# FORAGING EFFICIENCY AND GROUP BEHAVIOR IN NORTHERN JACANAS

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*Abstract:* Group-oriented behavior may entail both costs and benefits to the individual; we examined one possible cost. Northern Jacanas (*Jacana spinosa)* are tropical shorebirds that forage both individually and in groups. Adults defend territories aggressively, especially at dawn and dusk. We hypothesized that foraging activity would be lower for group foraging than for solo foraging, due to lower costs of aggressive interactions with conspecifics in solo foraging. Our results support this hypothesis, and suggest that increased aggression towards conspecifics reduces foraging activity.

*Key Words:* Jacana spinosa, *foraging activity, conspecific aggression, group dynamics*

## INTRODUCTION

The Northern Jacana (*Jacana spinosa)* is a tropical shorebird found in freshwater marshes of Guanacaste Province, Costa Rica. Jacanas spend much of their time foraging in floating vegetation for insects, small fish, and invertebrates (Janzen 1983). Jacanas also defend breeding territories aggressively, with energy-demanding behavior that includes attacking, fleeing, wing-raising and vocalizations. The birds are most aggregated and active during the early morning and late evening, scattering during the day (Jackson and Kopplin 1996). Higher densities may increase aggressive behavior among individuals. We hypothesized that foraging activity per individual would be higher in solo foraging than in grouped foraging, due to less time spent by solo birds in aggressive interactions.

## METHODS

We conducted our study on 10, 11 and 12 January 2006 in a freshwater marsh 0.5 km southwest of the OTS Field Station in Palo Verde National Park, Guanacaste, Costa Rica. We observed 20 individual Jacanas between 0500 and 0700 hours, and 23 individuals between 1600 and 1900 hours, along 0.5km of marsh edge with floating vegetation, between the observation tower and the bridge. We haphazardly chose each adult Jacana and monitored its foraging activity continuously for 5 minutes. Foraging activity was measured as mean peck rate in 30-second intervals. In each interval, we also counted the number of adult Jacanas within a 2 m radius of the focal individual, as well as the level of severity of aggressive behavior exhibited by the individual toward other Jacanas. Aggressiveness was recorded on a 0-3 qualitative scale, with zero representing the absence of aggression, and 3 representing prolonged, intense aggressive behavior.

For the 32 individuals that exhibited both solo and grouped foraging, we performed a one-tailed t-test of the difference between solo and group foraging activity. For the 11 birds that exhibited

either exclusively solo or exclusively group foraging, we performed a t-test between the foraging activity of solo and group foragers. Additionally, for all birds that foraged in groups, we performed an ANOVA to determine if foraging activity decreased with increased aggression towards conspecifics.

## RESULTS

Birds foraged more when alone than when in groups. Mean peck rate was greater (by 2.15 pecks/interval) for solo than for group foragers, for individuals foraging both solo and in groups (one- tailed t-test, $t_{30}$ =1.66, P=0.05). We also found a significantly higher foraging activity for individuals foraging exclusively alone than for those foraging exclusively in groups ($t_{17}$ =6.97, P=0.02; Fig. 1). Additionally,

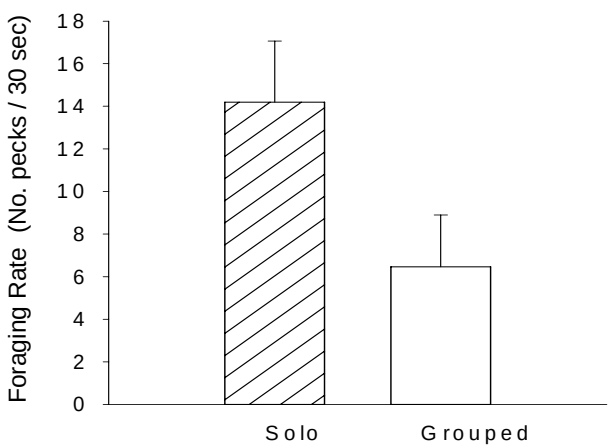


Figure 1. Mean foraging rate (measured as peck rate, mean ± SE) for Northern Jacana individuals foraging alone (striped) and in groups (white), at Palo Verde, Costa Rica. ( $t_{17}$=6.97, P=0.02).

we found a significantly reduced foraging activity, for individuals foraging in groups, with increased severity of aggression toward conspecifics (ANOVA, $F_{1, 29}$=4.17, P=0.05; Fig. 2).

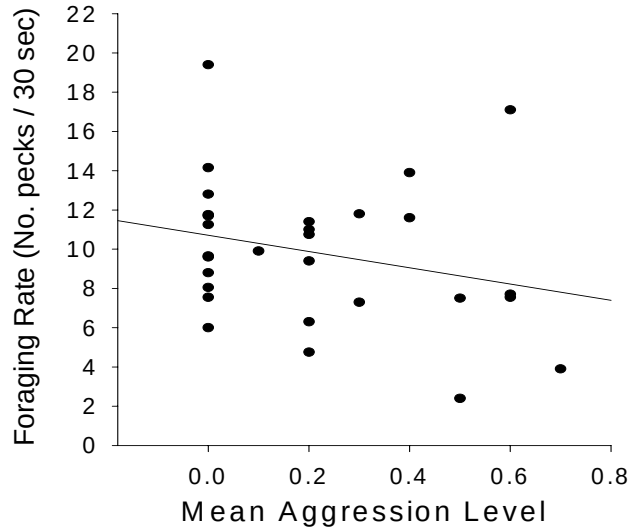


Figure 2. Mean foraging rate (measured as peck rate) for Northern Jacana individuals with increased aggression level at Palo Verde, Costa Rica (ANOVA, $F_{1, 29}$=4.17, P=0.05). See text for definition of aggression level.

## DISCUSSION

Group foraging for these Jacanas results in lower foraging activity than foraging alone and is therefore a cost to individuals in groups. However, Jacanas in groups may benefit from enhanced detection of predators and defense against predator attacks, balancing the reduced foraging rate in groups.

## LITERATURE CITED

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