other wood ducks at active sites. Although this strategy might reduce occupancy rates, it should reduce nest parasitism, increase nesting success, and encourage high productivity.

PREDATOR MANAGEMENT: Wood duck nest losses from artificial boxes are generally higher than for natural cavities because predators will quickly learn to associate boxes with an easy meal. Commonly reported predators of wood duck nests and hens include the great horned owl (*Bubo virginianus*), raccoon (*Procyon lotor*), bobcat (*Lynx rufus*), squirrels (*Sciurus* spp.), red-bellied woodpecker (*Melanerpes carolinus*), European starling (*Sturnus vulgaris*) and snakes. Raccoons especially have been reported to seek out boxes and will frequently enter every box on a management area during a single feeding period. Some predators reportedly develop a "search pattern" directed toward locating boxes. A nest box program should not be implemented without ensuring that predator guards

and/or other protective devices are used to prevent the boxes from becoming death traps. Snakes can be especially significant predators on wood ducks, and most snakes found inside boxes have been reported to consume the entire clutch. Rat snakes (*Elaphe* spp.) are usually implicated as having the greatest impact on wood duck nestlings. It is very difficult to exclude snakes from boxes because those that are at least 1.7 m in length can bypass most predator guards or can drop into boxes from overhanging limbs. The application of a sticky material on structures supporting duck boxes has been used to reduce snake predation. This approach may not be cost effective in large nest box programs.

Several types of predator guards can protect boxes. These include aluminum bands, metal cones, and similar devices. Special entrance hole designs have been used to exclude raccoons. Predation can also be discouraged by installing boxes on poles over water or by mounting them on bent metal brackets that extend approximately 0.6 m from a tree or post.

BOX MONITORING AND MAINTENANCE: Maintenance and monitoring of nest boxes is essential to a successful program. Depending on the size of the nest box program, complete checks or a random sampling of boxes can help in estimating the number of breeding pairs in an area. If possible, this information should be supplemented with data from harvest records maintained by state agencies and the U.S. Fish and Wildlife Service.

When developing a wood duck nest box survey program, basic information on each nest box installed at the project should be collected into a file. A standardized fact sheet should be prepared for each box; this sheet should contain at least the information shown in Figure 1.

Areas with nest boxes should be given a site number within a compartment, or other defined location, and a number should be inscribed on each box to facilitate record keeping. Managers can identify and move boxes from unproductive sites and maintain those that are successful. The numbering system will also facilitate handling of data. Ideally, boxes should be numbered sequentially as they are installed. It is recommended that fact sheets be filed according to site within each compartment.

At a minimum, wood duck nest boxes should be inspected twice a year. A maintenance check of all boxes should be made each winter, usually no later than mid-January, beginning with a pre-nesting check of all boxes to replace or repair those that are damaged. Additionally, old nesting material and egg shells should be removed, and boxes should be treated with a disinfectant to reduce ectoparasite problems. Wood shavings or sawdust should be added to a depth of 10 to 16 cm to provide a proper nesting substrate. Timing of pre-nesting box maintenance must precede the normal nest initiation dates.

Box use should be assessed soon after the ducklings have left the nest. During this inspection, data should be collected on wood duck use, including number of eggs and number of eggs hatched, and use by other species. Boxes not used and box failures should also be noted. If possible, the reason for box failure (e.g., abandonment, predation, flooding, human disturbance) should be indicated. These data should be compiled for each site on the inspection sheet (Fig. 2). It may be possible to inspect only a sample of boxes at each site during the summer survey period due to time and personnel constraints.

An annual summary report of wood duck nest box use should be filed with the District. The following information should be displayed for each site: habitat type; total number of boxes at the site; the survey sample size; and the number and percentage of boxes not used, boxes failed, wood duck use, other use, and total use.

NEST BOX FACT SHEET

Compartment # _____ Site # _____ Box # _____

Location _____
(include map for each site showing precise location of boxes)

Habitat Code _____ Site Description _____

Box Type (wood, plastic, metal, etc.) _____

Type of Support _____
(tree, wooden pole, metal pole, etc.)

Height of Base Above Water _____

Predator Guard (Y/N) _____ Type of Guard _____

Box Exposure _____
(shaded, partly shaded, full sun)

Direction of Hole Entrance - N NE E SE S SW W NW

Date Installed ____/____/____ Installed by _____

Annual Inspection Record:

<u>Date</u>	<u>Box Condition and Comments</u>
____/____/____	_____
____/____/____	_____
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Figure 1. Fact Sheet

CONCLUSIONS: Wood duck nest boxes are a useful management tool in areas that contain good brood-rearing habitat but are deficient in natural nest sites. Although a wood duck nest box program can increase local production, the proper preservation and management of bottomland hardwoods and associated wetland habitats are most critical to the well-being of wood duck populations. Management for natural cavities should be encouraged as much as possible.

ADDITIONAL RECOMMENDED READING:

Bellrose, F. C. 1980. Ducks, geese and swans of North America, Third ed., Stackpole Books, Harrisburg, PA.

Dugger, K. M., and Fredrickson, L. H. 1992. "Life history and habitat needs of the wood duck," U.S. Fish and Wildlife Service Waterfowl Management Handbook, Fish and Wildlife Leaflet 13.1.6.

Fredrickson, L. H., Burger, G. V., Havera, S. P., Graber, D. A., Kirby, R. E., and Taylor, T. S., eds. 1990. *Proceedings, 1988 North American Wood Duck Symposium*, St. Louis, MO.

Lacki, M. J., George, S. P., and Viscosi, P. J. 1987. "Evaluation of site variables affecting nest-box use by wood ducks," *Wildlife Society Bulletin*, 15, 196-200.

Ridlehuber, K. T., and Teaford, J. W. 1986. "Wood duck nestboxes: Section 5.1.2, U.S. Army Corps of Engineer Wildlife Resource Management Manual," Technical Report EL-86-12, U.S. Army Engineer Waterways Experiment Station, Vicksburg, MS.

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