Factors influencing movement probabilities of a nomadic food specialist: proximate foraging benefits or ultimate gains from exploration?

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We examined the factors that influenced movement probabilities of snail kites (Rostrhamus sociabilis) in Florida, USA, based on birds with radio transmitters (n = 282) during a three-year period from April 1992 through April 1995. We focused on the hypotheses that increased movement probabilities were in response to low food availability or low water levels; the latter also implying low food availability for this species. An alternative hypothesis was that snail kites exhibit exploratory behavior, and corresponding increased movement probabilities, during periods of high food availability.

Movement probabilities were not consistent with the hypotheses that low water levels or low food availability were the proximate cues to initiate movement from one wetland to another. Movement probabilities were higher during periods of relatively high food availability and were not associated with water levels; thus were consistent with the hypothesis that snail kites exhibited exploratory behavior during times of food abundance. However, we do not believe that our results are in conflict with previous reports of increased movement during extreme food scarcity; rather, that these hypotheses are not mutually exclusive and reflect different resource levels. During extreme drying events, food becomes virtually unavailable and birds must either move or die, but during times of food abundance there may be an advantage of exploratory behavior. Given that local drying events occur at frequencies of approximately every 5–10 yr in this environment, having explored wetlands throughout their range reduces the need for "blind" searching for suitable alternative habitats when such events do occur.

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The fitness of an organism is ultimately determined by its ability to survive and reproduce, and whether or not an animal moves from one location to another can significantly influence both (e.g., Parker and Stuart 1976). Thus, it is not surprising that considerable attention has recently been focused on the consequences of dispersal both from genetic and demographic perspec-

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However, as environments become less stable and predictable, the advantages of leaving may outweigh the advantages of staying (Wiens 1976).

One of the most commonly held beliefs for why animals leave a given site is low availability of food or other resources (e.g., Krebs et al. 1974, Greenwood and Swingland 1984, Pyke 1984, Nilsson 1989, Delestrade et al. 1996, Negro et al. 1997). Animals may move if food resources have been locally depleted, or if there is potential for better resources elsewhere (Pyke 1984, Korpimäki 1993). Nomadic species, in particular, are reported to disperse widely in response to sporadic food conditions (Andersson 1980, Sonerud et al. 1988, Fredrick et al. 1996), especially if they depend on few species of prey (Galushin 1974).

A nearly opposing view, with respect to the influence of resources on movement, is that some animals exhibit exploratory movements during times of high resource abundance (Bell 1991). The logic is that animals may use exploration to learn the location of food or other resources during periods when they are not food deprived. At such times, costs of movement are minimal. Later, if food is scarce, the information learned might facilitate locating available resources.

In Florida, snail kites (Rostrhamus sociabilis) are diet specialists (Howell 1932, Cottam and Knappen 1939) that live in a highly unpredictable environment (Beissinger 1986). As might be predicted by this uncertainty, snail kites exhibit nomadic tendencies (Sykes 1983, Bennetts 1993, Bennetts and Kitchens 1997a, b). The primary hypothesis for why snail kites move from one location to another has been low availability of food resources (Beissinger 1988, Bennetts et al. 1994). It has also been hypothesized that snail kites move as a result of low water levels, although this likewise implies low food availability (e.g., Beissinger 1988, Takekawa and Beissinger 1989, Sykes et al. 1995). The almost exclusive prey of snail kites in Florida is the aquatic apple snail (Pomacea paludosa), and during extreme low-water events, snails become temporarily unavailable; thus, kites may disperse widely (Beissinger and Takekawa 1983, Takekawa and Beissinger 1989). However, such extreme events occur at periodic intervals of approximately 5–10 yr in Florida (Thomas 1974, Duerer et al. 1994), and seldom encompass the entire range of snail kites (Bennetts and Kitchens 1997a, b). Thus, substantial, and probably most, movement occurs during less extreme conditions. Here, we examine the movements of snail kites within a probabilistic framework and evaluate the factors that influence movement probabilities during non-drought. We particularly test whether movement under more typical conditions is associated with water levels and/or food availability. We then evaluate whether any such associations are consistent with food searching in response to low food availability, or exploratory behavior during high food availability.

Material and methods

Study area

Within the United States, snail kites occur only in Florida (Sykes 1984, Sykes et al. 1995) and all evidence suggests that they constitute a single population that shifts in distribution throughout the state, rather than separate subpopulations within the state (Bennetts 1993, Bennetts and Kitchens 1997a, b). Consequently, the spatial extent of this study covered the entire range of snail kites in the United States, which is comprised of a network of wetlands throughout central and south Florida (Bennetts and Kitchens 1997b).

Field methods

Movements of snail kites were monitored over a 3-yr period between April 1992 and April 1995 in central and south Florida using radio telemetry. Our goal was to annually capture and radio tag 100 snail kites of which 60% were adults and 40% juveniles. The higher percentage of adults was based on the higher sensitivity of demographic models to adult survival (Nichols et al. 1980, Beissinger 1995), of which estimation was another aspect of this study (Bennetts et al. 1999a). To maintain independence of our sample, only one juvenile per nest was equipped with a radio transmitter. We targeted a 50:50 sex ratio of adults to keep our sample balanced. The proportion of our sample from each wetland was based on an annual survey and was intended to approximate the statewide distribution (Bennetts and Kitchens 1997a, Bennetts et al. 1999b). Adult kites were captured using a net gun (Mehl and Shaifler 1979), which uses 22 caliber blank cartridges to propel a 10-foot triangular nylon net. Juveniles were captured at the nest by hand just prior to fledging, at approximately 30–35 days old. Fifteen-gram radio transmitters were attached to birds with backpack harnesses. Given that body mass ranged from 360 to 440 g (\(\bar{x} = 394\)) for males and 350 to 570 g (\(\bar{x} = 446\)) for females (Sykes et al. 1995), the transmitters averaged 3.8% and 3.4% of the body mass for males and females, respectively. Transmitters had a battery-life of approximately 9–18 months. We attempted to locate all radio-tagged kites at 14-d intervals. Radio tracking was accomplished from the air by fixed-wing aircraft and from the ground by airboat. For some species, radio transmitters may influence the movement or behavior of study animals (e.g., Hooge 1991, Paton et al. 1991). However, for this species, Bennetts and Kitchens (1997a) specifically tested the effects of survival probabilities using capture-recapture methodologies on a sample of 913 birds with and without radio transmitters. They also specifically tested the effects of capture and handling on movement probabilities during a given month by comparing the proba-
bilities of radio tagged birds that had been captured during a given month, with birds that had been captured the previous year, but whose radios were still functioning. They found no evidence of such an effect on either survival or movement probabilities.

Natal departure

Natal dispersal is defined as the movement of an individual from its birth site to the place that it reproduces or would have reproduced had it survived and found a mate (Greenwood 1980, Greenwood and Harvey 1982, Johnson and Gaines 1990). However, snail kites are quite nomadic and juveniles may disperse from their natal wetland and reproduce in numerous different wetlands during their lifetime including their natal site (Bennetts and Kitchens 1997a). Thus, for the paper, we defined natal departure as the initial departure of a juvenile from its natal wetland regardless of its resulting breeding status. We estimated the probability of natal departure as a cumulative function using the Kaplan-Meier product-limit estimator (Kaplan and Meier 1958, Bennetts et al. 2001). A juvenile was considered to have departed when it was located alive outside its natal wetland and remained outside of its natal wetland for at least 30 d. We considered wetlands to be distinct if they were separated by a physical barrier (e.g., ridge or levee) and/or were under a different hydrologic regime either through natural or managed control. The time of departure was estimated as the midpoint between its previous location, in its natal wetland, and the first location outside of its natal wetland. Movements subsequent to this initial departure were not included in this analysis, but were included in our estimation of general movement probabilities. Birds were censored (Lee 1980, White and Garrott 1990) if either we were unable to locate their radio signal or if they were known to have died prior to dispersal from their natal area. Log-rank tests (Prentice 1978, Ying 1990) were used for comparisons among departure functions.

Movement probabilities

Breeding dispersal is the movement of individuals between successive breeding attempts (Greenwood 1980, Greenwood and Harvey 1982, Johnson and Gaines 1990). Snail kites exhibit breeding dispersal, as defined by these authors, but it constitutes only a small subset of the post-natal movements of this species (Bennetts and Kitchens 1997a, b). Because we were interested in factors that influence whether birds stay or leave a given site, we considered movement probabilities in a more general context based on the movement of an individual from one distinct wetland to another, regardless of the resulting breeding status.

We considered possible effects on movement probabilities within a generalized linear modeling (GLM) framework, where the number of animals that moved over a one-month time interval was considered as a binomial random variable (Nichols 1996, Bennetts et al. 2001). Using a logistic link function, the GLM constituted a logistic regression, conditioned upon animals being alive and their location known at times \( t \) and \( t + 1 \) (Nichols 1996, Bennetts et al. 2001). A one-month time interval was based on our sampling frequencies. The average time between consecutive radio locations was 13.5 (± 7.9 SD) d with the upper limit of a 95% confidence interval of 29 d (Bennetts and Kitchens 1997a). Thus, we were reasonably certain to have located all birds within our study area at monthly intervals.

Model selection was based on Akaike's Information Criterion (AIC) (Akaike 1973), although in some cases we used likelihood ratio tests (LRT) to evaluate specific effects of interest (Burnham and Anderson 1998). For example, water levels have been previously hypothesized to have a major influence on movements; therefore, we considered this an a priori hypothesis for which a LRT was appropriate.

Effects on movement probabilities

We considered the effects of age, time (year and season), location in relation to a drought preceding the study (region), and water levels directly within our GLM. We considered kites as adults after their first year post fledging. Juvenile snail kites are capable of breeding at 9 months of age (Snyder et al. 1989) and survival of juveniles is similar to that of adults after the first few months post fledging (Bennetts and Kitchens 1999). Annual differences were compared based on a study year from 15 April to 14 April of consecutive years (Bennetts and Kitchens 1997a, Bennetts et al. 1999a). Seasonal differences were evaluated with respect to three 4-month seasons (January–April, May–August, and September–December). This designation corresponds roughly to: (1) the annual dry season and the peak of nest initiation (January–April) (Snyder et al. 1989, Bennetts and Kitchens 1997a), (2) the onset of the rainy season and a post-breeding dispersal period (May–August) (Beissinger et al. 1983, Bennetts and Kitchens 1997a), and the beginning of the dry season and a winter period of only occasional breeding (September–December). This designation was the most parsimonious relative to alternative groupings (i.e., monthly, and possible alternative 2-, 3-, and 4-month seasons) based on model selection using AIC (Bennetts and Kitchens 1997a).

Water depth can be highly variable within sites, and reliable ground elevation data to estimate site-specific depth were lacking; thus, we tested the influence of
water levels on the probability of movement using the variation in mean monthly stage (i.e., elevation of the water surface relative to mean sea level (Bennetts and Kitchens 1997a, Bennetts et al. 1999a). The specific gauges used are reported by Bennetts and Kitchens (1997a). To account for differences in elevation among sites, we used the number of standard deviations above or below the mean monthly stage (Bennetts and Kitchens 1997a, Bennetts et al. 1999a). This measure provides an objective assessment of water levels, which can be applied to all areas, and corresponds well with the subjective designations of drought years reported by Snyder et al. (1989) and Beissinger (1995) in previous studies (Bennetts and Kitchens 1997a).

A major drought had occurred in the southern portion of the snail kite’s range during 1989 and 1990, with low water persisting through 1991. Droughts may have residual effects on food availability that extend beyond their occurrence (Snyder et al. 1989). Consequently, we also compared movement probabilities between the southern region, that had been substantially affected by the preceding drought (i.e., wetlands within the Everglades, Loxahatchee Slough, and Lake Okeechobee regions), and the northern region, that was relatively unaffected by the drought (i.e., the Kissimmee Chain-of-Lakes, and Upper St. Johns River Basin) (Bennetts and Kitchens 1997a).

Food availability

It was logistically infeasible to measure food abundance for all wetlands within the kite’s range each month. Thus, we measured the effect of food availability indirectly during 1993 and 1994 by comparing prey-capture rates within the major wetlands among seasons and years. Snail kites forage primarily by flying low over the marsh to locate snails (Snyder and Snyder 1969). Thus, birds that were actively foraging could easily be distinguished. To minimize confounding variation, all foraging observations were conducted on adult birds between two hours after sunrise and two hours before sunset. In addition, we restricted our observations to days that were not unseasonably cold (i.e., during the passage of cold fronts), that were not raining, and on which winds did not exceed 20 km per hour. To compare differences among years and seasons, we used a GLM, where the number of snails captured was considered as a Poisson random variable and the time observed actively foraging was used as an offset (McCullagh and Nelder 1989, Agresti 1990) to account for observation time. Using a log link function the GLM becomes a loglinear model of the number of captures per minute of foraging time (Bennetts and McClelland 1997). In addition to comparisons of capture rates among seasons and years, we also compared the capture rates of individual radio-tagged birds that we observed foraging both before and after a given movement. Given the generally high rate of movements for this species, we conducted periodic foraging observations on 48 individual adult snail kites with radio transmitters with the expectation that some individuals would move to a different wetland a reasonable time after our observations. To reduce confounding seasonal variation, we restricted this analysis to those observations where the movement was within 30 d of obtaining the first foraging observation. To further reduce confounding, we matched the time of observations before and after moving. Thus, if the foraging observations before moving were conducted between 1100 and 1300 h, then observations after moving were also conducted between 1100 and 1300 h. We then tested the null hypothesis that the difference in mean foraging time per capture before and after moving was zero.

Results

We equipped 282 snail kites with radio transmitters representing 271 individuals; 11 birds were recaptured in a subsequent year and their radios replaced. We attached 82 transmitters in 1992, and 100 each during both 1993 and 1994. Of the 282 radios, 165 (59%) were placed on adults and 117 (41%) on juveniles. Of the adults, 82 (49.7%) were males and 83 (50.3%) were females.

Natal departure probabilities

The overall probability of juvenile snail kites dispersing from their natal wetland during their first year was 0.81. Of the birds that dispersed during their first year (n = 57), most (60%) did so within the first 60 d after fledging and all did so within the first 240 d. Natal departure was lowest during 1992 and relatively higher in both 1993 and 1994 (Fig. 1). Departure functions differed between 1992 and 1993 (\( \chi^2 = 5.25, 1 \text{ df}, P = 0.022 \)) and between 1992 and 1994 (\( \chi^2 = 4.049, 1 \text{ df}, P = 0.044 \)), but not between 1993 and 1994 (\( \chi^2 = 0.129, 1 \text{ df}, P = 0.720 \)). Natal departure from the southern region, which was strongly affected by the preceding drought, was substantially lower than from the northern region during 1992 (\( \chi^2 = 7.53, 1 \text{ df}, P = 0.006 \)), but not during 1993 (\( \chi^2 = 0.635, 1 \text{ df}, P = 0.426 \)) or 1994 (\( \chi^2 < 0.001, 1 \text{ df}, P = 0.994 \)) (Fig. 2).

Movement probabilities

Our final logistic model of movement indicated that probabilities were influenced by age, season, year, region, and two interaction terms (Table 1). Water levels
did not influence overall movement probabilities ($\chi^2 = 1.16, 1$ df, $P = 0.28$). The overall probability of moving within a given month was higher for adults (0.25) than juveniles (0.20). Similar to natal departure, overall movement probabilities were lower during 1992 (0.15) than 1993 (0.25) or 1994 (0.27). Seasonal effects were primarily attributable to higher than expected movement probabilities during the summer post-breeding period and relatively lower probabilities during the spring breeding period and early winter (Fig. 3). There was also an interaction effect between year and season which probably reflected that the seasonal differences in movement were much less pronounced during 1994, although the relative pattern of summers having higher probabilities remained similar. There was also an interaction between year and region. Similar to natal departure, overall movement probabilities were lower in the southern region, which was affected by the preceding drought in 1992, compared to the unaffected region (Fig. 4).

**Food resources**

During 1992 and 1993 we conducted 343 h of foraging observation, during which we observed 814 prey captures. Our data indicated differences among years ($\chi^2 = 9.71, 1$ df, $P = 0.002$) and seasons ($\chi^2 = 55.31, 2$ df, $P < 0.001$), but no interaction between year and season ($\chi^2 = 3.86, 2$ df, $P = 0.145$) in prey capture rates. Capture rates were highest during summer, lowest during spring, and intermediate in autumn of each year (Fig. 5). Capture rates also tended to be higher during 1994 compared to 1993 for each season.

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**Fig. 1.** Kaplan-Meier estimates for the cumulative probability of natal departure of snail kites during each of the three study years.

**Fig. 2.** Kaplan-Meier estimates for the cumulative probability of natal departure of snail kites from wetlands within the southern region (strongly affected by the preceding drought) and the northern region (relatively unaffected by the preceding drought) in each of the three study years.
Table 1. Likelihood-ratio analysis of variance table for our final logistic regression model for the probability that a snail kite moved from one wetland to another between sampling occasions $t$ and $t+1$.

<table>
<thead>
<tr>
<th>Source</th>
<th>$\chi^2$</th>
<th>df</th>
<th>$P$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>4.67</td>
<td>1</td>
<td>0.031</td>
</tr>
<tr>
<td>Season</td>
<td>14.39</td>
<td>2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Year</td>
<td>24.92</td>
<td>2</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Region*</td>
<td>13.30</td>
<td>1</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Season $\times$ Year</td>
<td>9.63</td>
<td>4</td>
<td>0.047</td>
</tr>
<tr>
<td>Year $\times$ Region*</td>
<td>7.11</td>
<td>2</td>
<td>0.028</td>
</tr>
</tbody>
</table>

* Southern wetlands, which were strongly influenced by the drought preceding our study, and northern wetlands that were relatively unaffected by the drought.

Of the 48 radio-tagged adult kites for which we had observations, we were able to estimate capture rates for only nine individuals observed before and after moving from one wetland to another. Of these, three individuals moved more than once. Although this sample size was small, we observed no difference in prey capture rates before and after these birds had moved (paired $t = 0.33$, $P = 0.21$). Furthermore, for 6 of the 12 movements we observed, capture rates were lower following movement. The mean difference in the number of snails captured per minute before and after movements was $0.21 \pm 0.53$ SD with a $95\%$ confidence interval ranging from $-0.83$ to $1.26$.

Discussion

The temporal and spatial patterns of movement we observed were not consistent with the hypotheses that either low water levels or low food availability were the proximate cues to initiate moving from one wetland to another. Water levels were not indicated to have a direct effect on movement probabilities either from AIC or LRTs. Both natal departure and general movement probabilities were lower in the southern region, during the year immediately following a drought in that region. However, in this case movement probabilities were lower, rather than higher, as would have been predicted if movement were in response to low food resources.

Our analysis of capture rates also was not consistent with the hypothesis of low food levels as a proximate cue for dispersal from a given site. Movement probabilities were highest during the summer season, when prey capture rates were also highest. Beissinger et al. (1983) also reported observing a high rate of post-breeding dispersal during summer. The relatively lower probability of movement during spring may be at least partially explained by breeding activity. Birds that are breeding are not likely to disperse until the breeding attempt has been completed or in some cases until the occurrence of mate desertion, which is common for this species (Beissinger 1986). However, this does not explain the relatively lower probabilities of movement during autumn and early winter.
Our analysis also indicated that movement rates, including natal departure, were lower than expected during 1992 compared to 1993 and 1994; and further that this was most pronounced in the southern region. Although we did not begin formal foraging observations until 1993, anecdotal evidence strongly suggested that food resources during 1992 were substantially lower in the southern region following the preceding drought (Bennetts and Kitchens 1997a, Valentine-Darby et al. 1998). Our foraging observations during 1993 and 1994, as well as numerous previous reports (reviewed by Sykes et al. 1995), indicate that the capture of snails typically requires only a few (<10) minutes of actual foraging time. In contrast, we frequently observed birds in the southern region during 1992 foraging in excess of 30–60 min without capturing a snail. In a few instances during our trapping efforts, we observed groups of foraging birds for hours without observing a single snail having been captured.

Because our general sample of prey capture rates was not from individually marked birds (except 48 radio-tagged birds), we could not account for individual variation in our analysis. However, individual birds were seldom observed for >30 min; thus although some individuals may have been observed on more than one occasion, our sample likely was from numerous (>150) individuals. Consequently, it is unlikely that our results are an artifact of individual, rather than habitat quality.

The evidence that low food availability was not a proximate cue to initiate movement seemed to be further supported by foraging observations of radiotagged birds before and after movement. Half of the birds we observed actually did worse at obtaining food at their new location compared to the location that they left, even though other individuals that remained at these sites showed no obvious decline in foraging success (Bennetts unpubl.). However, our sample size for this analysis was quite small (n = 12 movements), of which three were repeated measures of an individual (i.e., pseudoreplicated). Thus, the inferences we can make from these data alone are very limited.

Beissinger and Takekawa (1983) and Takekawa and Beissinger (1989) suggested that during periods of drought, and corresponding low food availability, snail kites exhibited “massive dispersal” to refugia habitats. Our data during non-drought conditions are in marked contrast to this view, indicating that movement probabilities were highest during times of food abundance and were not associated with water levels. However, we do not believe that our data are in conflict with the suggestion of these authors. Rather, we believe that the disparity of our results and interpretations reflect the different resource levels during our respective studies. Movement patterns of animals may be highly influenced by the distribution of resources in space and time, and may be integrally associated with social behavior. When resources are predictable and evenly distributed in time and space, site tenacity may be favored (Alstam and Enckell 1979); there may even be advantages for territoriality, provided that the expense of resource defense is not excessive (Wiens 1976). As the distribution of resources becomes more patchily distributed and less predictable in space and time, nomadic tendencies may emerge (Wiens 1976). We suggest that stay or leave decisions of snail kites can be viewed in relation to a food gradient and represents a balance between proximate needs and ultimate benefits along this gradient (Fig. 6).

At one extreme, during drying events, food becomes virtually unavailable. At such low resource levels, the decision of whether to stay or leave a given site is undoubtedly influenced by proximate factors: a given bird either leaves or it starves. This response is consistent with the previous reports by Beissinger and Takekawa (1983) and Takekawa and Beissinger (1989) during such events, although such extreme conditions did not occur during our study and were therefore not observed.

Drying patterns across central and southern Florida (i.e., the kite’s range), exhibit strong spatial correlation, except in distant parts of the range (Bennetts and Kitchens 1997a). Thus, if food resources are marginal, but sufficient to survive (e.g., in the southern region during 1992), the probability of finding similar or worse conditions is high and may not warrant the energetic costs of moving. In addition, predation appears to be the major cause of death for this population during non-drought years (Bennetts et al. 1998), and moving into unfamiliar habitat may increase the risk of predation. Consequently, during such marginal conditions, there may be too much risk for marginal benefits, and the best strategy may be to “wait it out”.

As food becomes increasingly abundant, movement may be more related to long-term benefits in fitness.
virtual certainty about any wetland inhabited by snail kites is that it will go dry at some point in time, resulting in a local food “crunch” (Wiens 1976). What is not certain is which wetlands will go dry in which years. Given the dynamic and unpredictable nature of a kite’s environment (Beissinger 1986), there may be an advantage for kites to have had the experience of exploring wetlands throughout their range so that, when a local drying event occurs, past experience reduces the need for “blind” searching for suitable alternative habitats. Thus, moving when food availability is high may enable kites to explore potential habitats (see also Bell 1991) during times when risk of starvation is minimal. During such times, kites also had a tendency to increase the spatial extent of their movement (Bennetts unpubl.). However, as with any such behavior, there is probably a point of diminishing returns, beyond which the expected gains in familiarity of their range are not worth the energy and/or risk associated with constantly moving. Thus, a likely strategy for kites is to move a sufficient amount to provide information about areas throughout their range, but with minimal costs in energy and risk.

At the other extreme, during periods of localized, extremely high food availability (as evidenced by very short capture times), we observed radio-tagged kites using and even defending small areas (<0.5 ha) for several weeks. These birds exhibited territorial behavior including vocalizations at approaching conspecifics and ensuing chases if the intruding bird entered the foraging territory. Similar territory defense of small areas of superabundant food was also reported by Snyder and Snyder (1970). However, the high seasonal and annual variability in prey availability would preclude territoriality as a viable strategy over longer time scales.

Bell (1991) suggested that exploratory movements help to familiarize animals with potential food resources, and that such movements are probably more significant than is usually appreciated. Our data are consistent with Bell’s view. However, in the dynamic and uncertain environment of Florida, snail kites are faced with periods of both food abundance and scarcity. We suggest that the movement patterns of snail kites reflect both of these extremes in ways that likely improves their lifetime fitness.

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