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OBSERVATIONS OF THE POST-FLEDGING BEHAVIOR AND PREY OF THE SOLITARY EAGLE (*HARPYHALIAETUS SOLITARIUS*)

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The Solitary Eagle (*Harpyhaliaetus solitarius*) is a rare and local resident with a small population size within its broad distributional range from northern Mexico to northwest Argentina (Ferguson-Lees and Christie 2001, Clark et al. 2006, BirdLife International 2008). Due to a combination of a small population, low density, low fecundity, deforestation, habitat degradation, poaching, and restricted hab-

itat, the Solitary Eagle is listed as Near Threatened, but may be listed as Vulnerable based on further evidence of decreasing population size and trends (BirdLife International 2008).

Most aspects of the natural history, breeding biology, and population demographics are virtually unknown for this species, making any new information valuable for understanding the ecology of this rare eagle (Bierregaard 1998). Only two nests have been discovered for this species (Harrison and Kiff 1977). Both of them were in steep terrain within the vicinity of the transition zone between pine forest and broadleaf forest in Mexico, and in both cases, either the adults or eggs were collected

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before any detailed observations could be made (Harrison and Kiff 1977). Therefore, incubation and fledging periods for this species are unknown (Ferguson-Lees and Christie 2001).

Here we present the first observations of the post-fledging dependence period of the Solitary Eagle, including interactions between a juvenile and adults, prey use, and habitat use.

STUDY AREA AND METHODS

Observations were made in the Cayo District of Belize (17°03'N, 88°50'W), 6 km from the Mountain Pine Ridge Forest Reserve. The terrain was a combination of a gently rolling upland plateau and a rugged escarpment with steep slopes and deep canyons (Means 1997). The area was sparsely populated by humans, with low human disturbance, except for the occasional training exercises carried out by the British military. Observations were made in the transition zone between submontane pine forest and submontane broad-leaved forest at an elevation of 720 m (Meerman and Sabido 2004) during the rainy season that occurs from June through November (Hartshorn et al. 1984). Mean annual precipitation in the Mountain Pine Ridge region was 2003 mm (Means 1997).

From 7 July to 10 October 2009, a team from The Peregrine Fund conducted a release of Orange-breasted Falcons (*Falco deiroleucus*) in the area. During this period, at least one person from the release team was present at the release site from 06:00 H to 18:30 H daily, watching the falcons, taking notes on their behavior, and recording other wildlife sightings. Weather conditions were recorded every hour. Observations were made using 10×-42 binoculars and a 65-mm spotting scope from a small portable cabin on top of the highest point on the ridge. For every encounter with Solitary Eagles in the area, we recorded the date, time, location, number of eagles, their ages, whether the birds were perched or soaring, behaviors, and type of prey, if any.

RESULTS AND DISCUSSION

Between 9 July and 10 October 2009, we made 45 observations of either the adults or the juvenile, or one adult with the juvenile, in the study area. We first sighted an adult Solitary Eagle on 9 July. It was carrying an unidentified snake and flew low (approx. 50 m aboveground) past us, down into a canyon. We observed two adults together on two occasions. The first time, on 27 July, one of the adults flew in to the suspected nest area with an unidentified prey item. The other adult, who was vocalizing loudly, joined it. They landed together in a pine tree, and then flew down, presumably to the nest. The second and last time, on 18 August, both adults were soaring together and then flying far to the northwest, at least 1 km away from the study area.

We first observed the juvenile on 31 July 2009. It was perched in a Caribbean Pine (*Pinus caribaea*), picking at an epiphyte and hopping clumsily between the branches. This was the same location where we observed both adults



Figure 1. A vocalizing juvenile Solitary Eagle, with characteristic Basic I plumage.

on 27 July 2009. Based on the juvenile's behavior and fresh Basic I plumage (Fig. 1), we believe it had recently fledged and was close to the nest tree. The next day we observed the juvenile vocalizing and perched on a snag on top of the ridge 300 m away from the previous day's observation. During subsequent sightings, we noted an obvious improvement in its flying abilities.

We observed this juvenile nearly every day from 31 July to 11 August and nine times from 12 August to 10 October. The juvenile was vocalizing each time we observed it. Its vocalizations were much harsher and raspier than the adults', making it easy to distinguish between them.

Interactions Between Juvenile and Adults. We observed three interactions between the juvenile and an adult; two consisted of the juvenile food-soliciting and flying at the adult, and the third comprised an adult vocalizing, then delivering prey to the juvenile. Frequently, we could hear vocal interactions between the juvenile and the adults. These vocalizations consisted of a long series of characteristic whistling, during which we often could only visually locate one of the individuals, while the other remained out of sight.



Figure 2. An adult Solitary Eagle with a partially consumed tropical rat snake (*Spilotes pullatus*).

Feeding Habits and Food Exchange. We observed the adult eagles with prey on six occasions: one time with an unidentified item, four times with medium- to large-sized snakes, and one time with an unidentified lizard measuring approximately 30 cm from the tip of the tail to the snout. From a photograph, we identified one prey item as a tropical rat snake (*Spilotes pullatus*), an arboreal snake (Fig. 2). The only food exchange we witnessed in its entirety occurred on 23 August, when the adult female approached the area while vocalizing and carrying a large unidentified snake, approximately 1 m long, in her talons. The juvenile, who was perched nearby, began vocalizing and flew up to meet the adult above the canopy. The adult perched in a pine tree near the top of the ridge and the juvenile perched beside her. The juvenile took the snake and remained in the same tree to eat, while the adult stayed for 2 min and then flew off.

Although we did not find a nest, our observations give some insight into the nesting habitat, prey items, and the postfledging stage of the Solitary Eagle. Our observations of the Solitary Eagle pair and fledgling all occurred within a transition zone between broadleaf and pine forest. Our observations suggest that the juvenile was dependent on its

parents for food for at least 2.5 mo. Our observations of prey deliveries, consisting of four snakes and one lizard, supported the notion that Solitary Eagles have a specialized diet of reptiles.

OBSERVACIONES DEL COMPORTAMIENTO DURANTE EL PERÍODO POSTERIOR AL EMPLUMAMIENTO Y SOBRE LAS PRESAS DE *HARPYHALIAETUS SOLITARIUS*

RESUMEN.—El águila *Harpyhaliaetus solitarius* es una rapaz neotropical poco conocida y escasa. Con sólo dos nidios descubiertos para esta especie, existen pocos datos sobre su biología reproductiva, hábitat de anidación, período de emplumamiento o su dispersión juvenil. Observamos a una pareja con un juvenil volantón durante un período de tres meses, desde julio hasta octubre de 2009. Tuvimos un total de 45 observaciones en Mountain Pine Ridge, Belice, incluyendo interacciones entre el juvenil y un adulto, observaciones de presas capturadas, de intercambio de comida, de encuentros territoriales con otras rapaces y de uso de hábitat. Esta pareja de *H. solitarius* utilizó el área de transición entre el bosque siempre-verde y el de coníferas, en una región con pendientes abruptas. El juvenil dependió de los adultos durante los 3 primeros meses después del emplumamiento.

[Traducción del equipo editorial]

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