

Mate-reassessment in an Already-mated Female Northern Mockingbird

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Northern Mockingbirds (*Mimus polyglottos*) are considered to be monogamous. Long-term pair bonds lasting for 2-4 years are common, and pairs may remain together for as long as 8 years (Derrickson and Breitwisch 1992). However, as in many bird species, deviations from monogamy occur. Both males and females will take advantage of opportunities to attract additional mates (e.g. Derrickson 1989, Breitwisch, Ritter, and Zaias 1986, Fulk, Logan, and Hyatt 1987), divorce and mate switching have been observed (Logan 1991), and extra-pair fertilizations are known to occur (DeLoach, personal communication). While such variations from the maintenance of strictly monogamous pair bonds are not unusual, the conditions under which they occur are not known. For example, divorce (e.g. Choudhury 1995) may follow nest failure or other decreases in the reproductive output of established pairs. I report here observations made on mate re-assessment in an already-mated female mockingbird. They indicate that in the absence of unusual circumstances such as nest failure, some socially monogamous female mockingbirds may re-assess their mating decisions at the beginning of a breeding season even after sharing a long term pair-bond for several years.

In late February through March 1996 in Guilford County, North Carolina, I observed active mate re-assessment in a female mockingbird. The female had been paired with her primary mate for two prior breeding seasons. As is common for mockingbirds in North Carolina, the pair also remained together in their shared territory outside the breeding season, in the fall and winter. In late winter 1996, I saw the female repeatedly flying back and forth between the territories of two neighboring males. One was her long term mate of two years, and the other was a neighboring unmated male, who to my knowledge had never reared young, and who had moved into the adjacent territory the previous autumn. All individuals were color-banded for identification, so the identities of the birds were clear.

During 30 minutes of observation on February 28, the female flew back and forth between the two males' territories at least six times. Mockingbird song is thought to be involved in mate attraction (Merritt 1985) and in

stimulating breeding activities (Logan, Hyatt, and Gregorcyk 1990), and during this period both males sang loudly. Though the female spent time in both males' territories, she appeared to react differently to the two males. Her interactions with her primary mate were very aggressive: as she re-entered his territory, he repeatedly flew up to her and chased her. They frequently exchanged loud aggressive "hew" calls during the chases. Aggressive calling between paired birds is common in mockingbirds (Logan 1994), but the aggression expressed in these interactions was unusually intense. Because of the chases, the female was unable to perch undisturbed while she was in her primary mate's territory. In contrast, while she was perched in the new male's territory, many fewer aggressive calls occurred, and I never observed the male chase the female. Instead, the female perched quietly nearby, while he sang from a distance of 12-15 meters. Her primary mate appeared to be aggressively trying to force her to stay in his territory by chasing her away from the competitor's boundary. The new male, on the other hand, sang softly when she was nearby.

The primary male also pointedly flew into at least 5 prospective nest sites, displaying his white wing patches and singing as he did so, often while the female was perched near the boundary in the new male's territory. This behavior could have drawn the female's attention to the presence of valuable nesting resources in their territory. The second male also flew into prospective nest sites and sang from them as the female perched nearby.

For several weeks, the female continued to move back and forth between the two males' areas. Initially she used more space and spent more time in the area defended by her primary male — her familiar territory. For example, she flew back and forth five times during one 30-min observation period on the morning of 1 March. Though during that period she spent approximately equal amounts of time in each male's territory, that evening during the 30 minutes just prior to dusk she perched quietly with her primary male near the boundary of their territory most distant from the shared boundary with the competing male. She did not fly near the secondary male's boundary as night fell.

Interestingly, her interactions with her primary mate became less aggressive in successive days. Though aggressive calling continued to be common, I witnessed no additional aggressive chases after the first day. In addition, her use of the new male's territory gradually increased. When first seen in his territory, she remained near the boundary of her primary mate's territory, using only approximately one-fifth of the total area defended by the new male. After three weeks, she had been seen in all areas of his approximately 1.0 ha territory. This suggests that she was gradually evaluating the quality of the male's territory.

Both males continued to sing, and both continued to show the female nesting resources. Initially, the new male's nest displays were more intense. For example, in early March, after she followed the new male into a prospective nest site, he flew to the ground to gather twigs. As she watched from a perch approximately 8 m above him, he carried twigs back into the nest site they had just visited. Rather than using the twigs for building however, he dropped them and flew to perch near her. Carrying twigs appeared to be a display to retain her rather than an aborted attempt to build. However, by mid-March, both males had begun actual nest construction, and each had built a partially complete nest.

The female continued to move back and forth between the two territories as the males built, but neither nest had yet been lined. Nest-lining is an activity usually performed by females, and the absence of nest-lining behavior suggests that the female was assessing the males as they built, but not yet participating in the nesting process with either male. By late March she was sighted at the new male's nest, which by this time was fully lined, indicating that she had participated in nest construction with the new male. Her re-assessment continued until 31 March when she began to lay eggs in the nest constructed by her primary mate. She had spent approximately four weeks comparing the males and their territories, and despite her nesting activity in the other male's territory, she opted to remain with her long term mate.

I compared the female's nesting success with her primary mate during the 1995 breeding season to that of 12 other pairs in the same population. Numbers of nests in which eggs were laid ranged from 3-5 for the group. This female and her mate attempted five nests and successfully fledged young from two of the five. Their 40% success rate is comparable to an average of 51.1% for 12 other pairs in the population. The pair's success rate during the prior breeding season did not deviate greatly from the average for other pairs nesting in the same habitat. Indeed, several pairs that nested together in spring 1996 had a lower percentage of successful nests in 1995. This suggests that nest failure, a drop in reproductive success, or mate disappearance need play no role in the occurrence of mate re-assessment by female mockingbirds. Rather, this female's re-assessment seemed to be stimulated by the combination of a newly arrived male adjacent to her territory and the onset of a new breeding season.

I saw a similar pattern of comparison in a second female in late May 1996. Two days after nest loss in her mate's territory, she was seen both in his territory and a neighboring male's territory. Again, both males sang and began nest building, and after a few days of assessing the second male, the female opted to remain with her mate.

Clear instances of female choice in unmated female birds have now been documented in several species (e.g. Møller 1988). The observations described here indicate the importance of distinguishing between initial mate choice in female birds and mate-reassessment that occurs when females re-evaluate the quality of their mates after initial mate choice. The latter, as illustrated here, may continue in mockingbirds for at least two years following initial mate choice. It is impossible to determine from these observations how common reassessments may be. It is possible that they occur repeatedly in the same female, but go completely undetected, particularly if the female assesses other males using long distance signals (e.g. song) and/or chooses to remain with her first mate. Research on other birds indicates that monogamously paired females regularly assess the quality of their current mates (e.g. Soler *et al.* 1996, in monogamous female black wheatears). The observations reported here indicate that even when birds share a long term pair-bond, female mockingbirds may make comparisons between established mates and new competitors, in effect re-assessing their mate choice. Moreover, when the female opts to remain in the established pair, such comparisons need not result in divorce and the formation of new bonds.

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Southern Flying Squirrel Displaces a Red-cockaded Woodpecker from its Cavity

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The Red-cockaded Woodpecker (*Picoides borealis*), an endangered species, depends upon the cavities it excavates in living pines for nesting and roosting (Ligon 1970). Cavities, however, are often a limited resource (Ligon 1970). Factors limiting cavities include availability of suitable cavity trees, rate of cavity excavation, cavity enlargement, cavity tree loss, and use of cavities by other species (Conner *et al.* 1991, 1994; Hooper 1988, Loeb 1993).