



**Figure 4.** Frequency of nocturnal movements by female ( $n=6$ ) and male ( $n=6$ ) Yellow-breasted Chats. Both sexes move significantly more often during the receptive phase of nesting.

and distance of the transmitter from the tower, and thus assess the activity levels of male and female chats at night. A bird was considered active if the signal strength and bearing changed a significant amount, which we determined by using live birds as our control. Therefore, birds were not just active from a single spot (rotating in one spot) - they were actively moving among locations.

Six male and six female chats moved on 142 of the 276 nights (51%) we collected data. All 12 chats moved at night, with 9 of the 12 birds (75%) remaining in the study area throughout the season. This suggests that nocturnal movements are not simply a type of pre-migratory behavior. Birds moved significantly less on moonlit nights than on dark nights, suggesting that foraging is not the main purpose of this behavior, and that birds may be moving less when it is brighter. Nocturnal movement rates did not differ between males and females.

To explore the role of reproductive state on nocturnal movements, we grouped birds into two categories, receptive or non-receptive, based on whether females were fertile and whether a male's mate was fertile. We considered females receptive from their arrival in the nesting area, through nest construction and egg-laying, and again after nest failure. Females were classified as non-receptive when they were incubating eggs, tending nestlings, or caring for recently fledged young. Both sexes moved significantly more often during the receptive period than the non-receptive period (Fig 4). Although not statistically different, males moved more (1.1 movements/night) than females (0.7 movement/night) during the non-receptive time.

Our results suggest that female chats are active at night to evaluate the quality of males. Movements of male chats during the nonreceptive period may be related to switching song perches during the night hours, attempting to attract an extra-pair female, or a mate guarding behavior. Similar nocturnal movements have been observed in nightingales (Roth et al. 2009) and in Reed Warblers (Muhkin et al. 2009), and there is good evidence that these movements are largely related to mate assessment. Our results suggest nocturnal movements are not for foraging, and are not simply a pre-migratory behavior.

### Conclusions

Chats nesting at Kennekuk had low success relative to nesting Northern Cardinals, Brown Thrashers, and Field Sparrows. Because these four species nest in similar locations, we expected similar nest survival among species. Nest defense behavior may play an important role in nest survival. For example, Brown Thrashers are large, vocal birds and may be able to successfully deter predators, while chats, which had low nest survival, lack a distraction display and tend to slip quietly away from a nest when an intruder approaches (Ficken & Ficken 1962; Alessi, unpubl. data). It's possible that adult chats lower their own risk of being killed during a nest predation event by flushing quietly, as a trade-off to aggressively defending their nests. Nocturnal activities of chats appeared to be related to mating, with females and their mates moving more frequently when the female is fertile.