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Cavity Trees – Nature's Refuge

By Brian Naylor, Forest Habitat Biologist, Ontario Ministry of Natural Resources

Cavity trees are dead or dying trees that contain one or more holes or cavities that could be used by wildlife for a variety of purposes — nesting and raising young, denning, roosting, resting, feeding, caching food, escaping predators and hibernating.

In central Ontario, there are about 50 species of birds and mammals that use cavity trees. These cavity users can be divided into two broad groups - primary cavity users and secondary cavity users.

Primary cavity users are able to make (excavate) their own holes for nesting or roosting. Woodpeckers, chickadees and the red-breasted nuthatch fall into this category.

The majority of wildlife species that use cavities cannot excavate their own holes and rely on those created by primary cavity users or on holes that form naturally. This group is called secondary cavity users. The kestrel, some owls such as the saw-whet and barred owls, ducks such as the common goldeneye and wood duck, and songbirds like the eastern bluebird, great-crested flycatcher and white-breasted nuthatch are all secondary cavity users. Many mammals are in this category too. These include deer mice, red squirrels, grey squirrels, flying squirrels, weasels, martens, fishers, raccoons, porcupines and black bears.

Once you've seen one hole, you've seen them all, right? Wrong. Holes in trees are extremely variable in terms of their size, shape, orientation, location in the tree and value to wildlife.

Cavities can be divided into three main types based on their use by wildlife: nest, den, or roost cavities; escape cavities or feeding cavities.

Nest or den cavities are hollows that are surrounded by relatively sound wood and can be used by birds or mammals for nesting or denning. (Figure 1 shows a good example of a tree with a nest cavity).

A pileated woodpecker excavated this small entrance hole (about 10 cm in diameter) through the sound sapwood of this living hard maple. Once

Figure 1: Tree with a pileated woodpecker nest cavity. [1]

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it reached the rotted heartwood, the woodpecker created a nest chamber about 20 cm in diameter and about 50 cm deep. It used this nest for raising a brood in one season and may have used the cavity during the winter as a roost (place to sleep at night).

All woodpeckers create similar types of cavities, although the size of the cavity reflects the size of the bird. In general, a primary cavity user will use a hole for nesting only once but may return to the same tree to nest for a number of years. This is demonstrated in Figure 1, as it has a second nest hole about 2 m below the first nest hole.

Some primary cavity users prefer to create nest holes in living trees (e.g., the yellow-bellied sapsucker). Other cavity users prefer dead trees (snags) or dead parts of living trees (e.g., downy woodpecker), while still others will use either living or dead trees (e.g., pileated woodpecker).

Once a primary cavity user has abandoned a nest hole, secondary cavity users may make use of it. Species like the saw-whet owl, wood duck, grey squirrel and marten will use an old pileated woodpecker hole for nesting or denning.

Kestrels will use abandoned flicker nest holes and red squirrels and flying squirrels will use old sapsucker nest holes. Consequently, all trees with primary cavity user nesting holes are important habitat for other wildlife.

Not all good nest or den cavities are created by primary cavity users. The tree in Figure 2 has a good nest or den cavity that formed from the death of a large branch. At one time, the branch died, rotted

Figure 2: Good nest cavity formed from dead branch stub. [1]

Figure 3: Yellow birch with hollow butt. [1]

and fell off, leaving the neat round entrance hole. Rot organisms created a hollow chamber behind the knothole. This particular cavity was being used by a flying squirrel.

Sometimes it is difficult to know whether a knothole leads to a useable cavity, especially if the hole is high on the bole of the tree. One clue can be helpful. Trees will attempt to close these kinds of holes by producing callus tissue. Mammals using these holes will gnaw the callus to keep the hole open enough to let them in (but small enough to keep out predators). Thus, signs of gnawing on the callus tissue are a good indicator that the cavity is useable.

In addition to nest cavities, pileated woodpeckers will also create roost cavities. They will excavate numerous egg-shaped holes (up to a dozen) along the length of the bole of a hollow tree. At night, they enter the hollow tree through one of these holes and cling to the inside and sleep. They create many holes so that they have numerous exits in case a predator tries to trap them in the tree. Roost trees may be used by pileated woodpeckers (and other animals) for many years, so they are important to wildlife.

Not all holes in trees make good nest, den or roost cavities. Some just provide temporary shelter

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Figure 4. Maple tree showing feeding cavities. [1]

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from the elements or from predators. These are called escape cavities. Figure 3 shows an old yellow birch that has a church door and hollow butt. This is not a good site for most wildlife to nest or den because eggs or young would be exposed to predators. However, it does provide temporary shelter, and if the cavity is large enough, bears might use it to hibernate.

Escape cavities have value to wildlife, but are generally not as valuable as trees that contain good nest, den or roost cavities.

Figure 4 illustrates the third type of cavity, the feeding cavity. Woodpeckers excavate holes in trees in search of food such as carpenter ants or the larvae of wood-boring beetles. Feeding excavations vary greatly in size and shape.

The large rectangular feeding holes shown in Figure 4 would seldom be mistaken for nest, den or roost holes. However, small circular feeding holes may superficially resemble nesting holes.

Nest holes are typically very regular in shape, have clean edges and surfaces and appear dark because they lead into a cavity. Small circular feeding holes are more typically irregular in shape, have rough edges and surfaces and usually appear light because they do not have an associated hollow chamber.

Trees with feeding excavations are valuable components of wildlife habitat. However, feeding holes themselves will rarely be used by wildlife for nesting, denning or roosting. Thus, cavity trees with only feeding holes are not as valuable as those with nest, den or roost cavities.

Past logging operations that removed the sound, vigorous trees from a stand and left the declining individuals that were in poor health (a practice known as high-grading) have created an abundance of habitat for cavity users in many of the stands in central Ontario today.

However, there is a concern that habitat for cavity users may decline in the future because:

1) Dead trees (many of which are existing or future cavity trees) that pose a safety risk to workers must be removed during timber harvest operations to comply with the *Occupational Health and Safety Act* and
2) The rigorous application of silvicultural systems such as selection and shelterwood will lead to fewer declining and low vigour trees (i.e., trees with high potential to

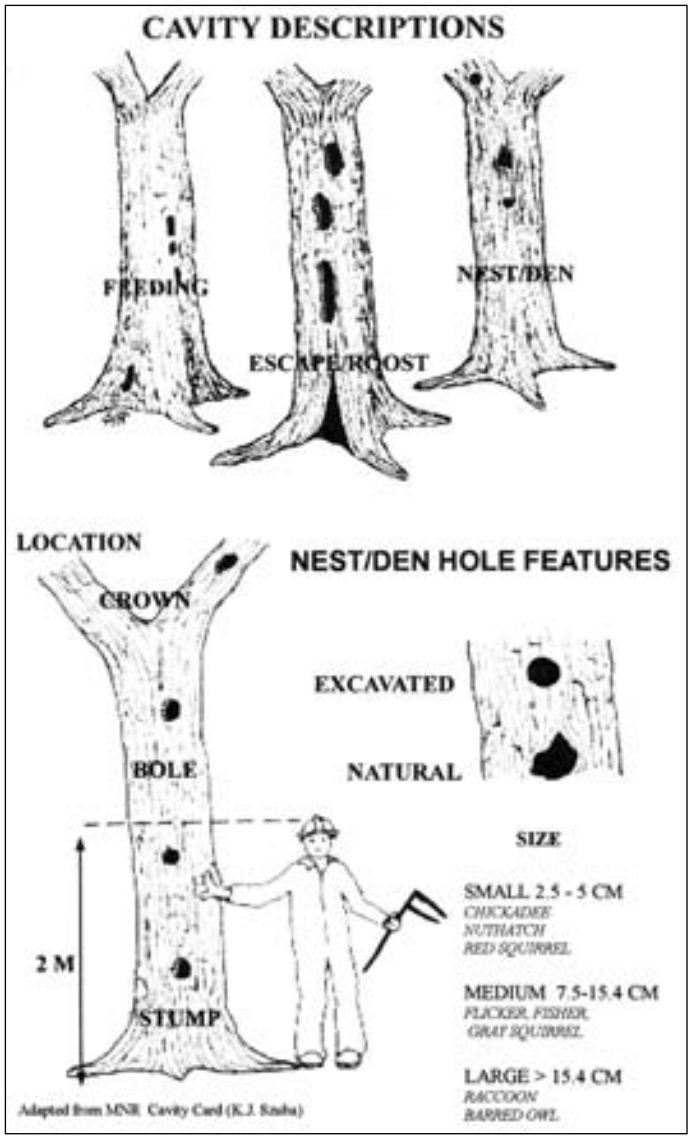

Figure 5. Cavity tree descriptions and features of nest/den holes. [2]

be cavity trees) in our managed forests.

Because of the concern about the future supply of cavity trees, the Ontario Ministry of Natural Resources (MNR) has adopted a guideline that requires the retention of 6 cavity trees per hectare within harvest operations on Crown land.

Although snags can be important as cavity trees, they are generally not identified for retention because of concerns for worker safety. Instead tree markers (highly trained individuals who identify which trees to harvest) concentrate on retaining living trees with existing cavities that are not a safety risk to workers.

Many landowners harvest fuelwood or sawlogs from their woodlots. When cutting trees, landowners should think about the habitat needs of cavity users. Leave as many snags standing as safety permits and try to retain some living cavity trees. Consider the guidelines that MNR uses (outlined below).

It isn't necessary to own a large woodlot to help provide habitat for cavity users. There are some things that landowners can do in their backyard or around their cottage. Leave standing any snags that are not a safety risk. When a tree dies, our first reaction is often to cut the tree down and use it (usually as firewood) so the wood won't go to waste. However, remember that dead trees aren't a waste of wood; they provide homes for wildlife and represent a reinvestment in the local ecosystem.

MNR tree markers use the following guidelines to help identify which cavity trees to leave:

1) In order of priority, leave living trees with nest, den, or roost cavities, escape cavities, then feeding cavities.
2) Leave potential cavity trees (trees that have rotten cores) when there is a shortage of trees with existing cavities.
3) Trees with multiple cavities of various sizes are more valuable than those with a single cavity.
4) Cavities in the upper bole are more valuable than those in the butt of the tree.
5) Bigger is better -- a small cavity user can usually find a home in a large tree but the reverse is not true. Cavity trees should be at least 25 cm dbh; at least one of the 6 cavity trees per hectare should be large (>40cm dbh).
6) Cavities found in long-lived trees (maple, oak) will last longer than cavities found in short-lived trees (poplar).
7) Leave trees that have relatively low risk of blowing down.
8) Since most cavity users are territorial, try to retain a relatively uniform number of cavity trees per hectare across the stand.

About the author. Brian Naylor is a forest habitat biologist with the Ontario Ministry of Natural Resources in North Bay, ON and was one of the contributing authors of MNR's new tree marking guide.

This article first appeared in the publication *T.R.E.E.S*. (Volume 1 – Number 1, Winter 1994). The article was updated in January 2006 by the author to reflect information from the new tree marking guide (OMNR, 2004. *Ontario Tree Marking Guide, Version 1.1*. Ontario Ministry Natural Resources. Queen's Printer for Ontario. Toronto. 252 p.) The guide is available online at <http://ontarioforests.mnr.gov.on.ca> or can be purchased from the Natural Resources Information Centre at 1-800-667-1840 ($27.50).

Photo and Illustration Credits

[1] Ontario Ministry of Natural Resources. *A Tree-Marking Guide for the Tolerant Hardwoods Working Group in Ontario.* 1993

[2] Adapted from the Cavity Identification Reference Card (K.J. Szuba). Ontario Ministry of Natural Resources. *A Tree-Marking Guide for the Tolerant Hardwoods Working Group in Ontario.* 1993