Nest Box Building Plans (continued)

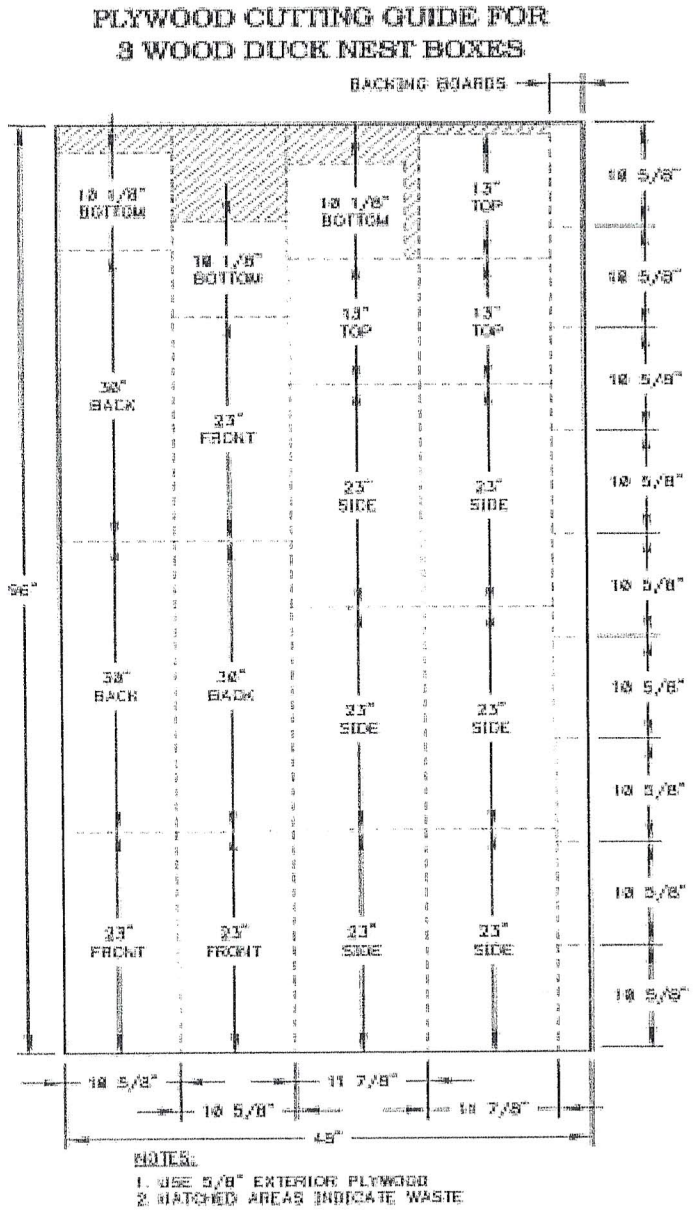


FIGURE 5: Template for cutting plywood sheet (makes three nest boxes).

Nest Box Placement

The best locations to place wood duck nest boxes are in wooded areas within 25 to 200 yards from small streams, ponds, coves, sloughs, and old river channels. Small bodies of water are preferred over large lakes and rivers. Wood ducks will nest a half-mile from water. However, the farther the nests are from water, the greater the danger the young ducklings face as they travel to the water. Boxes installed in densely wooded areas away from the shoreline are readily accepted by wood ducks and receive less predation and starling use than boxes in open areas along the shore.

Habitat near the nest boxes should include hiding cover for the ducklings. This cover might be emergent vegetation or branches and limbs of brush and trees hanging over or in the water. Logs, stumps, snags, and driftwood in the water near boxes add to the cover and provide loafing sites.

Tips For Placing Nest Boxes

1. Boxes facing toward water, so wood ducks can easily see them while swimming or flying, tend to receive higher use than boxes facing away from water.

2. Wood ducks show no apparent preference to the direction boxes face (north, east, south, or west).

3. Place boxes high enough to be above the highest floodwaters.

4. Boxes placed at heights so that the bottoms of the boxes are at least 6 to 12 feet above the ground are readily used by wood ducks and are seldom bothered by humans.

5. Do not place a box where it will be difficult or dangerous for a person to install, check, or maintain the box.

6. Place boxes so that there is a clear line of flight to and from the entrance hole, or clear limbs to allow a clear line of flight.

7. Fasten boxes to trees or posts with 3" to 5" long ¼" or 3/8" lag bolts or similar hanger bolts and large fender washers, rather than spikes or nails. These fasteners allow easier removal of the box if needed and can be loosened and adjusted as the tree grows.

Tips For Placing Nest Boxes (continued)

8. Use backing boards between the box and the tree to keep boxes from breaking apart in the future. Backing boards are scrap wood 3-4 inches wide and 8-10 inches long and vary from ½ to 2 inches thick with a hole drilled in it. Place the top and bottom lag bolts through the top and bottom attachment holes in the back of the box, through a backing board (which acts as a cushion), and into the tree.

9. Mount boxes vertical or with a slight forward lean. Boxes with a backward tilt may prevent ducklings from climbing and exiting the box and also tend to collect more rainwater.

10. Boxes should be mounted firmly. Boxes hanging loosely to a tree or post are often rejected and not used by female wood ducks.

11. Before leaving each box, make sure there is 4" of wood shaving type nesting material in the bottom and that the lid is wired on tight.

12. Place boxes so they are at least 30 feet apart from each other or visually isolated from each other. Nest boxes erected too close together invite dump nesting and predation.

13. Make a record of the location of each nest box (by box number) and the support or type of tree it is attached to. It may be helpful to mark the location of the nest boxes on a map.

Predator Guards

Raccoons, and sometimes mink, can be serious predators of wood duck hens when they are incubating eggs. Raccoons will also eat the eggs. Predator guards provide some measure of protection from raccoons and mink.

Site-specific conditions may determine what type of predator guard would be most useful.

1. The 3 inch by 4 inch elliptical nest box entry hole is a good guard against raccoons in Washington State. Early nest box designers found that raccoons one year old and older could not enter holes 3 inches by 4 inches in size, but the hole size is just large enough so that wood ducks can enter it.

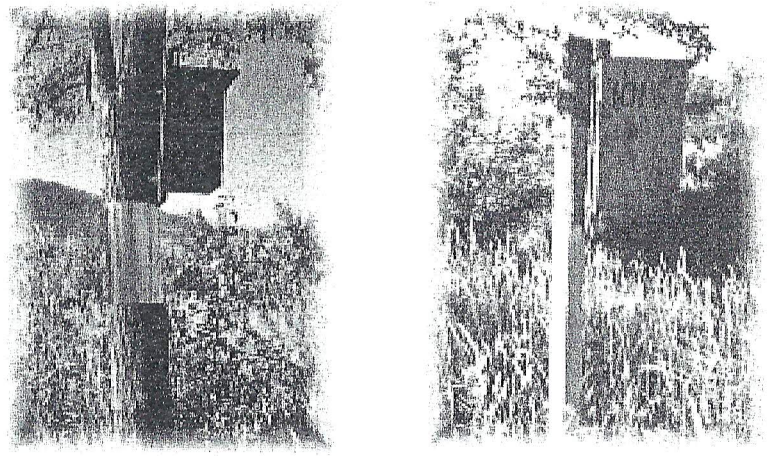
2. Sometimes the original 3" by 4" hole on the box becomes worn, damaged, or enlarged so as to allow raccoons entrance into the box. To fix this, screw a face plate (a piece of wood 7" by 11" and 5/8" or thicker with a cleanly cut 3" by 4" hole) onto the front of the nest box to align with the original entrance hole. This will form a "right sized" hole and slightly longer entrance tunnel that should restrict raccoons.

3. Boxes placed in trees surrounded by or standing in water tend to receive less predation.

4. A 2-3 foot wide piece of thin sheet metal wrapped around the trunk of the nest box tree and fastened with sheet metal screws will keep raccoons and mink from climbing the tree to get at the box. It is important that the predators cannot reach the tree from above the predator guard by branches and limbs from other trees.

Predator Guards (continued)

5. For boxes mounted on posts or pipes, a 3-4 foot long piece of PVC pipe 4-6 inches in diameter hanging below the box and around the post or pipe will keep raccoons from climbing the pipe. The post can also be wrapped with a length of sheet metal.



ABOVE: Metal wrap predator guard fastened around tree (left). PVC pipe predator guard slipped over post (right).

6. Inverted metal cones attached below boxes mounted on pipes or posts have been effective. However, the metal cone does not usually last as long as the nest box, after which the box becomes unprotected.

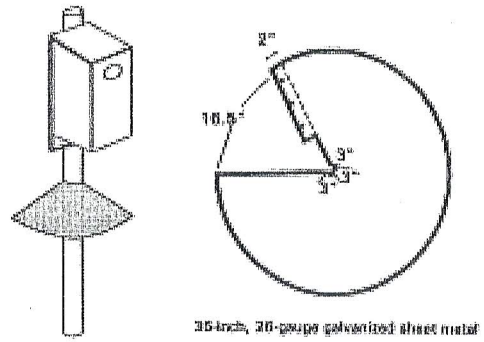


FIGURE 6: Inverted metal cone predator guard.

Nesting Material

Nesting material influences wood duck use of your boxes. Wood ducks do not carry nesting material into nest boxes, so managers must add it annually.

The best types of nesting material for nest boxes are wood shavings or small wood chips. Agricultural or Grange supply stores stock bales or bags of cedar or wood shavings under the name of "litter for livestock". This material is easily obtained and optimum in size. Wood ducks tend not to lay eggs in boxes with wood chips that are too large and coarse or too fine and powdery. Light colored nesting material reduces starling use of nest boxes.

Nesting material should be about 4" deep. If boxes contain more than 4" of wood shavings, the incubating hens sit too high within the box and are within reach of a raccoon from outside the entrance hole. If there is not enough nesting material in the box, the hen cannot cover her eggs as she lays them (one egg per day). Also, if there is not enough nesting material, the eggs do not receive enough insulation and protection during incubation.

Nesting material should be refreshed during the nesting season after a nest has been completed (hatched or destroyed). This sometimes allows a nest box to produce two nests during the same nesting season. Refresh nesting material prior to each new nesting season. Remove old eggs, nests, feathers, grass, and whatever else might have accumulated in the box. Discard this far from the nest box so it does not attract predators. Nest box cleaning is generally done during the annual box maintenance. Fewer nests, eggs, and ducklings are produced in nest boxes that are not checked and maintained regularly (Utsey and Hepp, 1997).

3. MAINTAINING A NEST BOX PROGRAM

A nest box program is like a vehicle: periodic maintenance is needed to keep it running right. Once you've put in the expense and effort to erect nest boxes, you want to keep them in good working order. Maintained nest boxes produce more ducks.

Pre-Season Nest Box Check

Prepare nesting boxes for each new nesting season in late winter or very early spring, before wood ducks start nesting. Some wood ducks start laying eggs by March tenth in western Washington and by April first in eastern Washington.

1. Move nest boxes that have not been used for several years and repair or replace damaged boxes.
2. Clean out or refresh old nesting material and remove debris or bird droppings that have accumulated in the boxes.
3. Prune branches that obstruct the boxes.
4. Add predator guards to boxes where predation may be a problem.

<u>Items suggested for pre-season nest box checks</u>

- Sturdy 8-14 foot ladder
- Leather gloves
- Wood shaving nesting material
- Hammer and assorted nails
- Battery-operated screwdriver and screws
- Socket wrench, sockets, lag bolts, & washers
- Pruning shears for trimming branches
- Extra box lids and extra wire
- Field data notebook
- Camera and film (optional)

Mid-Season Nest Box Checks

After your boxes are ready for the nesting season, you should prepare to check them several times during the nesting season. Your nest boxes will produce more wood ducks (and less starlings) if you check them during the nesting season. The number of times you check boxes will depend on how many boxes you have and how much time you have to check them. Checking boxes at two-week intervals is optimum. But check your boxes at least twice during the nesting season.

Starlings are bad for wood ducks and other cavity nesting wildlife. Starlings are not native to the USA. They compete with many native bird species for nesting cavities and are considered a nuisance. Starlings are not protected by laws in this country, and they and their nests may be destroyed.

Checking nest boxes during the nesting season allows you to remove and destroy starling nests and eggs. This keeps the boxes available for wood duck use and reduces the number of starlings that may be imprinted to your nest boxes in future years. Wood ducks will seldom use a box that a starling has half filled with nesting material. Starlings are very aggressive and will harass wood ducks away from nest boxes the starlings are using.

Checking nest boxes during the nesting season allows you to:

1. Keep the boxes available for wood duck use
2. Remove starling nests
3. Monitor boxes being used by which species
4. Determine the number of eggs laid and hatching success
5. Identify predation problems, and
6. Keep a record of what happens in each box.

End-of-Season Or Final Nest Box Check

This is the last, or sometimes the only, time that the nest boxes may be checked. These checks provide information concerning if the box was used, what species used the box, and the fate of the nest. This check also identifies predation problems and identifies boxes that may need attention before next year. The season ending nest box check alone does not maximize wood duck use of your nest boxes and does not lessen the number of starlings your boxes may produce.

A nest box program should be a continuing effort year after year. Recording and reporting your data should be part of that program. These records should include the location of each box so that others could monitor the boxes when you cannot. Keep a record of the use in each nest box to monitor the success of your nest box program annually. Records also help identify boxes that are regularly successful or unsuccessful. The unsuccessful boxes can be modified or moved.

An example of a record keeping form for nest box programs is included in this booklet. Modify or add to the form to meet your specific needs. Keep a record of the use and success of your nest boxes. Report the results of your nest boxes to the local office of the Washington Department of Fish and Wildlife and or the U.S. Fish and Wildlife Service.

Safety

Check and maintain wood duck boxes with a partner. Working in remote wooded areas along streams climbing ladders or trees can have natural hazards. A partner will help make the project safer and more efficient and fun.

Wood Duck Nest Box Data Form

Sample wood duck nest box data form.

Nest box project area

County | Nearest city

Water body | Nearest road

Box #	Location	Pole or tree type	Distance to water	Predator guard y/n	Survey dates and what was found	Fate

Findings:
0 = Nothing present in box
ST = starling nest
cov = eggs covered
AB = nest abandoned
WD-#e = Wood duck nest and number (#) of eggs
HM-#e = Hooded merganser nest
inc = eggs being incubated
NF-#e = Northern flicker nest
D = nest, eggs, or female destroyed
Examples: WD-11e inc or ST-6e D

FIGURE 7: Sample data form

4. MANAGING WOOD DUCK NEST BOXES

The Rights, Wrongs, and Why

1. **Get permission to install nest boxes.**
Why: To have legal access for installation and checking nest boxes. Landowner will know what boxes are for.

2. **Anchor boxes securely to trees.**
Why: Wood ducks may not use boxes that are loosely attached. Boxes will remain on trees and will not fall off for years.

3. **Lag bolt, don't nail, boxes to trees or posts.**
Why: Lag bolts can be loosened so box does not break apart as tree bark grows. Lag bolts allow removal of boxes if necessary. Nails sometimes will pull out of trees but lag bolts will not.

4. **Remove unneeded fasteners from trees when nest boxes are removed or relocated.**
Why: Metal pieces left in trees are dangerous. They especially present problems if the tree is later cut for timber, firewood, or other uses.

5. **Use large washers between the lag bolt head and the box.**
Why: Washers will keep the growing tree from "pulling" the lag bolt head into or through the wood of the nest box and prevent later removal or loosening of the lag bolt.

6. **Place boxes in tree stands within 200 yards of water.**
Why: Boxes within 200 yards of water are well used by wood ducks. Boxes setback from water receive less predation and boxes in dense tree stands are used less by starlings. The farther ducklings have to travel from the nest box to water (i.e. over 200 yards), the higher their mortality.

7. **Place boxes so that their bottoms are 6-12 feet above ground or 3 feet above the expected highest water levels.**

Why: Wood ducks use nest boxes erected 6-12 feet high as much or more than they use boxes erected higher or lower. Boxes placed too close to the ground may attract more predators and human disturbance. Boxes too high are difficult or dangerous to check. Boxes should be high enough to prevent flooding during high waters.

8. **Put "backing boards" (about 3-4 inches wide and 8-10 inches long, varying from ½ to 2 inches thick) to act as buffers between the box and tree. Lag bolts can be inserted through box, then through backing board, and into tree.**

Why: As the tree bark grows (especially where the lag bolts attach the box to the tree) the growing bark will push against the backing boards. These backing boards will push evenly against the back of the box and keep the box from breaking apart for years.

9. **Place boxes vertical or tilted slightly forward. When needed, this can be done by using a thick backing board at the top hole and a thin backing board at the bottom hole.**

Why: Ducklings may not be able to climb up and out from boxes that are tilted back away from the opening.

10. **Make sure boxes have about 4 inches of nesting material (either wood shavings or small wood chips) in the bottom.**

Why: Wood ducks do not carry nesting material into nest boxes. Hens bury their eggs under nesting material during the egg laying period. The nest material helps insulate, cushion, and protect the eggs during incubation.

11. **Inspect boxes regularly during the nesting season.**

Why: To remove debris brought in by other animals. To remove undesirable species, such as bees, wasps, or starlings. To make repairs that might be needed. To replace nest materials as needed. To collect information on nest box use and success. To clean out the nest box after early nest attempts for possible second nests. To keep the boxes available for wood duck nesting throughout the nesting season.

12. **Wear leather gloves when checking nest boxes.**

Why: Gloves will protect hands from slivers and cuts.

13. **Have extra wood shaving or wood chip nesting material with you when checking boxes.**

Why: Flickers and starlings will remove nest material from boxes. If boxes need to be cleaned out during the nest season, wood shavings may need to be replaced or added.

14. **Make sure boxes have removable lids.**
Why: Removable lids make boxes easier to check without disturbing nesting hens. The box must be opened up for annual cleaning and replacing nesting material. Boxes with removable lids are stronger, sturdier boxes and will last longer than boxes with side opening access doors.

15. **Number your nest boxes.**
Why: To help keep track of box location, use, and success during record keeping.

16. Provide a **"ladder" on the inside front of the box between the bottom and the entrance hole (refer to nest box construction procedures).**
Why: The "ladder" will give the ducklings footing and make it easier for them to climb up to the entrance hole to leave the box the day after they hatch.

17. **Fold over a ½ inch seam along each edge of the wire mesh ladder to leave a smooth, uncut edge. Then staple the wire mesh (with the cut side of the wire mesh against the wood) to the inside front of the box.**
Why: The folded edges of the wire mesh ladder will keep the ladder from becoming frayed and developing loose, sharp projections that could poke hens or ducklings.

18. **Drill five ¼" holes in the bottom of the box before construction.**
Why: These holes will provide drainage for the box.

19. **Pre-drill 3 attachment holes (left, center, and right) 2" from the top and bottom of the back board of the nest box.**
Why: Several pre-drilled holes will let you select the one that best allows vertical mounting of the nest box on tree trunks that are not vertical; (Example: the top right and bottom left holes might be used to attach a nest box to a tree leaning from left to right).

20. **When building boxes, nail and screw through the sides of the box and into cut edges of the front and backboards of the box.**
Why: The box will hold together longer as the box hangs and weathers over the years. Screws and nails through the sides of the box into the front and back boards will not pull out because they are perpendicular to the pull of gravity as the heavy box leans away from the tree.

21. **Use predator guards under boxes mounted on posts and, when possible, on trees.**
Why: Often, not always, predator guards can easily keep raccoons and mink from destroying hens and eggs in nest boxes.

22. **Place boxes in good wood duck habitat in locations where they can be easily and safely checked and maintained.**
Why: To make it easier for you or others to check, repair, and maintain the nest box after it is erected. Nest boxes that are dangerous, too high, or inconvenient to check are less likely to be monitored or maintained over the years. Safety should be a concern with all projects.

23. **Use a sturdy stepladder or lightweight extension ladder to erect and check boxes.**

Why: A ladder allows nest boxes to be erected at proper heights for wood duck use and so that humans will not bother them. Ladders also make wood duck nest box work easy and safer.

24. **Make the nest box entrance hole a 3" by 4" elliptical hole as shown below.**

Why: Raccoons cannot enter a 3" by 4" elliptical hole to prey on incubating hens or eggs.

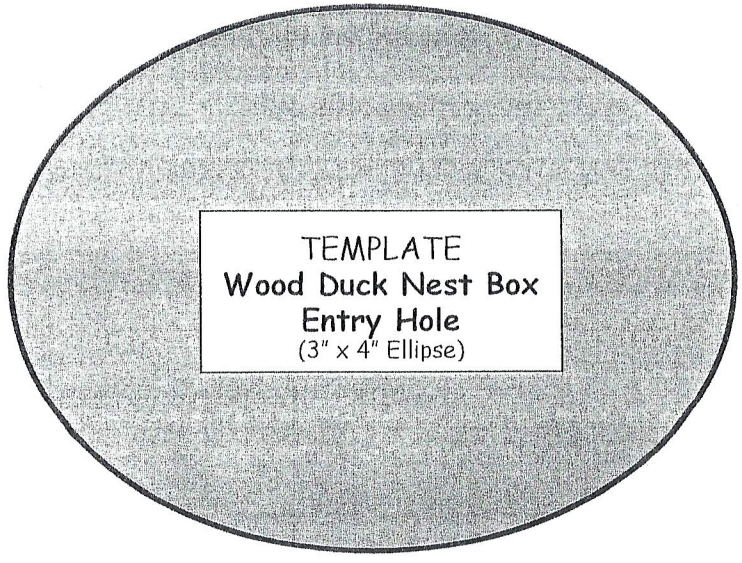


FIGURE 8: Template for proper size & and shape of a wood duck nest box entrance hole.

5. IDENTIFYING PREDATORS OF WOOD DUCK HENS AND EGGS IN WASHINGTON

Telltale Signs to Look For

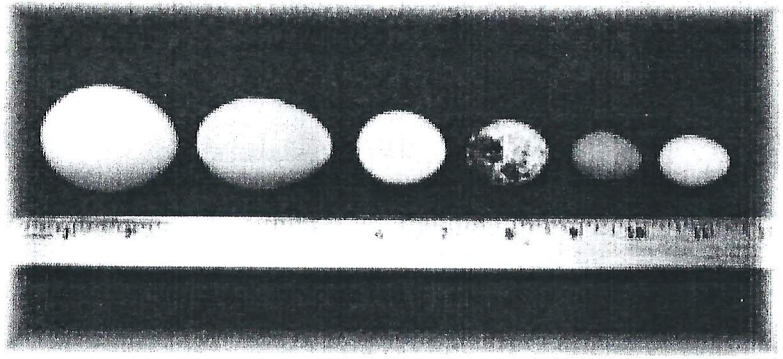
RACCOON: The dead wood duck hen is often present in or near box. If the hen is found, the carcass is not decapitated. Much of the hen's carcass will usually be eaten. Feathers and blood are often present and scattered about in, on top of, or near the box. Signs that the hen struggled are evident. Muddy or bloody raccoon tracks may be on box lid. Long, silvery-gray raccoon hair may be snagged on rough edges of box or in the entrance hole. The wood duck eggs are usually broken and crushed and much of contents are eaten if the raccoon is small enough to get into the nest box.

MINK: The decapitated carcass of the hen will usually be in the nest box. Often, the hen's body will be in an incubating posture, and will seem undisturbed. Few feathers will be scattered about in or near the box. Much blood may be evident. Signs of a struggle may be lacking. Hen's carcass may be uneaten. The wood duck eggs will be unmolested.

LARGE HAWKS: The dead wood duck hen may be found outside nest box, often decapitated. Much of the wood duck hen's carcass may be eaten. The wood duck eggs will be whole and uneaten.

NORTHERN FLICKER: The wood duck hen will not be dead. There will be no signs of struggle, blood, or large feathers. The wood duck eggs will have tiny holes pecked in them. Some of the wood duck eggs may be missing. Flicker eggs may be present.

6. *OTHER WILDLIFE THAT MAY USE WOOD DUCK NEST BOXES IN WASHINGTON*



ABOVE: Eggs of (from left to right) Hooded Merganser, Wood Duck, Western Screech Owl, American Kestrel, European Starling, and Northern Flicker (photo by Steve Simmons).

What You May Find in a Nest Box

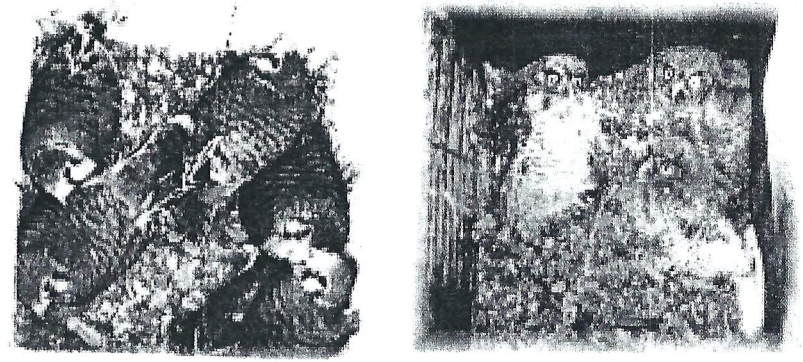
HOODED MERGANSER: Will nest in wood duck boxes. Clutches are 5 to 12 white eggs, size 2-1/10" x 1-3/4". Wood ducks and hooded mergansers may sometimes both lay eggs in same nest in mixed clutches.

COMMON GOLDENEYE: May nest in wood duck boxes. Clutches are 6 to 15 pale green eggs, size 2-3/5" by 1-2/3". May form mixed clutches with wood ducks.

BUFFLEHEAD: May nest in wood duck boxes. Clutches are 6 to 14 olive green to creamy white eggs, size 2" by 1-1/2". May form mixed clutches with wood ducks.

What You May Find in a Nest Box (continued)

AMERICAN KESTREL: May nest in wood duck boxes. Clutches are usually 3 to 5, rust to light brown, heavily spotted eggs, size 1-2/5" by 1-1/8". Adults are often seen nearby.



ABOVE: Young American Kestrels (left) and young Western Screech Owls (right) in nest boxes. (photos by Steve Simmons)

WESTERN SCREECH OWL: May nest or roost in wood duck boxes. Clutches are 3 to 7 white eggs, size 1-1/2" by 1-1/3". Adults regurgitate "owl pellets" of hair, bone and feathers outside box.

NORTHERN SAW-WHET OWL: May nest or roost in wood duck boxes in NW Washington. Clutches are 3 to 7 chalky white eggs, size 1" by 9/10". Adults regurgitate "owl pellets" of hair, bone and feathers and insect shells outside box.