Tree cavities – a vital wildlife habitat

OVER 1,000 BIRD species, and many mammals, amphibians and reptiles worldwide depend on using tree cavities for nesting and shelter. In interior British Columbia, about 25% of forest birds and mammals use tree cavities to conduct their critical life activities. Tree cavities can be formed by excavation or decay. Some cavity-dependent species are able to excavate their own holes in trees. In other situations the normal decay processes in senescing trees gradually form holes, some of which are suitable for nesting and roosting. Cavity-using species are classified into three guilds according to how they acquire cavities. Woodpeckers, nuthatches and some chickadees are primary excavators that create cavities in trees. Secondary cavity nesters include a variety of songbirds, ducks (yes, some ducks nest in tree holes!), birds of prey, and medium-sized mammals that use but cannot excavate cavities. Thus, they rely on cavities created by excavators or decay. A third guild, weak excavators, may excavate their own cavities in decayed trees or use existing decay-formed or excavated cavities. Dr Kathy Martin (Department of Forest Sciences) coined the term Nest Web to describe the inter-dependence among the three groups with respect to the creation and use of nesting and roosting tree cavities. Nest Web wildlife communities occur on all continents except the Antarctic where there are no trees.

Pileated woodpecker feeding chicks

Photo: Amanda Adams

Woodpeckers and Aspen

When Kathy Martin started her research on cavity-nesting vertebrates in interior British Columbia 17 years ago, it was immediately obvious to her that aspen, especially decayed trees, were a very important resource for cavity nesters. Although aspen comprised only 15% of the trees in her study sites, over 95% of the 4,850 nests of 32 species of cavity-using birds and mammals were found in aspen. In British Columbia, about 90% of secondary cavity nesters use excavated cavities, with the rest in decay-formed holes. The northern flicker is the most important of the 10 excavating species at Kathy's sites because it is abundant and produces many medium to large-sized cavities that can be used by species ranging from bluebirds and swallows to squirrels and ducks. The less abundant pileated woodpecker provides large long-lasting cavities for owls, kestrels, goldeneye, pine marten, and fisher. Woodpeckers prefer to excavate cavities in trees that are still alive but unhealthy with some internal decay or damage, but aspen that are recently dead and those with advanced decay are frequently used. To support cavity-dependent wildlife communities, it is important to keep aspen in a range of conditions, especially live unhealthy aspen (hard trees with soft spots of decay) and dead trees.

Male northern flicker

Photo: Jenny McDonell

Woodpecker Legacies

Woodpeckers can produce several cavities annually but use each cavity only once for nesting. Since tree cavities can last for 10 to 15 years or longer, these cavities are available for over 30 other species to use. Kathy Martin's research group followed the lives of tree cavities and found that a cavity over its lifetime may be used by such different species as flickers, red squirrels, northern flying squirrels, saw-whet owls, kestrels, tree swallows, chickadees, and several duck species. One cavity was used 17 times in 13 years (cavities can be re-used sequentially in the same year). In North America, woodpeckers are often considered to be a keystone species or an ecosystem architect because they form high quality tree cavities that are suitable for use by many cavity-using vertebrates. Kathy's research group discovered that woodpeckers are excellent indicators of biodiversity as forest stands with many woodpeckers generally also have high avian biodiversity.

Decay Legacies

Kathy and her research group have also looked at the use of excavated and non-excavated cavities and at cavity persistence across continents. They found striking differences among regions. In North America, woodpeckers were responsible for a large proportion of functional cavities, and both excavated and decay-formed cavities had a similar lifespan. In South America, there are many cavity-using birds and mammals, including very colourful species such as toucans and parrots. In Argentina, about 80% of the non-excavating cavity users nested in decay-formed cavities, despite the presence of many woodpecker species. This extensive use of decay-formed cavities was found in South America, Europe, Asia, and Australia. In contrast to North America, decay-formed cavities elsewhere persisted much longer than the woodpecker cavities. But decay is a very slow process. Trees can be 100 years old before decay processes are advanced enough to form cavities and are usually several centuries old before a number of suitable cavities are formed. Thus, wildlife species using decay-formed cavities are relying on large old living trees, but these valuable cavity trees are also targeted for harvest in South America and across much of the tropics. Kathy Martin's results suggest that excavating species may be able to ameliorate some impacts of tree harvest on cavity-using species in North America, but that this approach will not work so well in other regions.

High quality cavities are limiting in almost all ecosystems and this research supports the need to ensure an ongoing supply of tree cavities for cavity-using wildlife. In North America, management for woodpecker friendly forests is required, and this involves retaining as much aspen as possible in a range of live and dead, mid-aged and older trees. The majority of cavity-using species live in South America and other continents, and here large old trees, in which decay-created cavities are found, need to be retained to support these complex wildlife communities.

For further information contact Dr Kathy Martin at kathy.martin@ubc.ca or kathy.martin@ec.gc.ca