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Observations of Three-toed Woodpeckers (*Picoides tridactylus*) in the breeding season

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Three-toed Woodpeckers (*Picoides tridactylus*) are year-round residents of the spruce-fir forest, with populations increasing in response to spruce bark beetle outbreaks (Yunick 1985). Endemic populations of Three-toed Woodpeckers have low densities (Murphy and Lehnhausen 1998), and populations throughout Europe and North America are thought to be declining due to human-induced habitat change (Mikusinski and Angelstam 1997, Leoneard 2001).

Throughout the Inter-Mountain West, the U.S. Forest Service classifies Three-toed Woodpeckers as a sensitive species (Spahr et al. 1991). The Three-toed Woodpecker is morphological and behaviorally similar to other *Picoides* woodpeckers. It is easily distinguished by the yellow crown in males and juveniles, heavy dorsal barring, and by a barred back in the northern subspecies (Cramp 1985). The subspecies *dorsalis*, which is present in the Southern Rocky Mountains, has a nearly white back, devoid of the barring found in northern subspecies where there is range overlap with the Black-backed Woodpecker, and the pattern of barring differentiates the two species. Three-toed Woodpecker fledglings are slightly smaller than adults. The ones we observed appeared to be about 1 inch shorter and have a rounder shape than adults, possibly as a result of plumage or because of continuous feeding by adults. Fledglings have shorter beaks than adults, with what looks like a pouch or skin fold connecting it with the neck. Kilham (1983) illustrates similar characteristics in young Hairy Woodpeckers that also have a proportionately shorter beak and an apparent double chin. The yellow feathers on the head of juvenile Three-toed Woodpeckers are farther forward than on adults, extending down on the front of the forehead and between the eyes, rather than on the crown. The breast of juveniles is also more darkly mottled than adults.

Three-toed Woodpecker pairs excavate a new cavity each year, typically returning to the same territory they occupied the previous year (Cramp 1985). Both male and female take turns excavating the cavity, with multiple excavation attempts common in the nest tree itself (Cramp 1985). Excavation begins in early spring, but there can be a large variation in timing of breeding activities (Steeger and Machmer1996), depending on elevation and snow melt.

We observed breeding activities of Three-toed Woodpeckers during the summers of 2000 and 2001 in the Fishlake National Forest in south-central Utah. We found a total of 20 nests, 9 in 2000 and 11 in 2001. In 2000, excavation of nest cavities appeared to be completed between 6 June and 12

June. In 2001, as a possible result of a drier winter and earlier snowmelt, it appeared that all cavities were complete before we began our fieldwork on 4 June 2001. Approximate fledging dates in 2001 were from 18-23 July.

One nest that we observed being excavated by Three-toed Woodpeckers in a live aspen tree was blown down in a windstorm on 7 June 2000. Inside the blowndown cavity were 4 eggs, 1 of which was cracked from the impact of the fall. Within 1 week the eggs had been depredated from the fallen nest. This pair apparently renested immediately in another aspen 20.0 m away, but we were unable to determine if they fledged a successful brood. The first cavity was 6.4 m off the ground facing 210 degrees or southeast. Diameter at breast height of the tree was 20.3 cm, and total tree height was 19.2 m.

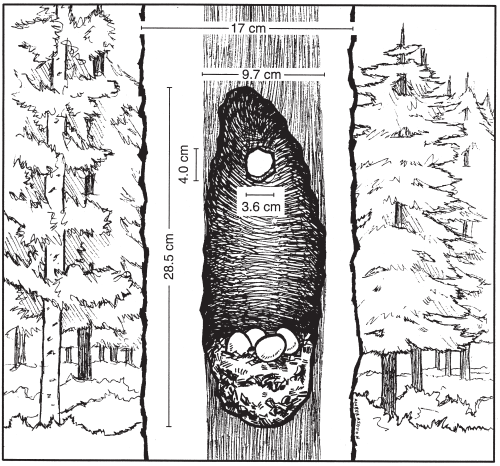
One year later, we returned and removed the section of tree that contained the fallen nest cavity in anticipation of the area being logged. The inside of the nest cavity was 28.5 cm long and 9.7 cm wide (Figure 1). The diameter of the tree where the cavity was excavated was 17.0 cm. The entry hole was slightly elliptical, and it measured 4.0 cm tall and 3.6 cm wide (Figure 1). This tree was infected with fungal heart rot, which causes the heartwood of the tree to become soft and decay, making it easier to excavate. In this cavity, the pattern of woodpecker excavation closely followed the pattern of heart rot.

Throughout our study area, we found 3 factors that appeared to influence Three-toed Woodpecker nestsite selection. (1) Aspen or softwood trees, especially those with fungal heart rot, were used frequently (McClelland and McClelland 2000). (2) Trees with broken tops also were used often (McClelland McClelland 2000). And (3) Three-toed Woodpeckers typically selected nest trees facing habitat edges or openings (Cramp 1985, Kilham 1983), despite their general preference for feeding in closed-canopy forest.

Only one detailed account of Three-toed Woodpecker copulation has been documented by Cramp (1985). We observed Three-toed Woodpecker copulation on three different occasions. Each copulation we observed was within 60 m of a known nest tree, but not on the nest tree itself. Kilham (1983) also observed that copulation of Hairy Woodpeckers usually occurred away from the nest cavity. The following sequence of behaviors occurred on 8 June 2001. Prior to copulation, both male and female were drumming intermittently on separate trees near their nest. The female then flew to the cavity, and vocalized while perched there. The male flew from the drum tree to a nearby Engelmann spruce, where the female immediately followed and landed on a branch slightly above him, 6 m off the ground. The female continued to vocalize as the male flew up and landed on top of her, perching on her back with wings outstretched (Figure 2). The male leaned slightly to the left, and he wrapped his tail around the side of the female and underneath her tail, holding it there for 4-5 seconds, while both birds made squeaking and whimpering noises. Cramp (1985) describes this call given by both male and female during copulation as "tjekk-tjekk-tjekk." Kilham (1983) describes a similar sequence of events preceding copulation by Hairy Woodpeckers, where either male or female drum, followed by the female calling "tewk" throughout copulation. Copulation is most frequent during nest

building, but it may occur intermittently throughout the nestling period (Kilham 1983).

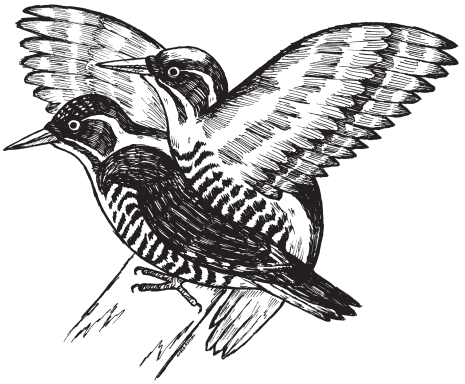
After eggs hatched, we observed numerous instances of adults feeding young at the nest. When juveniles are small, adults will enter inside of the cavity to feed them. They sometimes exit as quickly as 3 seconds later, but typically stay inside for longer durations, or until their mate returns to switch places. On 19 June 2001, we observed a pair of Three-toed Woodpeckers switch places inside of a cavity 3 times in 40 minutes. On 28 June 2001, we observed a pair switch places 14 times in 4 hours and 14 minutes. The male on average spent longer inside the cavity (19.4±11.9 minutes) than did the female (14.7±11.0 minutes), but this difference was not statistically significant using a 2-sample test (p=0.46). Once the juveniles become large enough, there is not room for the adult birds to feed them inside of the cavity, so the adults will perch outside of the cavity and feed the young from outside.



1. Sketch and dimensions of the interior of the nest cavity (center) that was excavated and used by a pair of Three-toed Woodpeckers. The tree was blown down after the four eggs were laid, and the woodpeckers immediately renested in a nearby tree. The sketches on the left and right sides illustrate the setting of the tree before it fell.

After juveniles have fledged, they forage with their parents for at least 4-8 weeks (Cramp 1985) and possibly longer. They remain within constant voice contact of other siblings or adults (Cramp 1985), with family groups of 2-3 birds easily observed post-fledging due to frequent vocalizations. On 19 July 2001 at 07:35, we found a juvenile Three-toed Woodpecker sitting on a branch about 15 cm from the trunk of an Engelmann spruce tree. An adult male was feeding on the trunk of the same tree within 0.5 m of the juvenile until 07:55. During this time, the male fed the juvenile by going to the branch where it was sitting, cocking its head sideways, and placing a bug in its bill. When feeding the juvenile, the male made chirping sounds, while the juvenile made purring sounds similar to a cricket. In the 20 minutes, the male fed the juvenile 12 times and then flew to another tree when startled by movement from the observer, while the juvenile remained motionless. After 3 minutes the male returned. The juvenile remained still for a few seconds and then began a weak feigned pecking on the branch where it was

perched. At 08:00, the juvenile hopped to the trunk of the tree and followed the male as he foraged, staying less than 1.0 m beneath him. Because the juvenile was usually beneath the male, it occasionally moved to avoid flying bark chips scaled off by the foraging male. While following the male, the juvenile intermittently began to peck harder, but not as hard as the adult. At 08:18, the juvenile flew to a spruce 10 m away and began pecking timidly. At 08:19, the male found a bug and began peeping. The juvenile called back with fainter peeps and the male flew to feed it, and he then returned to the original tree. At 08:21, the juvenile flew to another tree 20 m away and began to peck again. After the male had a secured another bug, it peeped and then flew to feed the juvenile before the observer lost sight of both birds.



2. Sketch showing copulation activity of Three-toed Woodpeckers. See the text for a full description of courtship and copulation behaviors.

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