unknown. Red-cockaded Woodpeckers are strongly territorial and non-migratory, but recent information has shown that at least on occasion they can move distances up to 90 km (Walters et al. 1988).

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Tool-making and tool-using by a Brown Thrasher (*Toxostoma rufum*)

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On 15 October 1990 at my banding station at Hilton Pond near York, South Carolina (Lat 34°58'N, Long 81°13'W), I watched a Brown Thrasher (*Toxostoma rufum*) enter a pull-string welded-wire ground trap baited with shell corn and white millet. The bird ignored the bait, instead using its bill to pick up an un-capped acorn that was about 1.5 to 2 cm in diameter and probably from a nearby Southern red oak, *Quercus falcata*.

The thrasher carried the acorn outside the trap door and dropped it onto rain-softened bare ground. With rapid downward sweeping motions of its bill, the bird immediately excavated a hole in the soil about 1.5 cm deep and placed the acorn in it. The thrasher then repeatedly rammed its bill perpendicularly against the exposed surface of the acorn. Although the nut usually stayed in place, the bird returned it to the depression on each of several times the acorn was dislocated by impact from the thrasher's bill.

On about the tenth hit, the thrasher cracked off a small piece of nutshell, exposing the orange meat of the acorn. After this, the bird appeared to aim its blows at the broken shell edge rather than hitting the acorn surface at right angles; several times the thrasher used its bill to rotate the acorn in the hole, ap-

parently to provide a better angle of attack. The bird took about two minutes to expose a complete upper hemisphere of acorn meat and another 90 seconds to peel the remaining shell from the other hemisphere. Only after the shell was completely removed did the thrasher begin to peck directly at the nutmeat, breaking it into small chunks and ingesting them one at a time.

Thorpe (1956) defines tool-use in animals as the manipulation of objects that serve as extensions of an organism's body. Perhaps the best known example of tool-use in birds is by the short-billed Galapagos Woodpecker-Finch (*Camarhynchus pallidus*) that prods insects from holes with a long cactus spine (Lack 1947). Few North American birds have been reported as tool-users, one exception being Brown-headed Nuthatches (*Sitta pusilla*) in Louisiana that use pine bark scales to pry other bark scales from trees, exposing prey items (Morse 1968).

Birds such as Blue Jays (*Cyanocitta cristata*) often wedge acorns or seeds into tree bark crevices to hold them in a position suitable for breaking the shell (personal observations). In a sense, the crevice becomes a "tool" for the jay in the same way that a vise is a tool for a woodworker, i.e., the vise (or crevice) is a "third hand." The Brown Thrasher I watched actually made a tool by excavating a depression of appropriate size to hold a food item.

A thrasher's heavy, decurved bill is well adapted for sweeping through leaves for terrestrial invertebrates, lizards, small snakes, and seeds, or for digging up earthworms. Beal et al. (1916) examined the gastrointestinal tracts of 266 Brown Thrashers and found about a 2:1 ratio of animal to plant material; of the vegetable matter, 24 per cent was acorns. Skinner (1928) reported that "Brown Thrashers sometimes pick up acorns and carry them away in their bills, and later open them as the Jays do. But they are ground birds, unlike the Jays, and when they try to split the shell from an acorn by pile-driver blows, they often drive the acorn down into soft ground. In spite of this difficulty, they persevere and the shell eventually flies off."

My observation at York shows the Brown Thrasher can crack nutshells with greater efficiency by crafting a holding device prior to the first blow by its bill.

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