NEST & DEN BOX SPECIFICATIONS

For Upland and Wetland Wildlife Habitat Management

Exhibit FL519.2

Purpose:

To provide information and guidance concerning construction, placement, density, and maintenance of nest and den boxes.

Construction:

Nest or den boxes shall be made of rough cut cypress, cedar or other durable rot-resistant wood.

Boxes shall not be constructed of metal or plastic or treated with creosote, green preservative (a.k.a., “pressure treated”) or finishes with pentachlorophenol as an ingredient..

The outside backs of boxes may be treated with wood preservative to reduce rot and extend their life.

With the exception of bat box exteriors, boxes should not be painted or stained.

For ventilation several ⅝ inch holes shall be drilled near the top of a box on both sides, with an exception for duck nest boxes.

Four ⅜ inch diameter holes shall be drilled in the bottom of each box for drainage, except for the Peterson bluebird house.

Quarter inch galvanized hardware cloth or plastic mesh shall be attached to the inside front panel of all duck nest boxes.

A hinged side or roof should be designed to allow easy access for box maintenance. All metal parts should be stainless steel to reduce likelihood of rust.

Wood screws or concrete coated nails are recommended for box construction. Galvanized nails should be avoided.

The box floor board should be recessed at least ¼ inch up from the bottom of the sides.

The top of the box should be flush with the sides or be slightly overhanging, with a front overhang of at least 2 inches.

Do not add perches to box designs as this will attract and benefit non-native house sparrows and European starlings.

Boxes should be firmly attached to a support post, building or tree. Lag bolts and washers are the preferred means to attach boxes as one can loosen the screws as a tree grows.

If depredation is a problem, predator guards should be installed. Guards should be made of either 26-gauge galvanized metal or of heavy plastic sheeting (e.g., utility pole wrap).

Box designs for various species of wildlife can be found in the attached Appendix or the referenced publications or web-sites.

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Box Placement & Density:

Where possible, nest and den box placement and density specifications for selected species shall conform to the following table:

Species	Height From Ground (ft.)	Additional Criteria[a]
E. Bluebird	4 to 6	N or NE aspect; ≥ 100 yards apart
Woodpeckers	15 to 30	Trees > 15" diameter at breast height (dbh); SW aspect;
American Kestrel	20 to 30	> 50 ft from forest edge in lone trees; ½ mile apart
Screech, Barred and Barn Owls	20 to 30	¼ (small owls) to ½ mile (large owls) apart; preferably within 200 ft of water; make sure there is an open flight path to the box.
Great Gray and Horned Owls	20 to 45	Place platform crotch of live trees ≥ 12 inches dbh; ½ to ¾ mile apart.
Nuthatches	12 to 20	Hardwoods where canopy coverage does not exceed 60%
Chickadees	5 to 15	Hardwoods where canopy coverage does not exceed 60%
Flycatchers	10 to 20	In pine trees in mixed hardwood pine; near water is best.
Prothonotary Warbler	5 ft above the normal high water mark	Bottomland and riparian habitats; uplands proximal to water or, preferably, in woodland pools or oxbow ponds facing open water; make sure there is an open flight path to the box; 100 yards apart.
Purple Martin	12 to 18	On poles 30 ft from nearest tree; 1 per acre
Wood Duck or Hooded Merganser	5 ft above the normal high water mark	Near good brood rearing habitat; ≥ 100 yards apart & visually isolated from each other; uplands proximal to water or, preferably, in water facing open water; make sure there is an open flight path to the box.
Gray Squirrel	30 or more	Trees > 10" dbh; 2 boxes per acre
Raccoon	15 to 35	Trees > 12" dbh; 1 box per 2 acres
Bats	12 to 15	East or SE aspect; paint box black; place near water if present

[a] – to reduce predation, do not place boxes do not place near game trails, on edge of clearings or near residences unless directed to do so above.

Operation & Maintenance:

On an annual basis, boxes shall be maintained in good working condition and material from the previous year's nesting attempt removed.

Several inches of nesting material (e.g., Wood chips or shavings – do not use sawdust) should be added to boxes prior to the nesting season.

Wasps, bees and other wildlife may reside in the box, so care should be taken when inspecting, maintaining, and cleaning out boxes. An insecticide strip stapled to the inside of box lids is an effective deterrent against stinging insects.

After the nesting season, open fronts or sides of songbird boxes and leave them that way over-winter to reduce the

likelihood that undesirable wildlife take up residence.

References:

Florida Fish and Wildlife Commission. Wood duck nest boxes in Florida. Brochure. 6pp. http://www.wld.fwc.state.fl.us/duck/Wood_Ducks/wood_duck.htm

Henderson, C. 1992. Woodworking for wildlife: homes for birds and mammals. 2nd ed. St. Paul, MN: Minnesota Department of Natural Resources, Section of Wildlife, Nongame Wildlife. 111pp.

Missouri Department of Conservation. Woodworking for wildlife. http://www.conservation.state.mo.us/nathis/woodwork/

Tennessee Wildlife Resources Agency. 1991. Woodworking for wildlife. 39 pp.

APPENDIX A.

NEST BOX DESIGNS

Wood Duck

DESCRIPTION

Male wood ducks are easily recognized by their iridescent green and purple feathers and white chin and throat strap. Females are mottled brown with a white throat patch and eye ring. Both sexes have well-defined head crests and long, dark, square tails.

HABITAT

Wood ducks begin nesting in Florida in late winter through the end of June. Unlike most ducks, they nest in tree cavities near water instead of on the ground. They also readily nest in man-made structures.

The ideal brood habitat is wetland with good emergent vegetation and low-hanging bushes where the broods can swim easily to find food and cover. This type of vegetation provides an abundant food source for both juveniles and adults. The young ducks eat mainly insects and adults eat mostly plant material.

NEST BOXES

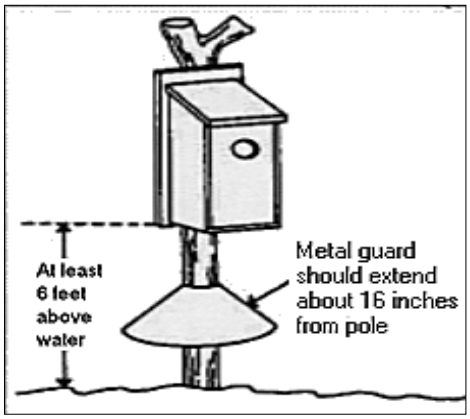
Increasing wood duck numbers can be accomplished by providing adequate nesting sites that are protected by predators. The following includes directions on the placement and construction of nest boxes for wood ducks.

Nest boxes should be placed over water or in woodland habitat near lakes, ponds, marshes and rivers. If boxes are placed over water, they should be mounted about 6-8 feet above the water surface. If placed above the ground, the box should be 30-100 feet from the water's edge and 10-20 feet above ground. The distance to water should be free of obstacles to newly hatched ducklings. One nest box per 5 acres of suitable brood habitat is suggested. Do not erect boxes if brood rearing habitat is not available.

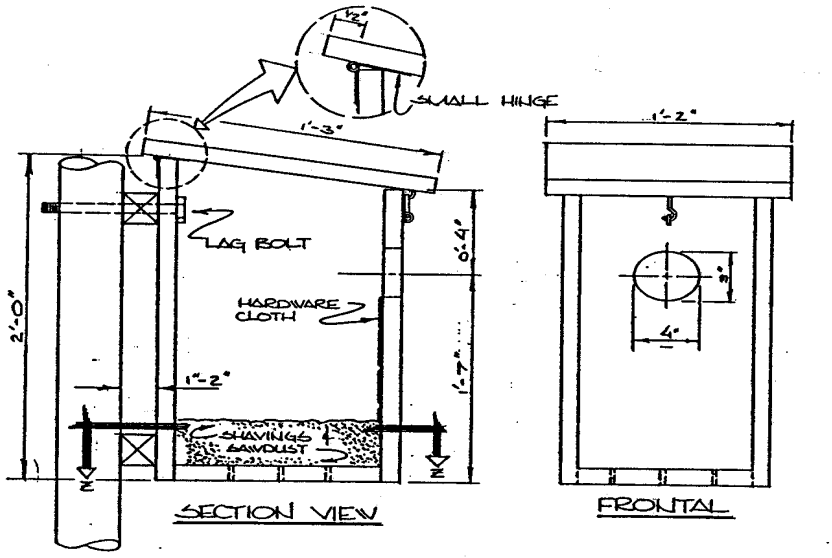
The box dimensions should be about 10" x 12" and about 24" in height. The opening should be a 4" diameter oval, about 18" above the floor. Place 5-6 inches of wood shavings in the bottom of the box. Hardware cloth on the inside of boxes will help ducklings climb out of the nest when they are ready to leave. Old nesting material must be cleaned out and more wood shavings should be added each year during the winter.

Predator guards against raccoons, snakes, and opossums are necessary. These can be constructed in several ways. A large, cone-shaped sheet-metal guard attached

to the post (shown at right), or a metal sandwich around the post should keep predators out of the nest box. The guards should fit tight enough to prevent snakes from squeezing through.



The following diagram serves as a guide for building one type of nest box for wood ducks. It was designed by the U.S. Fish and Wildlife Service.



MATERIALS LIST:

1" THICK ROUGH CYPRESS RED-WOOD, OR TREATED PINE.

ONE CEDAR, CYPRESS OR TREATED POST, LONG ENOUGH TO ALLOW BOX TO BE ERECTED ABOVE HIGH WATER LEVEL.

4-6 SHT. METAL SCREWS OR POP RIVOTS.

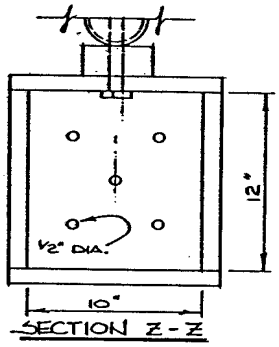
2 - SMALL HARDWARE HINGES

1 - SMALL SCREEN DOOR HOOK AND EYES.

1 - PLATE (4'-0" x 4'-0") OF THIN SHEET METAL.

ONE 12" x 4" x ¼" MESH HARDWARE CLOTH, SHAVINGS, + SAWDUST AS ILLUSTRATED.

ONE LAG BOLT.



Eastern Bluebird

DESCRIPTION & HABITAT

The male bluebird has a bright blue back and an orange breast. Females have a duller, gray-blue back. Bluebirds live in most regions in Florida. Their ideal habitat is fields, prairies, and open, dry pinelands. They can be seen perching on tree snags and wooden fence posts. Bluebirds have also adapted to suburban areas such as golf courses, cemeteries, and highway right-of-ways. The bluebird's diet consists primarily of grasshoppers, caterpillars, and other insects during the summer, with the fruits of trees and shrubs being important during the winter.

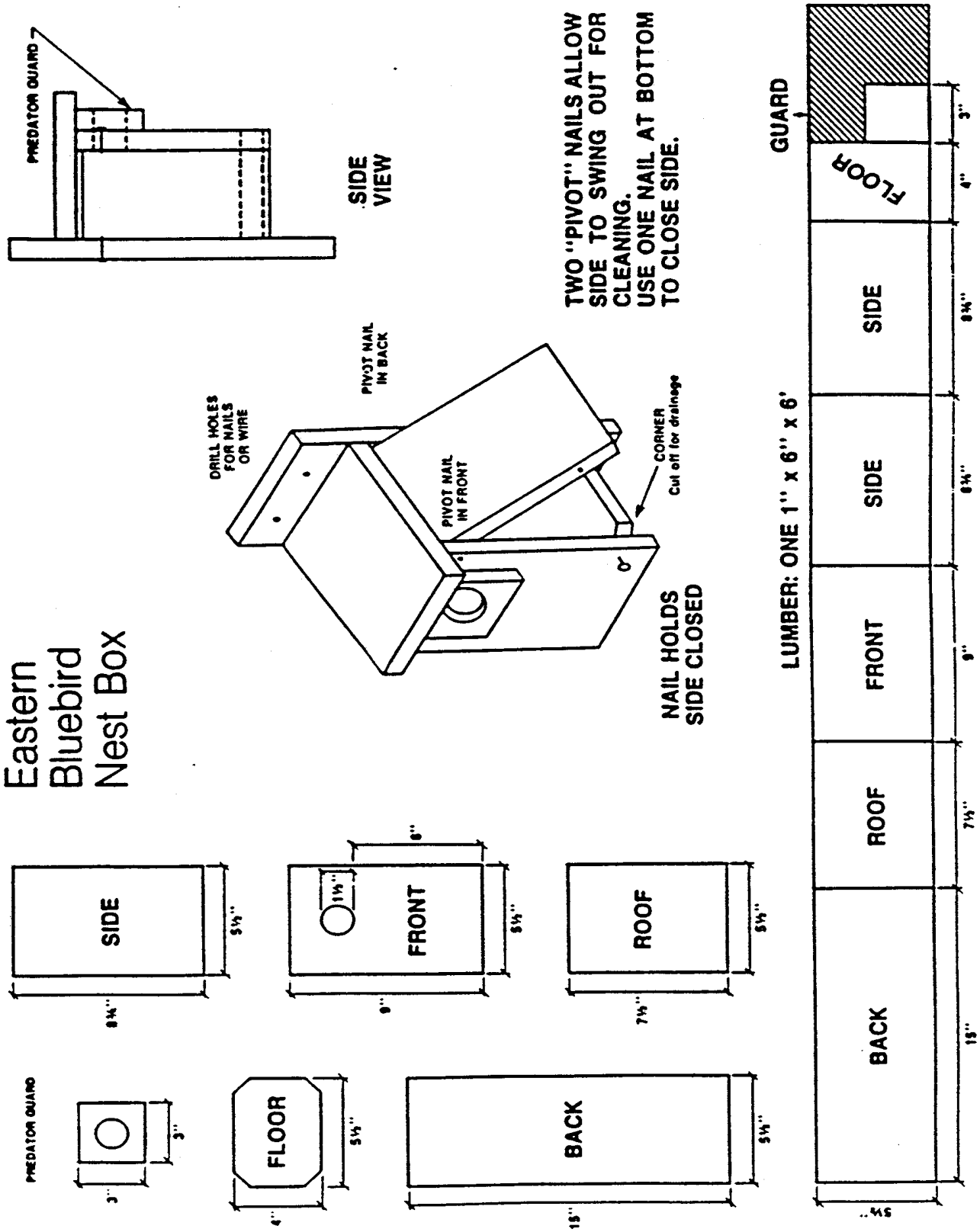
NEST BOXES

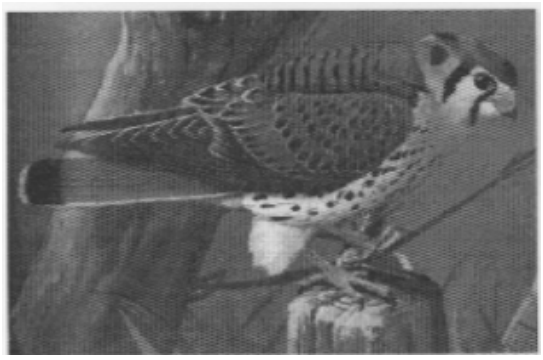
Bluebirds will readily nest in artificial nesting structures. The following house plan was designed by the Cooperative Urban Wildlife Program of the Florida Cooperative Extension Service. The house can be built from a 1" x 6" x 6' piece of cedar lumber. Floor dimensions should be 4" x 5 ½" and walls should be 8 ¾" high. The entrance hole should have a diameter of 1½" placed 6" above the floor.

Bluebirds are territorial and require about 1½ acres per pair. Boxes should be placed at least 100 yards apart in open areas with woods nearby. The best mounting is a metal pole to prevent damage from predators. The box should be placed 5-10 feet above ground. Face the nest box toward bushes or a fence line so young birds can easily find a perch when they leave the nest. Bluebird territories are established in March, so have boxes ready by that time

Old nests should be removed as soon as the young have left the nest. This increases the chance of a second brood being raised in the same box. If starlings or sparrows try to nest in the boxes, remove their nests. Houses should be inspected and cleaned in February each year, making sure the drain holes in the floor are open.

Since bluebirds are insectivorous, use of insecticides in their territory should be limited.


Eastern Bluebird Nest Box
PREDATOR GUARD
SIDE VIEW
TWO "PIVOT" NAILS ALLOW SIDE TO SWING OUT FOR CLEANING.
USE ONE NAIL AT BOTTOM TO CLOSE SIDE.
DRILL HOLES FOR NAILS OR WIRE
PIVOT NAIL IN BACK
PIVOT NAIL IN FRONT
CORNER Cut off for drainage
NAIL HOLDS SIDE CLOSED
LUMBER: ONE 1" x 6" x 6'
GUARD
FLOOR
SIDE
SIDE
FRONT
ROOF
BACK
SIDE
FRONT
ROOF
FLOOR
BACK
PREDATOR GUARD



Southeastern American Kestrel

DESCRIPTION & HABITAT

The American Kestrel, also called the sparrow hawk, is the smallest member of the falcon family. The males are easily identifiable by their reddish brown back, slate blue wings and buff underside. Females are reddish brown, have brown streaks on their chest, and black tail bands. The Southeastern kestrel is restricted to South Carolina, Alabama, Georgia and Florida. This species is listed as threatened by the State of Florida.

Kestrels live in open pine woodlands as well as in isolated longleaf pines in fields and pastures. These areas provide the birds with good nesting sites. Insects, lizards and voles are an abundant food source. Short understory vegetation is ideal for kestrels to see and catch prey.

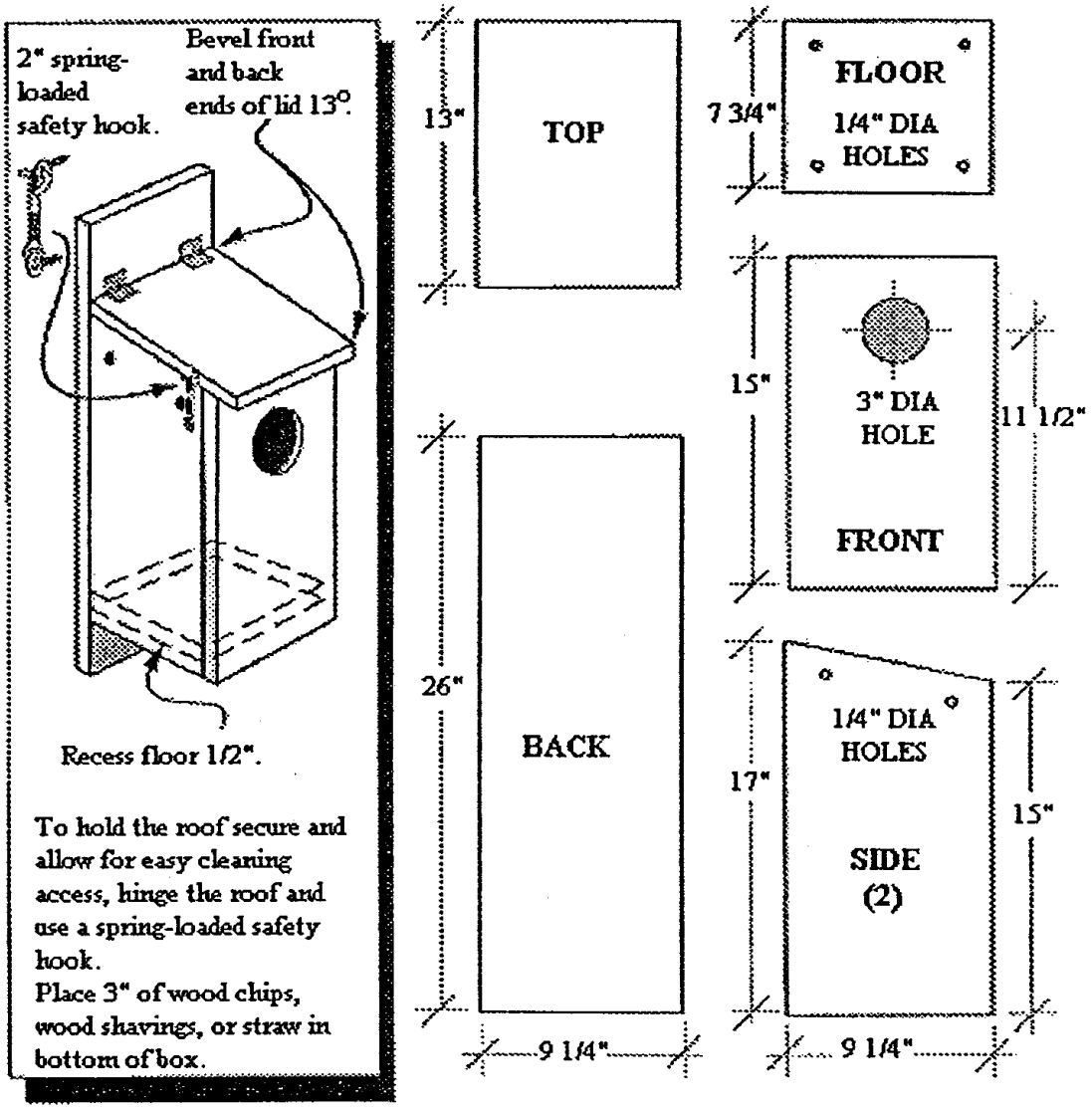
NEST BOXES

The biggest threat to the Southeastern kestrel is habitat loss. With rapid growth and development in Florida, the kestrel is now uncommon. There are several ways to help the declining populations. The first is to maintain a natural habitat. This can be accomplished by manipulating the understory to maintain a desirable height for kestrels (e.g., burning, mowing, chopping, grazing). Leave snags (dead trees) standing and leave enough live trees so that normal mortality will provide enough dead trees for nesting sites for the kestrels.

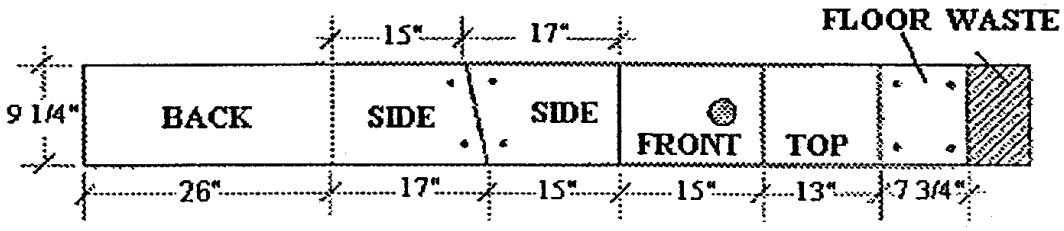
Another way to help conserve kestrels is to build nest boxes. Nest boxes are best located near longleaf pine stands and in fields and pastures. The boxes should be spaced about 1/3 mile apart. Place boxes 10-20 feet above ground to keep out predators. A predator guard can be constructed by wrapping a 3 ft. strip of sheet metal around the pole to prevent raccoons and snakes from entering the nest. Eggs are laid between March and June, so make sure old nesting material and debris are cleaned out before this time. After cleaning, place 3 inches of new wood shavings or straw in the nest box.

The following dimensions and construction plan were designed by the Northern Prairie Wildlife Research Center:

Construction of a Kestrel Nest Box



LUMBER: One 1" x 10" x 8', (#2 white pine recommended).
HARDWARE: Twenty-two 1 1/2" wood screws (#6), two 2" hinges and one 2" spring-loaded safety hook.



Barred Owl

DESCRIPTION

The barred owl is distinguishable by its large round head, horizontal brown and white barring across its back, and vertical streaking on its chest. Since owls are most active at night, they are more easily identified by their calls. The barred owl has a distinct “who cooks for you, who cooks for you all” sound.

HABITAT

Barred owls are associated primarily with floodplains, riverbottoms, lake margins, and almost any woodland area. They nest mainly in tree cavities, but will also use abandoned hawk and squirrel nests. They also readily nest in man-made structures. The owl’s diet consists primarily of small rodents, frogs, snakes and insects.

Although owls are federally protected under the Migratory Bird Treaty Act, development in Florida is affecting their habitat. You can help by constructing a nest box.

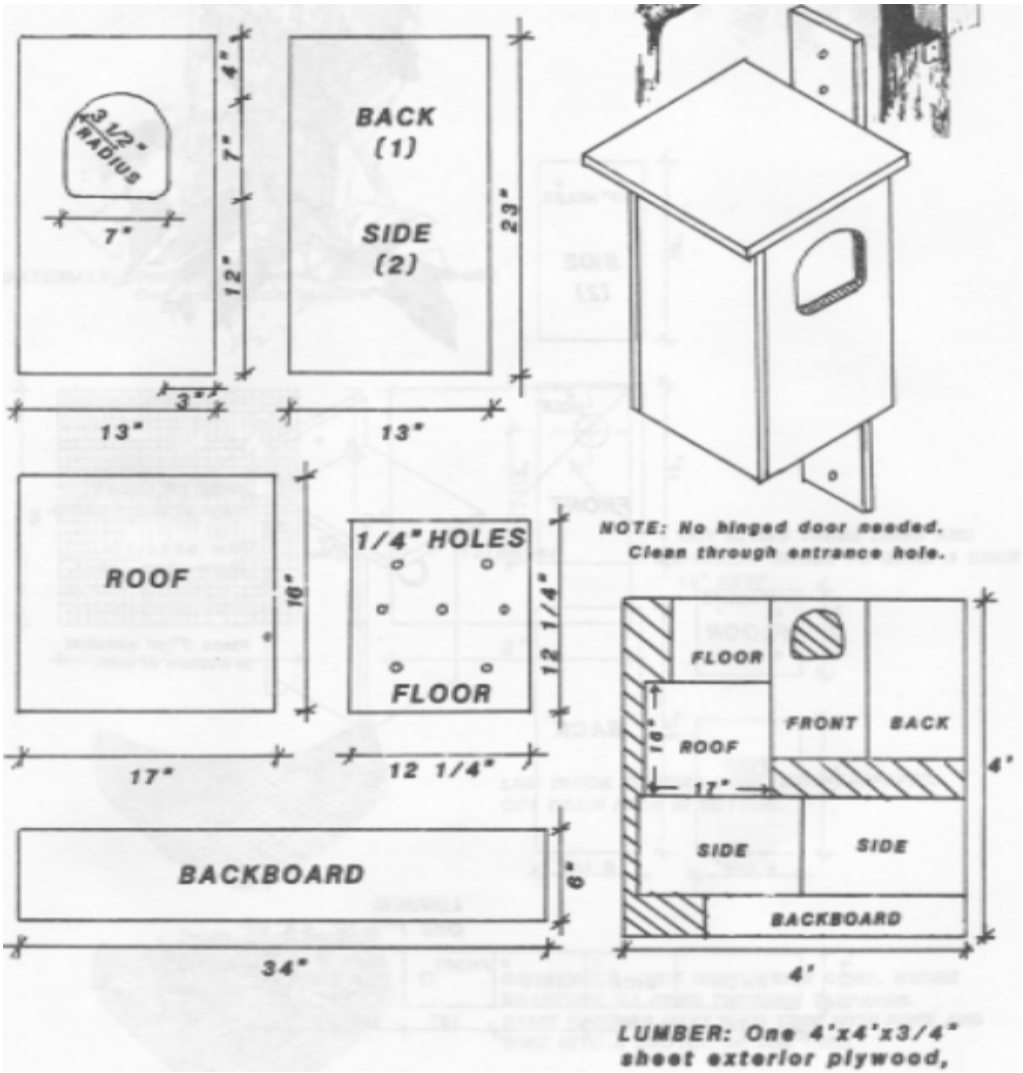
NEST BOXES

The nest box should be constructed of 3/4 inch plywood. It should be 23 inches high with floor dimensions of 12 1/4 x 12 1/4 inches. The entrance hole should be 12 inches from the floor and have dimensions of 7 x 7 inches. Place about 3 inches of wood chips in the nest. Place the box 20 - 30 feet above ground on a tree trunk in a wooded area. Make sure the entrance is not obscured by branches. Barred owls are territorial, and require about 125 acres. Boxes should be spaced at least 1/2 mile apart.

Nesting occurs from December to June in Florida. Make sure debris is cleaned out and new wood chips are added each year before nesting time.

A predator guard can be constructed in order to keep out raccoons and snakes. Place a 2-3 foot sheet of aluminum around the tree at breast height. The following house plan was adapted from *Woodworking for Wildlife in Tennessee*, a publication of the Tennessee Wildlife Resources Agency.

Construction of a Barred Owl Nest Box



Purple Martin

DESCRIPTION & HABITAT

Purple Martins are the largest member of the swallow family. Male martins are dark metallic blue with purple iridescence. The females are blue-brown with a buff-colored belly. Both sexes have notched tails that are characteristic of swallows. Purple martins are a neotropical species that migrate to Florida in late January and early February for the breeding season. They return to the same nest area each year. Their nests are made in cavities of twigs, weeds, dead leaves and grasses. Martins prefer to nest in large open areas near water, such as fields, pastures and golf courses. The diet of the purple martin consists of flying insects such as beetles, moths and dragonflies.

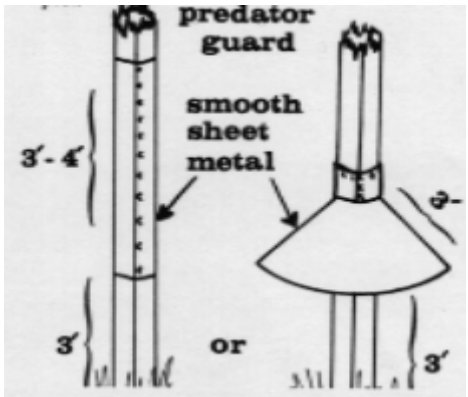
NEST BOXES

Because of a shortage of tree cavities, purple martins have become almost totally dependent on man-made housing. Once martins nest at your site, they will come back every year, if you manage the site properly. Martins are colonial birds, so apartment style houses are usually best. Martins have very specific aerial requirements. The house will have the greatest success in attracting the birds if it is placed in an open area 15 -20 feet above ground and placed at least 30 feet away from trees and buildings. Boxes are available commercially, but if you prefer to build one, the diagram from the Cooperative Extension Service at the University of Georgia is a guide for suggested house dimensions.

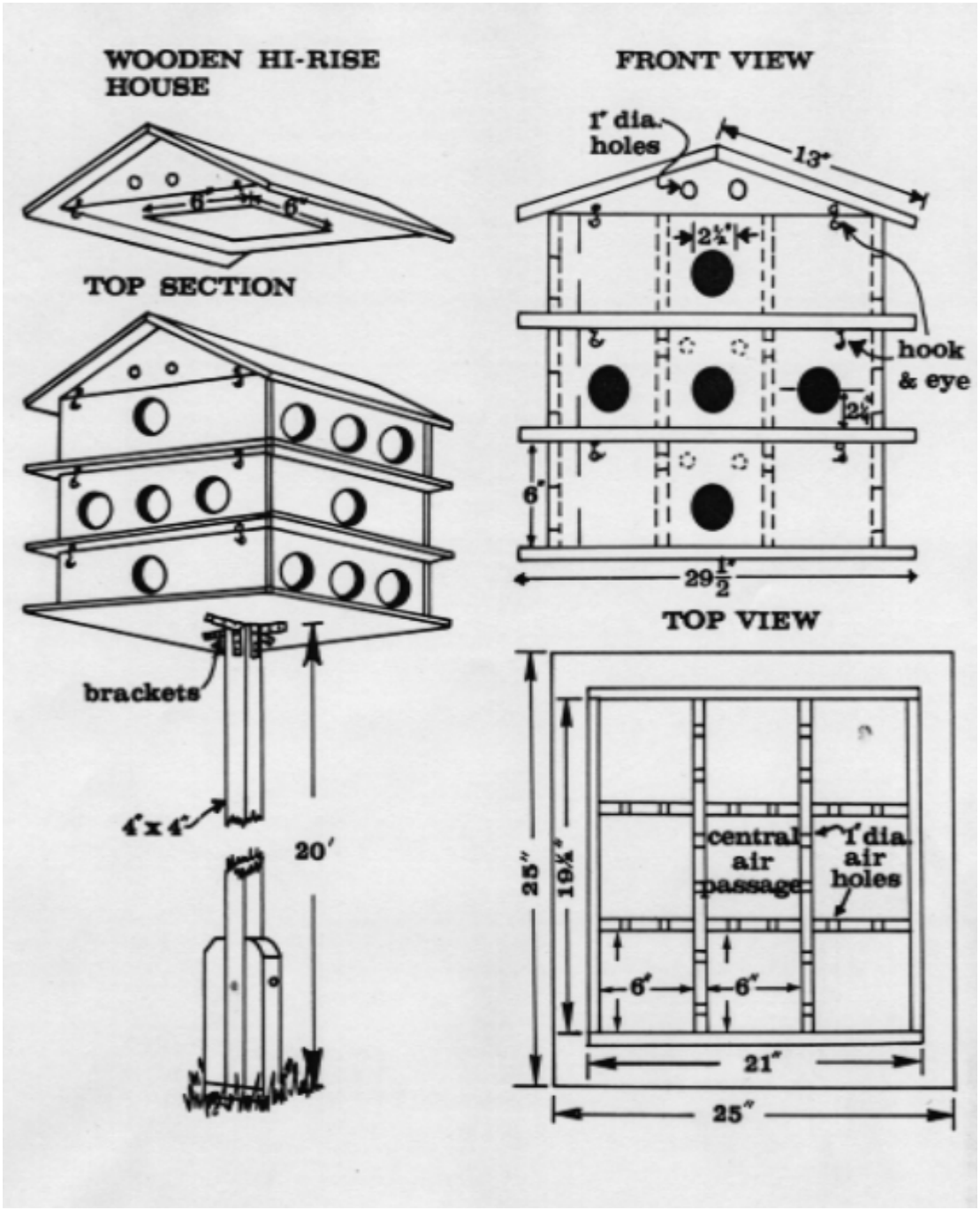
The dimensions for each compartment floor should measure 6” x 6”and should be 5-7” in height. The center compartment is for air ventilation. Drill small holes in the interior compartment walls and exterior walls of the roof to provide good air circulation. Entrance holes should be 2 1/2” in diameter and 1” above the floor of compartment. Houses should be painted white to reflect heat. Paint only the outside of the house.

Martins will not nest if sparrows or starlings are using some compartments. To prevent sparrows and starlings from nesting, take the houses down from October until late January or plug the entrance holes. If they do manage to nest, evict them and temporarily plug holes.

A predator guard should be constructed to keep out cats, raccoons and snakes. Place smooth sheet metal around the pole or attach a sheet metal cone to the pole (see illustration at right).



Construction of a Purple Martin Nest Box



Bats

DESCRIPTION & HABITAT

There are 16 species of bats found in Florida. Some of the more common species are the Brazilian free-tailed bat, Evening bat, and the Northern Yellow bat. Bats are seen most frequently on warm nights feeding near water or around lights. They feed by catching insects while flying in the air. During the day, they find shelter in dark places such as caves, tree cavities, and attics of buildings. Bats prefer to roost within 1/4 mile of a water source. Snags near wetlands with open water provide ideal habitats.

Bats have been wrongly feared by humans. They are, in fact, rather shy and harmless. There is a misconception that bats carry rabies, but less than 1/2 of one percent actually carry the disease. Even if infected, they rarely become aggressive like other animals. Bats provide a beneficial service to man because they eat a huge amount of insects, including mosquitoes. They usually consume their weight in insects each night.

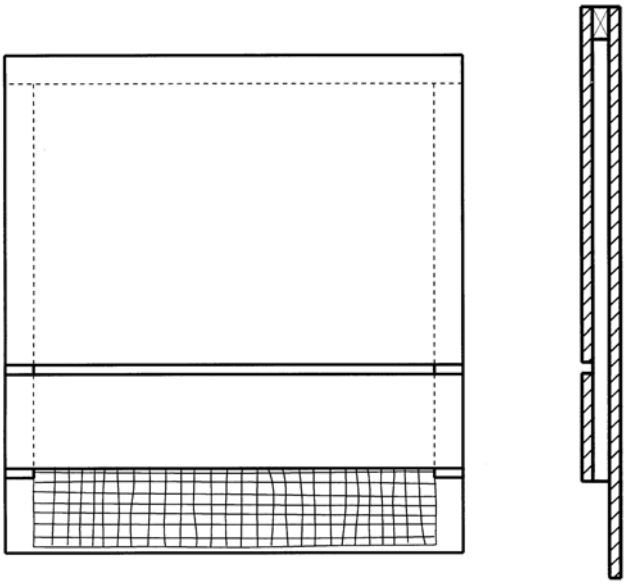
Bat populations are declining because of disturbance to natural roosting sites such as old trees and caves, as well as vandalism. There is also a loss of habitat due to development. Providing a bat house can help sustain the population of bats as well as keep them from roosting in buildings.

BAT HOUSES

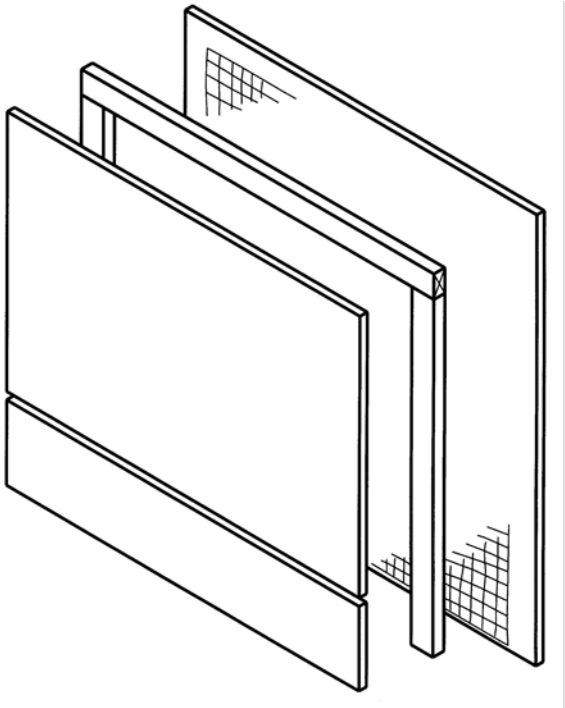
The greatest bat house success has been achieved in areas where there is a mixture of agricultural use and natural vegetation. A single chamber bat house may house 50 bats, while larger houses may attract more than 200. Most houses have 1-4 roosting chambers. Houses should be mounted at least 10 feet above ground, but 15-20 feet is better. Locations at least 20-25 feet from trees are best. Sun exposure is a critical factor in positioning a bat house. In Florida, houses should receive at least 6 hours of direct sun. Mounting on a pole provides the best protection from predators.

Bat houses should be at least two feet tall and at least 14 inches wide. A landing strip should extend 3-6 inches below the entrance. Partitions in the house should be spaced 3/4 to 1 inch apart. Partitions and landing area should be roughened or covered with plastic screening. Include vents 6 inches from the bottom of the house. A combination of plywood and cedar is best for construction. Paint the exterior with 3 coats of dark brown or gray outdoor paint. The bottom of the house is open, which reduces the problems associated with birds and squirrels. Bat Conservation International designed the following bat house plan:

Small Economy Bat House



Side View



Materials Needed (makes 1)

¼ sheet (2'x4') ½" cdx (outdoor grade) plywood
1 piece 1"x2" x 8' pine (furring strip)
1/8" mesh HOPE (plastic) netting, 20" x 22.5"
20-30 1 5/8" multipurpose (drywall) screws
1 pint latex acrylic paint
1 tube paintable acrylic caulk
5/16" staples

Recommended Tools

Table saw or handsaw	caulking gun
Variable-speed reversing drill	scissors
Phillips bit for drill	stapler
Tape measure or yardstick	paintbrush

Construction Procedure

1. Measure and cut plywood into three pieces
   26.5" x 24" 16.5" x 24" 5" x 24"
2. Measure and cut furring into one 24" and two 20 1/4" pieces.
3. Screw back to furring, caulking first. Start with 24" piece at top.
4. Staple the netting to inside surface of back, starting at the bottom. Be sure netting lies flat (curve down) and does not pucker.
5. Screw front to furring, top piece first (don't forget to caulk). Leave ½" vent space between top and bottom front pieces.
6. Caulk around outside joints if needed to seal roosting chamber.
7. Attach a 3" x 28" board to the top as a roof, if desired.
8. Paint exterior at least twice.

Optional Modifications

1. Wider bat houses can be built for larger colonies. Be sure to adjust dimensions for back and front pieces, ceiling furring strip, and netting.

2. Two bat houses can be placed back-to-back mounted on poles. Before assembly, a horizontal ¾" slot should be cut in the back of each house about 10" from the bottom edge of the back piece to improve ventilation and permit movement of bats between houses. Two pieces of wood, 4" x 4 ¼" x3/4", screwed horizontally to each side will join the two boxes. One 3" x 22" vertical piece, attached to each side over the horizontal pieces, blocks light but allows bats and air to enter. Leave a ¾" space between the two houses, and roughen the wood surfaces or cover the back of each with plastic netting. Do not cover the vents. A tin roof covering both houses protects them and helps prevent overheating. Eaves should be about 3" in southern areas and about 1 ½" in the north.

Bat house information is reprinted with permission from Bat Conservation International (BCI). For more information about bats, BATS magazine, membership in BCI, bat house plans, or information about ordering a constructed bat house, please visit the BCI web site at www.batcon.org or write or call: Bat Conservation International, P.O. Box 162603, Austin, Texas 78716, 512-327-9721.