

# Breeding Biology of the Hook-billed Kite in Belize: A Successful Triple Brooding

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## Abstract

The Hook-billed Kite is an uncommon species across a wide distribution from southern Texas to northern Argentina, but it remains enigmatic and little studied, particularly its breeding biology. Its population trend appears to be decreasing, but due to its large distribution is listed as Least Concern by the IUCN. Over a three year period, 2012-2014, we made observations of six nests from a presumed same pair in the Cayo District of Belize to better understand the breeding biology of the species and to potentially solve the mystery of why the northern population is migratory. Two nests were studied in 2012, one nest in 2013, and three nests in 2014. In 2012, one young fledged from the first nest and two young of near fledgling age were observed in the second nest, but fledging was not observed, which represents double brooding. In 2013, two young successfully fledged, but we suspect that this was a second nest this year. In 2014, we documented three different nests from the presumed same pair, which successfully fledged five young from all three nests. This represents the first observation of triple brooding for Hook-billed Kites, which has only been documented in a few raptor species and is usually due to failure of a prior nest, but not in this case. The high productivity in certain years may be a response to increased snail detectability and abundance, but further research is needed. The prey at these nests was 100% snails of two species, *Orthalicus princeps* and *Euglandina ghiesbreghtii*. *Orthalicus princeps* represented 99% of the diet at all of these nests. These kites have a very specialized diet leading to high vulnerability of being impacted by human activities, such as climate change, habitat degradation or pollution.

## Introduction

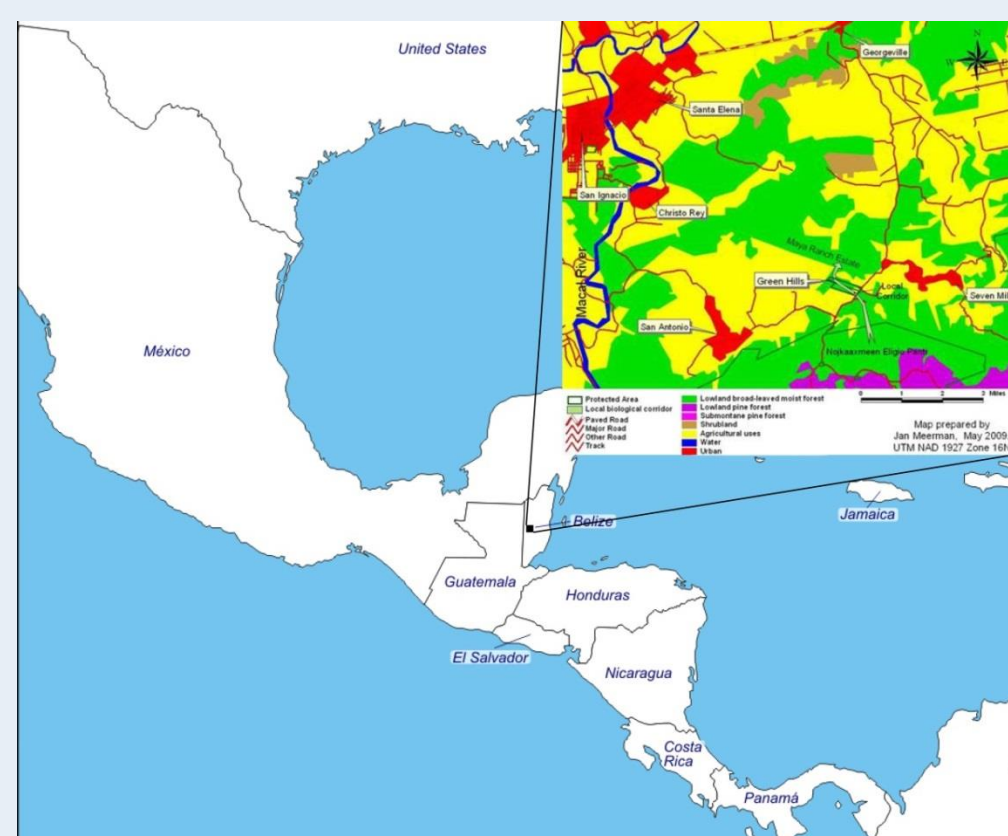
- We observed 6 different Hook-billed Kite nests within 300 meters from one another of the presumed same pair from 2012-2014.
- In 2014, we observed successful triple brooding at 3 different nests of the presumed same pair, which is the first recorded for this species.
- Triple brooding is rare in raptors and a successful triple-brooding was documented in *Parabuteo unicinctus* (Harris's Hawk) (Brannon 1980).
- Double brooding has been documented in Hook-billed Kites in Texas (Clark 2004), but never triple brooding. We observed double-brooding as well.

## Methods

- In 2012, direct observation of 2 nests were made from 13 June – 31 August during 46 days.
- In 2013, 120 direct observations were made of the adults from 3 April – 8 June. A nest was located on 28 May when the pair started building. 181.6 hours of direct observations were made during the incubation period of this single nest.
- In 2014, 79.4 hours during 26 monitoring days was conducted of 3 nests.

## Study Area

- This research was conducted in Belize, Cayo District at the Green Hills Butterfly Ranch (a 100 acre private conservation management area)
- The habitat was secondary lowland broad-leaved moist forest surrounded by citrus orchards, agriculture, and urbanization



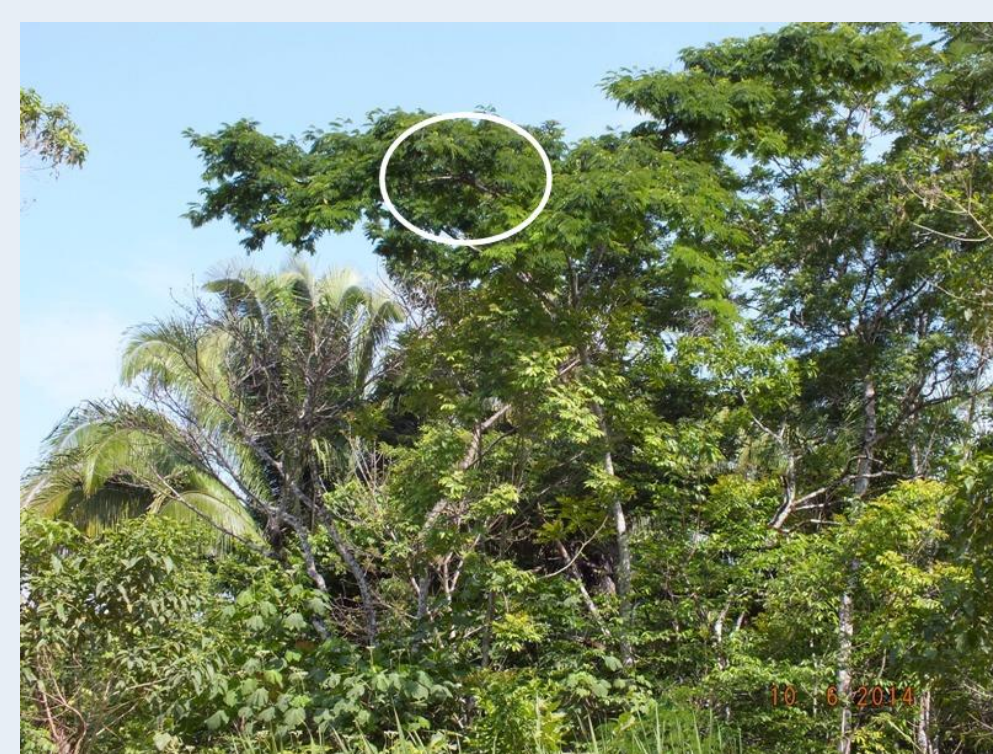
## Results

### Phenology

- The earliest adult Hook-billed Kite observed at the study site was 20 February, in 2014, otherwise all arrived in March.
- Nest building occurred from 30 March -12 August
- Incubation period occurred from 3 April -14 September
- Nestling period occurred from 29 May -14 October
- Fledging only occurred during the onset of the wet season (late May-early June) or during the wet season (June-November)

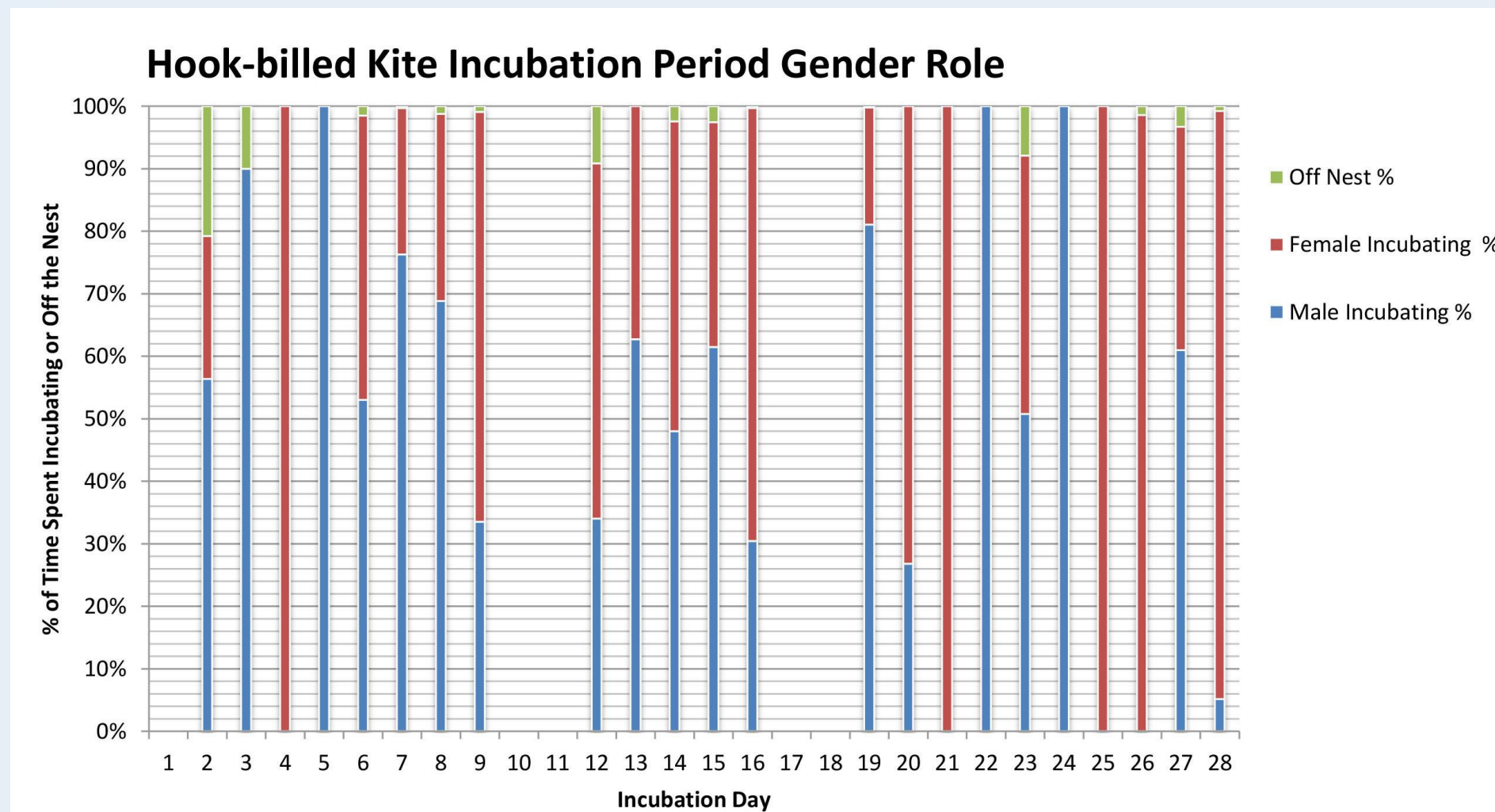
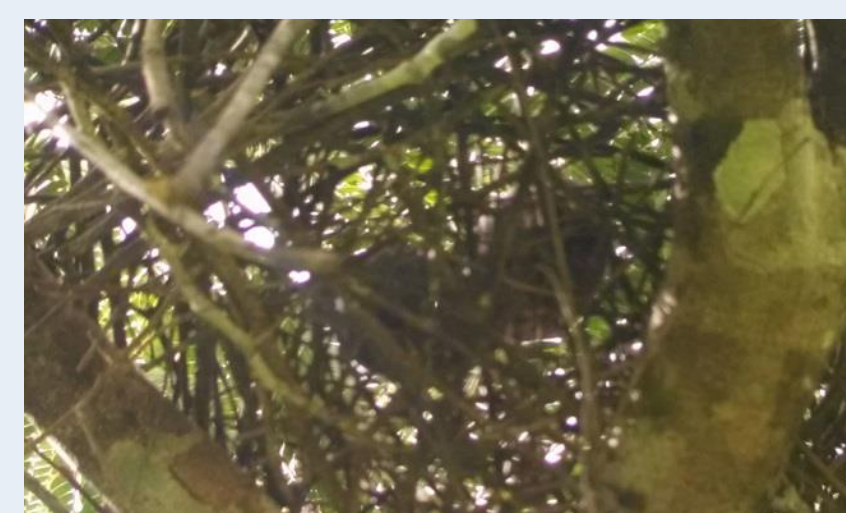
### Nest and Nest-site Characteristics

Nest and Nest-site Attributes	2012-01	2012-02	2013-01	2014-01	2014-02	2014-03
Habitat	secondary lowland broad-leaved moist forest	secondary lowland broad-leaved moist forest	secondary lowland broad-leaved moist forest	secondary lowland broad-leaved moist forest	secondary lowland broad-leaved moist forest	secondary lowland broad-leaved moist forest
Elevation (m a.s.l.)	222	222	228	222	218	228
Nest tree species	<i>Zanthoxylum kellerianum</i> (nickle yellow)	<i>Swietenia macrophylla</i> (mahogany)	<i>Cecropia peltata</i> (ceiba)	<i>Platanium dimorphandrum</i>	<i>Acacia glomerosa</i>	<i>Cecropia peltata</i> (ceiba)
Nest tree DBH (cm)	40.1	34.0	99.1	25.4	17.8	99.1
Emergent	no	yes	yes	no	no	yes
Height of nest (tree m)	27	16	29	23	9	29
Slope of nest tree (°)	0	0	5	0	0	5
Height of nest from ground (m)	21	12	24	20	8	26
Nest location in tree	Fork of secondary and tertiary branch	Fork of tertiary and quaternary branch	Fork of secondary and tertiary branch	Fork of secondary and tertiary branch	Fork of trunk and primary branch	Fork of secondary and tertiary branch
# of fledged young	1	2 (2 nestlings)	2	2	1	2



### Incubation Period

- All nests that we observed had 2 eggs
- Female incubated 51.3%, male 48.7%
- 97.3% total time observed adults incubating
- Both adults hunted and fed themselves



### Nestling Period

- The range of the nestling period was 22-26 days (n=4)
- On average, the days between branching and first flight was 2 days
- Both adults fed nestlings

### Nest Productivity

- In 3 years, we observed 10 nestlings from 6 nests of which at least 8 fledged
- Four nests had 2 nestlings and two nests had 1 nestling
- Overall productivity was 1.3 fledged per nest

### Triple Brooding



2014-01 nest fledged 2 young on 29 May



2014-02 nest fledged 1 young on 12 August



2014-03 nest fledged 1 young on 14 October

### Diet

- The diet was composed of 100% terrestrial snails of 2 species:
- 99% *Orthalicus princeps*
  - 1% *Euglandina ghiesbreghtii*



### Post-Fledging Period

- Fledglings were fed by adults for on average 3 days post branching around the nest.
- On 4 and 5 October 2014, 2 juveniles visited nest 2014-03, presumed from nest 2014-01.

## Discussion

- This is the first documentation of triple brooding and successful triple brooding from three different nests in a single nesting season by Hook-billed Kites.
- It appears that in 'good' snail years Hook-billed Kites will triple and double brood making the nesting season one of the longest of any raptor (March-October). A study on snail behavior and abundance in Belize is needed.
- This may explain why Hook-billed Kites migrate through Belize from mid to late October through mid December. Tracking studies of these Belize birds is necessary to determine if they are migratory or resident.

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