

HABITAT SELECTION BY *JACANA SPINOSA* IN PALO VERDE NATIONAL WILDLIFE REFUGE

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ABSTRACT (LCB)

We studied habitat selection by Northern Jacanas (*Jacana spinosa*) following experimental manipulation of lily pad abundance. We hypothesized that jacana foraging was limited by the abundance of the lily, *Nymphaea ampla*. Jacana numbers increased 2 to 3 fold in experimental plots compared to unmanipulated control plots. Jacana numbers also increased in control plots after lily addition. These data support the hypothesis that jacana abundance is casually linked to lily abundance. Lilies may serve to limit jacana distribution in this system because they provide anecessary foraging substrate.

Key Words: *Jacana spinosa*, habitat selection, *Nymphaea ampla*

INTRODUCTION (PLK)

The Northern Jacana (*Jacana spinosa*) is typically found in areas with floating aquatic vegetation. This vegetation seems to be an important foraging substrate (Jenni 1983). The dominant floating vegetation at Laguna Palo Verde was the pond lily (*Nymphaea ampla*); the marsh also contained another lily species with smaller leaves and less conspicuous flowers.

Abram et al (1994 FSP) found that jacanas used large lilies more frequently than would be expected given the abundance of lilies in the marsh. Thus we hypothesized on that lilies are a limiting resource for jacanas, and predicted than an increase in large lily abundance would result in increased jacana abundance. To test this, we experimentally transplanted *N. ampla* plants into areas where they were previously absent, and examined the responses of jacanas.

METHODS (PLK)

We conducted our study of jacana habitat selection in Lagunas Palo Verde in the Palo Verde National Wildlife Refuge, Guanacaste Province, Costa Rica. We selected an area of marsh east of the observation tower and subdivided it into four 7 x 7m plots, which were separated by at least 5m. This area was characterized by shallow, muddy water (0.5m), clumps of tall grasses, and small lilies. We selected two experimental plots at random and experimentally transplanted eight lily plants of the species *N. ampla* to each; the plants covered approximately 50% of the 48m² area. The *N. ampla* transplants were apparently successful because they showed no signs of wilting or disturbance when compared to *N. ampla* in undisturbed areas.

The abundances of adult and juvenile jacanas were determined prior to lily transplantation at 5, 22 and 30 hours after treatment. We used the maximum number seen at one time within a 10 minute period as the measure

Table 1. Mean number of jacanas (\pm SE) in control and experimental plots before and after addition of lily pads.

Time	n	Adults		Juvenile		Total	
		Control	Experimental	Control	Experimental	Control	Experimental
Pre-treatment	4	0.3 \pm 0.3	0.3 \pm 0.3	0 \pm 0	0 \pm 0	0.3 \pm 0.3	0.3 \pm 0.3
6 hours	5	0.6 \pm 0.4	1.2 \pm 0.5	4.5 \pm 1.5	7.8 \pm 1.2	2.4 \pm 1.0	8.8 \pm 1.6
22 hours	5	1.2 \pm 0.6	4.0 \pm 1.9	0.6 \pm 0.4	4.6 \pm 1.6	1.2 \pm 0.7	6.8 \pm 2.3
30 hours	5	2.0 \pm 0.8	7.2 \pm 0.9	8.2 \pm 2.3	19.4 \pm 2.4*	10.2 \pm 2.9	26.6 \pm 2.5**

*p<0.05; **p<0.01; Paired t-tests comparing control and experimental plots within an observation period.

of jacana abundance. We measured 4 pretreatment censuses and 5 each of the post treatment censuses with 10 minute intervals between each.

We used a Chi-square test to examine the jacana abundances before and after transplant. A paired t-test was used to compare jacana abundances in the control and experimental plots. Birds usually changed location between censuses, which allowed us to treat censuses as independent observations.

RESULTS (AEL)

Both adults and juvenile jacanas increased in the study area after the addition of lilies (Table 1). Comparisons of jacana abundance before and at 30 hours after lily addition show significant increases in adults ($X^2 = 8.1$, $df = 1$, $p < 0.005$), juveniles ($X^2 = 27.6$, $df = 1$, $p < 0.005$), and total birds ($X^2 = 35.3$, $df = 1$, $p < 0.005$) in the study area. Furthermore, in all post-treatment censuses, both adults and juveniles were more abundant in the experimental plots compared to the control plots (Table 1). Abundances, however, were highly variable. Only after 30 hours was there a significant dif-

ference between the means of experimental and control plots for total birds and for juveniles (Table 1). Jacanas also increased in the control plots (0.3, $t = 0$ hours; 10.2, $t = 30$ hours), after the addition of lilies.

DISCUSSION (LCB)

Our results showed a significant increase in jacanas after lily addition, which supports the hypothesis that jacana abundance is causally linked to lily abundance. Jacana numbers in control plots also tended to increase after the manipulation, which may have been a response to the increased abundance of lilies in adjacent experimental plots. The difference between treated and control plots increased throughout the study, indicating that jacanas needed ≈ 30 h to adjust to the new habitat.

There are two factors that we did not take into consideration in our experiment. We observed that there were more jacanas in the afternoon than the mornings which suggests a diurnal pattern to their movements. In addition, we observed that jacanas more frequently and in groups. Our ten minute censuses may not have been ideal for capturing the patterns

of their movements. Further studies should take into account jacana preferences for time of day and the frequency and structure of their movements.

The next step is to determine the reason(s) lilies limit jacana abundance. The lily pads may serve as a structure on which jacanas can easily forage. The lily plants themselves (the ovules) may be a food source. Or, alternatively, the lilies may provide a habitat in which invertebrate prey can live. Jacana preference for invertebrate versus plant food source could be investigated. Artificial lily pads with and without invertebrate food could be added to environments to distinguish between these three alternative hypotheses. Also,

all three factors could play a role in making lilies important for jacana abundance.

Jacanas seem to require lilies for a foraging substrate in this environment. Our results indicate that lilies may be a limiting resource for jacanas at Palo Verde National Wildlife Refuge.

LITERATURE CITED

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