

FEATURE ARTICLES

**INDIVIDUAL AND TEMPORAL VARIATION IN INLAND FLIGHT
BEHAVIOR OF MARBLED MURRELETS: IMPLICATIONS FOR
POPULATION MONITORING**

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Abstract. We studied the inland flight behavior of 46 radio-marked Marbled Murrelets (*Brachyramphus marmoratus*) in 2000 and 2001 in central California to determine how the frequency of inland flights varied among individuals and over time. All breeding murrelets regularly flew inland (mean 82% of daily surveys), but we observed considerable variation in the inland flight behavior of non-nesters. Non-nesters that were physiologically in breeding condition (potential breeders) regularly flew inland (90% of individuals; mean 41% of daily surveys), but non-nesters that were not in breeding condition (nonbreeders) rarely flew inland (20% of individuals; mean 1% of daily surveys). The mean percentage of surveys on which individual murrelets flew inland increased from 20% in 2000 to 61% in 2001, which was partly due to an increase in the percentage of breeders from 11% in 2000 to 50% in 2001. The frequency of inland flights was greatest during the incubation and chick-provisioning stages (100% in both stages), and lowest during the pre- and postbreeding stages (70% and 78%, respectively). Although the mean percentage of flights increased dramatically between years, the regional population estimate from at-sea surveys increased only 28% from 496 to 637 individuals during the same period, indicating that monitoring techniques such as radar that count inland flights are more likely to reflect annual variation in breeding effort than changes in regional population size. Moreover, the inland flight behavior of potential breeders indicates that radar surveys will overestimate breeding population size, even though the lack of inland flights by nonbreeders indicates that radar surveys will underestimate regional population size.

Key words: Brachyramphus marmoratus, breeding, inland flights, Marbled Murrelet, population monitoring, radar, radio-telemetry.