

OBSERVATIONS ON THE BEHAVIOR OF SURPLUS ADULTS IN A RED-SHOULDERED HAWK POPULATION

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ABSTRACT.—We describe the behavior of two adult male Red-shouldered Hawk (*Buteo lineatus*) “floaters” in response to the temporary removal of two resident males from their breeding territories in coastal southern California. We also provide observations of a radio-tagged floater moving through eight adjacent Red-shouldered Hawk home ranges.

Observaciones de conducta de adultos sobrantes en una población de aguilillas de la especie *Buteo lineatus*

EXTRACTO.—Describimos la conducta de dos aguilillas de la especie *Buteo lineatus*, machos adultos y sin territorio de reproducción, que responden a la ausencia temporal de dos aguilillas machos residentes, los que han sido alejados de sus territorios de reproducción en la costa sur de California. También proveemos observaciones sobre una aguililla sin pareja y sin nido, que fue radiocontrolada, mientras se desplazaba a través del área de reproducción adyacente de ocho pares de rapaces de esta especie.

[Traducción de Eudoxio Paredes-Ruiz]

“Floaters” are non-breeding individuals that are capable of establishing a territory and breeding if resources become available (Brown 1969). With the exception of the study by Bowman and Bird (1986) and anecdotal data by Newton (1979), there is little published information on the behavior of floaters in raptor populations.

The replacement of individuals or entire pairs that were shot during the breeding season has provided most of the anecdotal evidence for the existence of surplus nonbreeders (Ratcliffe 1980). Time to replacement has varied from within the same day to 10 wk (Newton 1979). Bent (1937) noted that a Red-shouldered Hawk (*Buteo lineatus*) of unknown sex was “promptly” replaced after being shot. We describe the attempted replacement of two breeding adult male Red-shouldered Hawks temporarily removed from their territories, and the behavior of an apparent adult male floater equipped with a radio-transmitter.

STUDY AREA AND METHODS

Our study area was located on Camp Pendleton Marine Corps Base, San Diego County, and adjacent Rancho Mission Viejo, Orange County, California. Dominant vegetation is oak woodland, riparian woodland, coastal sage scrub, and grassland (Bloom 1989).

Observations were made at Camp Pendleton of two floaters that attempted to replace two resident adult male hawks, both captured on 17 February 1979 before the egg laying stage (McCrary 1981). Both resident hawks were captured in their own adjacent territories and held 2 and 3 hr, respectively, while we attached back-mounted transmitters. Observations of a floating adult male (Fig. 1) captured on 1 July 1987, during the post-fledging/dispersal period, and affixed with a radiotransmitter were made on adjacent Rancho Mission Viejo (Bloom 1989).

RESULTS

We observed a surplus Red-shouldered Hawk adult in each of the captured males’ territories at Camp Pendleton. Both intruders were probably males since they were smaller than the females. Reactions of the resident males upon release back into their territory varied. One male attacked and struck the intruder immediately, dislodging it from its perch

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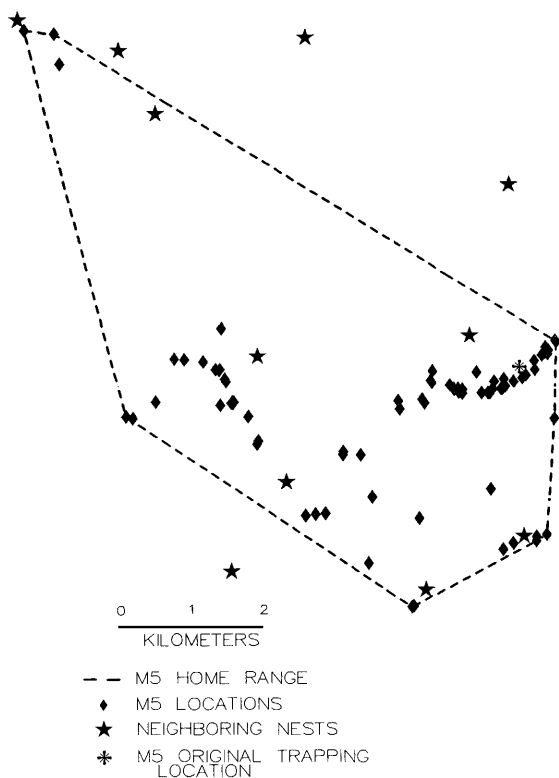


Figure 1. Home range and locations of adult male Red-shouldered Hawk M5 on Rancho Mission Viejo in relation to other Red-shouldered Hawk nesting territories.

on a utility pole. This attack was followed by the rapid departure, in opposite directions, of both hawks from the vicinity of the nest. The resident male was later seen about 100 m south of his nest, but the intruder was not found. Prior to the resident male's release, the resident female and intruder vocalized almost continuously. Within 5 min of the release of the resident male all calling ceased.

In the second territory both the resident female and the intruder also vocalized almost continuously. Immediately after release, the resident male perched in a tree near his nest and began calling. The female and the intruder soared over the nest and, after 1–2 min, the resident male also began soaring. At one point the resident male perched briefly in a tree where he was attacked several times by the intruder. A few minutes later the resident female and intruder perched next to each other on the same branch of a tree near the nest. When the intruder assumed a near horizontal posture similar to that of females

during copulation, the female immediately knocked it from the perch. The intruder immediately returned to the branch and assumed the same position next to the female, who knocked it off the branch again. Both birds circled over the nest site for approximately 2–3 min, then the female joined the resident male on the nest where they copulated for 8 sec. After perching nearby, the intruder circled over the resident pair for 3–4 min and soared off 2 km north before disappearing.

No surplus male hawks were observed at 5 other territories where we captured and temporarily held 5 resident adult males, nor did any surplus females attempt to displace 10 resident adult females at 10 territories where they were captured and held 1.5–3 hr for transmitter placement (McCrary 1981, Bloom 1989).

The hawk (M5) captured on Rancho Mission Viejo and equipped with a radiotransmitter conformed to the definition of a floater (Brown 1969, Newton 1979). In contrast to seven other adult male Red-shouldered Hawks that were radiotagged and tracked several months/bird, and that maintained distinct territories averaging slightly more than 1 km², this bird ranged over an area of 35.7 km² in just 2 mo (Bloom 1989). Except for very slight overlap between some adjacent pairs, none of the paired, breeding birds wandered into more distant home ranges (McCrary 1981). The floater's home range between 1 July and 31 August 1987, however, included portions of the home ranges of eight breeding pairs that it visited from 1–3 times (Fig. 1). Of the 20 d it was monitored during the 2 mo period, 169 daylight hours of 14 d were spent in the area in which it was trapped, and 71 daylight hours of 11 d were spent in the territories of other pairs. During the 2 mo period, it was observed vocalizing only once (100 m from where trapped), and was quiet when in the home ranges of other pairs. On four nights it roosted in two of these home ranges.

DISCUSSION

Although limited to a few birds, our observations show the existence of floaters in a southern California Red-shouldered Hawk population. The Red-shouldered Hawk is a highly territorial species (Bent 1937, Henny et al. 1973), and the existence of floaters within a population is thought to be an important factor in explaining the function of territoriality (Brown 1969).

In most instances described in the literature only

female raptors were removed and replaced (Newton 1979); little documentation is available for males (Village 1983). In a mate replacement experiment conducted on a wild population of American Kestrels (*Falco sparverius*) during the incubation period, 8 of 16 males were replaced within 18–144 hr (Bowman and Bird 1987). The rapidity of male replacement may be related to the availability of floaters in the population, the proximity of floaters to a vacated territory, stage of the breeding cycle, seasonality, or sexual differences in female behavior or vocalizations.

Bowman and Bird (1986) found that only some of the mates lost in their study were replaced. Surplus birds may cue in on factors influencing their future reproductive potential before “deciding” to replace (Smith 1978, Saether and Fonestad 1981), or replacement may merely depend on the proximity of suitable recruits when a mate is lost (Dare 1961). Bowman and Bird (1986) concluded that nonbreeders did not actively monitor territories for replacement potential but were non-randomly distributed in areas of suitable habitat.

The behavior of the radio-tagged floater suggests that vacant territories are detected by periodically searching territories and waiting for an opening. The speed at which the other two floaters became aware of vacancies and moved in suggests they were alerted to a possible opening by some aspect of the female’s behavior. Floaters may increase their chance of detecting such a signal by active searching. Future research should focus on obtaining the critical observation of a patrolling surplus nonbreeder actually replacing a lost member of the breeding population.

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