Research Review

A Summary of Recent Scientific Research on Bluebirds and Other Cavity Nesters

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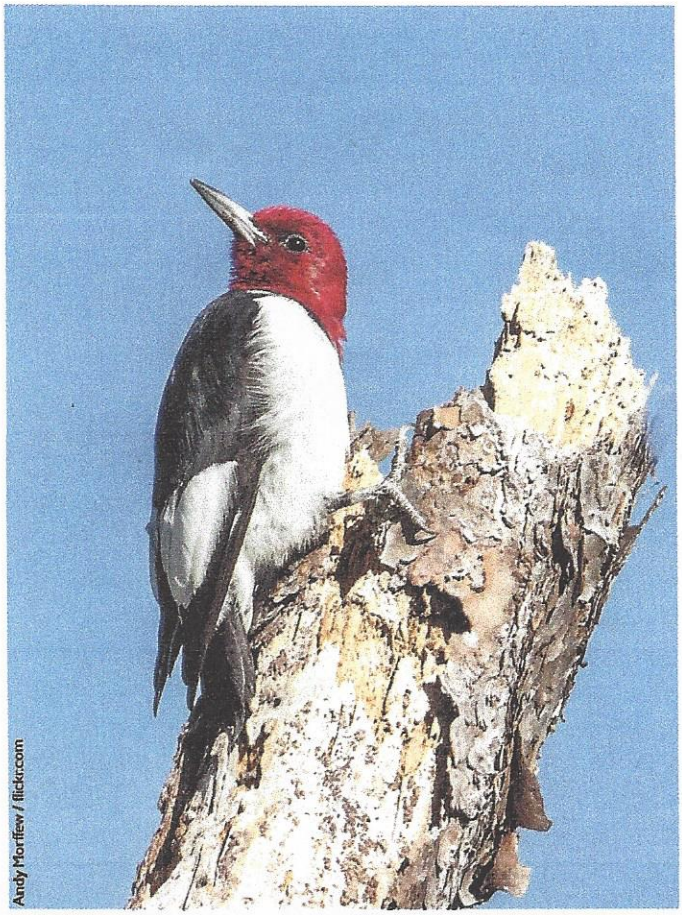
Conserving a Declining Species

While the Eastern Bluebird population is large and growing, other cavity-nesting birds are not faring as well. The Red-headed Woodpecker is one of those species. This beautiful and charismatic woodpecker has been declining for at least 40 years, leading it to be listed as a species of special conservation concern by various conservation groups and government agencies.

One of those agencies is the New York State Department of Environmental Conservation, which has designated the Red-headed Woodpecker as a Species of Greatest Conservation Need. New York is near the northern edge of the woodpecker's continental range, and the species is declining faster there than in many other areas. This is not unusual—declining species often decline fastest at the edges of their range, probably because the habitat is not as suitable there as in the core of their range.



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But therein lies part of the problem of conserving the Red-headed Woodpecker: surprisingly little is known about its habitat needs. Or its breeding habits. Or other aspects of its natural history, for that matter. Fortunately, Jacob Berl and his colleagues set out to fill some of these gaps in our knowledge. They carefully measured characteristics of the nesting habitat used by Red-headed Woodpeckers in New York. Their findings should prove useful to land owners and land managers looking to help this species:

- As woodpeckers go, the red-head is a relatively weak excavator, so it needs soft, dead wood in which to excavate a nest cavity.
- To minimize the loss of nests and nestlings to predators, the cavity needs to be fairly well concealed by live vegetation (i.e., tree leaves).
- The key, then, is to **conserve live trees with large dead limbs** in which this woodpecker can create nest cavities.

Jacob L. Berl, John W. Edwards, Jeffrey S. Bolsinger, and Todd E. Katzner. 2014. Survival of Red-headed Woodpeckers' (*Melanerpes erythrocephalus*) Nests in Northern New York. The Wilson Journal of Ornithology 126:700–707.

Bluebird Mothers Know Best

The ranges of Western and Mountain Bluebirds overlap extensively in western North America. Since their habitat needs are so similar, the two species compete for space wherever they occur together. The outcome of this competition varies in a predictable manner, based on the stage of the forest, the density of bluebirds, and the availability of nest cavities.

Step 1: New habitat is created when overgrown forests burn, creating a more open environment; the burned trees are attacked by insects; the insects and open habitat attract woodpeckers; the woodpeckers excavate nest cavities; and the open habitat and nest cavities attract Mountain Bluebirds, which are better at colonizing new areas than are the Western Bluebirds.

Step 2: Eventually, aggressive Western Bluebirds arrive and push out the Mountain Bluebirds by out-competing them for territories.

Step 3: While the Western Bluebird population in an area is relatively small and nesting territories are abundant and easy to claim, the proportion of less-aggressive individuals is high (i.e., there are more "mellow" Western Bluebirds in the population).

Step 4: As the Western Bluebird population in an areas grows and becomes more dense, and competition for territories becomes more intense (especially competition with cavity-nesters other than bluebirds), mothers produce more-aggressive sons, who are more apt to leave the area to colonize new sites (pushing out the resident Mountain Bluebirds in the process, and starting the process all over again).

What is really interesting about this cycle is the way that mothers respond to the density and competition by "manipulating" the birth order of their offspring, and the amount of a particular hormone in the eggs—a hormone that is known to make birds more competitive once they reach adulthood:

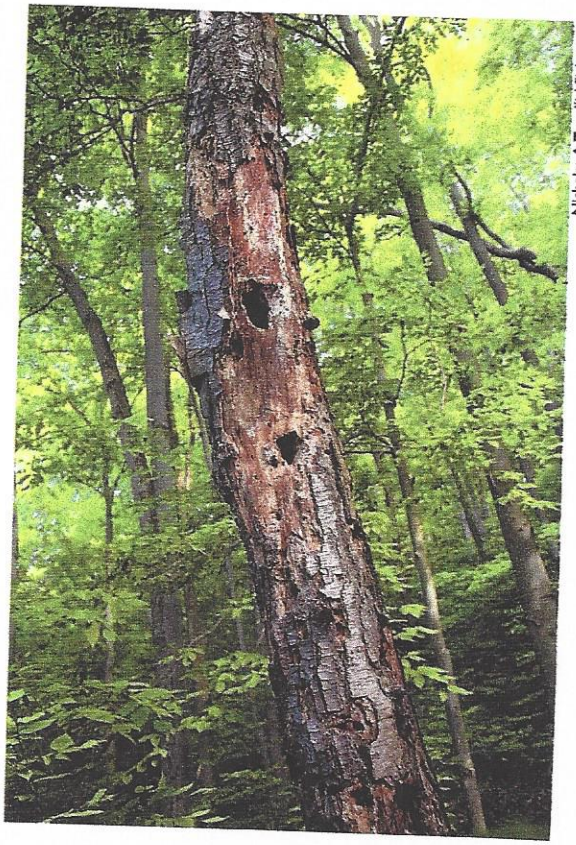
- In Step 3 (above), mothers produce more sons late in a clutch (sons that hatch late grow up to be adults that are less competitive), and deposit less of the hormone (resulting in "mellow" sons).
- In Step 4, mothers produce more sons early in a clutch (resulting in sons that grow up to be more competitive adults), and deposit more of the hormone (resulting in competitive, aggressive sons that are more likely to be successful in dispersing to new areas).

It's a complex, fascinating system whereby Western Bluebird mothers affect the structure of a cavity-nester community.

Renée A. Duckworth, Virginia Belloni, and Samantha R. Anderson. 2015. Cycles of Species Replacement Emerge from Locally Induced Maternal Effects on Offspring Behavior in a Passerine Bird. Science 347:875–877.

Conserving Cavity-Nesters by Conserving Snags *and* Live Trees

Primary cavity-nesters are birds that excavate a nest cavity in a tree—mostly these are the woodpeckers, but also nuthatches and even chickadees, if the wood is soft enough. Secondary cavity-nesters are birds that cannot excavate a cavity on their own, but instead must find an existing cavity to call home—bluebirds and swallows are examples of secondary cavity-nesters. Clearly, the conservation of secondary cavity-nesters is tied to the conservation of primary cavity-nesters, since they provide the nest cavities.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For many years, forest management has included some protections for standing dead trees, called snags. The decaying wood of snags makes them attractive to primary cavity-nesters—the soft wood is easy to excavate. One of the steps in a timber harvest project is to identify and mark for preservation snags that have cavities. These "wildlife trees" are an important part of a healthy, fully functioning forest.

But primary cavity-nesters don't limit their nest-digging activities to snags—nest cavities can be excavated in live trees, too. In fact, a recent project by Amanda Edworth and Kathy Martin in British Columbia demonstrated the importance of live trees with nest cavities. Their project showed that cavities in live trees lasted longer (because the live trees remain standing for more years than do snags) and their dimensions change more (the cavity gets larger over time, making them usable by a wider array of birds and even mammals, over the course of the cavity's "lifetime").

Bottom line: Conserve cavity-nesting birds by conserving *both* snags and live trees bearing cavities.

Amanda B. Edworth and Kathy Martin. 2014. Long-Term Dynamics of the Characteristics of Tree Cavities Used for Nesting by Vertebrates. Forest Ecology and Management 334:122–128.