

Methods for capturing tropical forest birds of prey

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Juvenile male collared forest-falcon (*Micrastur semitorquatus*)

Since 1988, diurnal and nocturnal birds of prey (raptors) have been studied in northeastern Guatemala at Tikal National Park as part of the Peregrine Fund's "Maya Project." I describe a variety of field-tested methods for capturing birds of prey in a

tropical forest environment. Many of the capture techniques presented here assume that nest sites have been located and that selected individuals have been targeted for trapping. While results reported here were based on raptors at a single Neotropical locality, it seems likely these methods may be applicable elsewhere in tropical forests. This review is intended as a practical guide for researchers who need to trap birds of prey or other birds with similar nesting habits in tropical forests.

Capture techniques

We trapped species ranging from forest-falcons to hawk-eagles during 1989–1993 at Tikal National Park. Trapping specific species required knowledge of their behavior and nest site locations or areas where breeding



Bal-chatri trap with canary as bait

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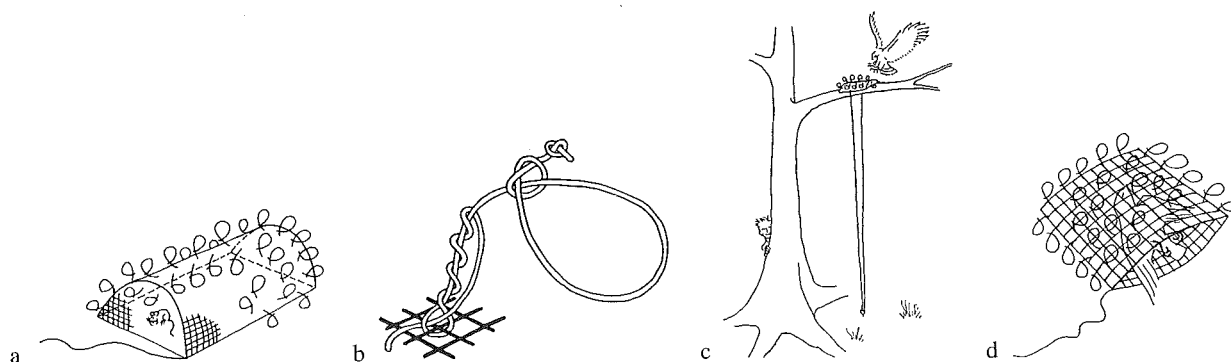


Fig. 1. Variations and characteristics of bal-chatri traps used to capture raptors in Guatemala: (a) quonset-shaped bal-chatri with small rodent as bait, (b) example of locking slip knot used on a bal-chatri, (c) bal-chatri positioned for quick raising and lowering on a tree branch, and (d) modified bal-chatri to form an envelope trap with a bird kill as the bait.

activity was apparent. During this project we primarily used (1) baited traps near or at nests, (2) mist netting, and (3) line trapping. Line trapping for raptors was tested only in 1993 when 10–12 baited bal-chatri traps were placed along established trails at 50-m intervals.

Many of the trapping techniques described below refer to an actual nest-site location and require placing bal-chatris or other trap types on the ground, in a tree near a nest tree, in a nest tree, or actually at a nest. Raptors are strong and tolerant animals, but captured individuals should be removed promptly from the trap in order to prevent injury. When a raptor is trapped, care must be taken to grab and control the legs to prevent it from struggling and possibly injuring itself. It is helpful to have an assistant while removing and handling the bird after capture.

Once a raptor is controlled, the toes or tarsi can be released from the nooses by opening the closed nooses or cutting the monofilament and backing it off the bird. The bird should be held by placing 1 finger between the tarsi, with the thumb and other fingers wrapped around the tarsi with a firm grip. The other hand can be placed on the back, keeping the wings closed with slight pressure and holding the bird against the handler's body. A raptor that struggles,

bites, or grabs can be calmed down by placing a properly fitted hood on its head. Birds trapped in trees were released from the nooses, placed in a cotton sack that was secured at the top, and lowered to a waiting assistant. In all the trapping episodes, only 1 case of an injury was observed—when a male collared forest-falcon (*Microstur semitorquatus*) was left on a bal-chatri trap for approximately 45 minutes, resulting in a swollen foot and toes. One year later this bird was documented at a nest site where he fledged 2 young.

Trap types

Bal-chatri. The bal-chatri (Fig. 1a) is a painted hardware cloth enclosure with monofilament nooses tied to the top and sides and contains a lure animal (Berger and Mueller 1959). Size and shape of the trap and the monofilament strength varies with the species to be captured. We have used 20–40-lb test monofilament. It is preferable to use colors such as brown or green, which blend with the forest vegetation, when available. The noose knot we used was a locking slip knot (Fig. 1b). This knot is recommended over other slip knots because it does not release when closed. Occasionally, the style of slip

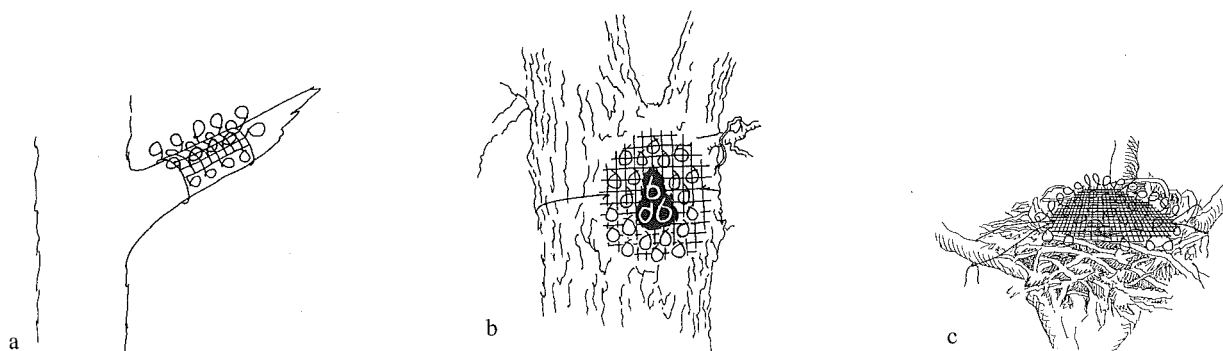


Fig. 2. Variations of a noose carpet trap for capturing raptors in Guatemala: (a) placed on a tree branch, (b) positioned over a nest cavity entrance, and (c) placed on a stick nest.

noose reported by Berger and Mueller (1959) releases its tension and frees the bird when it bounces and struggles on the trap. Typical bait animals included white mice, wild rats (*Rattus* spp. and *Stomodon hispidus*), canaries (*Serinus flaviventris*), rock doves (*Columba livia*), snakes (*Drymobius* sp.), and chickens (*Gallus* spp.). Normally, 1 active bait animal was sufficient, but use of ≥ 2 in the same trap helped sustain activity levels and enhanced attractiveness to raptors. Traps should be checked every 15–30 minutes or when there is noise, as when 1 of the lure animals is distressed, to prevent injury to a captured bird or the bait animal.

We used bal-chattris that were quonset-shaped (Berger and Hamerstrom 1962) or octagonal (Erickson and Hoppe 1979). Bal-chattris and their modifications were set in the following ways: (1) tied to the ground or on fallen trees, (2) tied on tree limbs 5–30 m high, (3) pulled up and centered over tree limbs with nylon twine that aided in pulling the trap and captured bird down without having to climb (Fig. 1c), (4) tied on a limb 1–2 m from a nest, (5) tied on top of a platform nest, (6) tied in a platform nest with the nestling placed inside the bal-chattri, and (7) set in a line of 10–12 bal-chattris on the ground in an area of unknown raptor activity.

Envelope trap. This trap is a modification of a bal-chattri and was used to trap fledglings and some adults that had been flushed off prey. This trap used as bait the food left behind by a flushed bird. It is designed like a stationary envelope with nooses tied on the top and sides (Fig. 1d). When a raptor was flushed from prey, the prey was placed inside the envelope trap and tied, and the trap was secured by a nylon twine. The trap was returned quickly to the spot where the bird was eating, and the trapper walked out of view from the trap and raptor. Normally, the bird of prey will return to the partially eaten prey and begin feeding. Generally, the bird gets its feet, toes, or nails caught in the nooses of the trap. This trap should be examined frequently and cautiously every 15–20 minutes to see whether a bird has been caught.

Noose carpet. A noose carpet is a piece of wire mesh, hardware cloth, or chicken wire, with nooses tied to the upper surface (Beebe and Webster 1964,

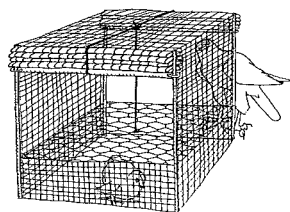


Fig. 3. Swedish goshawk trap with a small chicken as bait.

Bloom 1987, Bub 1991). The trap is placed on a perch site or at the entrance to a nest site (Fig. 2a). The size of the noose carpet will depend on the size of the perch and nest entrance. As a bird enters a nest or perch, it walks

over the noose carpet and sometimes catches its toes in the nooses.

I designed a modification of the noose carpet to close off the entrance of a nest cavity. Wire cloth or chicken wire was placed over the cavity entrance and tied to the tree to prevent a bird from flying away with the trap attached to its feet (Fig. 2b). Monofilament nooses are attached to the exterior side of the trap. When a bird tried to enter a cavity, it landed on the trap and usually got its feet caught in the nooses. This trap works well if birds are not wary in response to the nest entrance being closed with wire and monofilament. However, some birds are wary, and if after several hours the birds do not attempt to enter, the trap must be removed. This trap works well during egg and nestling periods. Another use of this trap has been placing it over eggs in a stick nest (Fig. 2c) to catch an incubating bird (Newton 1986). Care should be taken to protect the eggs. Ideally the raptor eggs should be removed and replaced with eggs of similar size and color from a domestic bird.

Swedish goshawk trap. This trap is compartmentalized into a lower bait cage and an upper section that closes by sliding or swinging doors to capture and hold the bird of prey (Fig. 3; Meng 1971, Kenward and Marcstrom 1983). Bait animals used were young chickens; using ≥ 2 bait animals/trap worked best because they were more visible to birds of prey. This trap has the advantage of requiring less frequent examination. One important caution in the tropics is that army ant swarms can cause injury to lure animals or birds of prey caught in the trap. Also, direct sunlight should be avoided as it can cause dehydration or heat stress; water and food should always be provided.

Wire hoop trap. This trap was used to catch cavity nesters as they entered their nests (Fig. 4). It was designed for trapping forest-falcons (*Micrastur* spp.) that nest in tree cavities and showed no interest in bal-chattris. The nest cavities where this trap was used ranged from 13–25 m above ground. The trap was made from bendable wire that was formed into a hoop, slightly larger in diameter than the cavity entrance. Several of the nest sites had ≥ 2 entrances. These alternate entrances were closed off several days prior to trapping so the

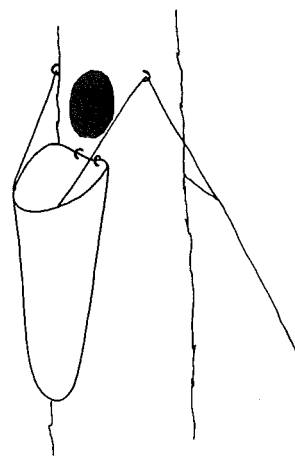


Fig. 4. Wire hoop trap positioned at a nest cavity entrance as applied to capturing forest-falcons in Guatemala.

birds could adjust to using the main entrance where the trap was placed. The wire hoop had fishing net tied to it in the form of a wind sock, which dropped 1–2 m below the entrance. I recommend using strong fishing net of small-diameter mesh so the raptor cannot rip through it or cut the net with its beak. For example, mist netting is too light in weight, and some larger birds can cut and shred this material as was observed in a trapping attempt on a male collared forest-falcon.

The wire hoop trap was attached to a tree at the bottom of the cavity by large staples, bent nails, or wire wrapped around the tree; in the latter case, a small circular wire linking the trap hoop to the wire around the tree permitted the trap to pivot freely up and down. Using slightly malleable wire, the hoop can be bent and hammered to fit around the shape of the cavity and the tree's curvature, preventing the bird from escaping between the wire hoop and the tree. Two sections of nylon twine were tied to the hoop, and these twines ran through a pair of staples that guided the hoop to a point where the tip of the hoop sealed the cavity on the sides of the tree (Fig. 4). Care is needed with thick, coarse bark because the twine can bind and inhibit the hoop from sealing the cavity; the twine needs a smooth channel to close the hoop rapidly. The 2 sections can be tied behind the tree, allowing enough spacing for the hoop to move from open to closed positions.

A strong, single twine that would withstand the force of pulling the hoop was tied to the 2 joined sections and run down to the ground. This is the main pull line to close the cavity entrance. The trap was then tested to verify that it pivoted freely and sealed

the cavity entrance. If the rotation was not smooth, adjustments were made. The most common problems occurred where the cords pass through the staples or when the spacing of the junction of the 2 cords did not allow the hoop to close properly.

After practice with the trap, the hoop should be left in place approximately perpendicular to the tree trunk so that the birds have access to the cavity. If the trap is placed much below perpendicular, the pivot point becomes parallel to the pull of the twine, and, if pulled, the force will bend the wire hoop, and it will not seal the cavity. I allowed the birds 1–2 days to adjust to the new apparatus at their nest site. This trap was effective for capturing males that delivered food directly into the cavities, spending only seconds inside. Two people are recommended for operating this system: 1 as the observer to signal when the bird has entered the cavity, and the other as the puller to close the cavity and entrap the bird. An advantage to this trap is that raptors of either sex can be trapped selectively. With experience this trap could be set in an hour and left up for a day to allow the forest-falcons to adjust to it. Experienced climbing ability is recommended to use this trap.

Noose pole trap. This trap is a flexible wire rod or pole with nooses attached to an oblong piece of leather or other material located at the end of the wire rod or pole. It is intended for removing incubating and nestling birds from tree cavities too deep to allow their extraction by hand. The pole is placed down the cavity, and as the bird grabs at the oblong-shaped end, its feet get caught in the nooses. Birds can then be removed from the cavity with care. This trap has worked well in deep cavities.

Table 1. Distribution of 191 captures of 15 raptor species among 7 trap types used in Tikal National Park, Guatemala, 1989–1993.

Species	Captures among trap types ^a						
	BC	NC	SGT	ET	WHT	PT	MN
Plumbeous kite (<i>Ictinia plumbea</i>)							1
Gray-headed kite (<i>Leptodon cayanensis</i>)		2					
Bicolored hawk (<i>Accipiter bicolor</i>)	4	2					1
Crane hawk (<i>Geranospiza caerulescens</i>)	1						
White hawk (<i>Leucopternis albicollis</i>)	6						
Great black hawk (<i>Buteogallus urubitinga</i>)			1				2
Roadside hawk (<i>Buteo magnirostris</i>)	10						
Gray hawk (<i>B. nitidus</i>)	1						
Black hawk-eagle (<i>Spizaetus tyrannus</i>)	2						
Ornate hawk-eagle (<i>S. ornatus</i>)	24	5	1				
Laughing falcon (<i>Herpetotheres cachinnans</i>)	4	1					
Barred forest-falcon (<i>Micrastur ruficollis</i>)	52	2		2	7	17	1
Collared forest-falcon (<i>M. semitorquatus</i>)	8	1		3	2	2	1
Mottled owl (<i>Ciccaba virgata</i>)	23						
Black-and-white owl (<i>C. nigrolineata</i>)	1	2					
Total	136	15	2	5	9	19	5

^a Trap types include: BC = bal-chatri, NC = noose carpet; SGT = swedish goshawk trap; ET = envelope trap; WHT = wire hoop trap; PT = pole trap; and MN = mist net.

Young that were out of view in nest cavities 2 m deep were successfully extracted using this method.

Mist net. Mist nets were in place from daybreak to mid-afternoon from January to May 1991-1993, for studies of passerine birds (D. Whitacre, The Peregrine Fund, Boise, Id., pers. commun.). We used Association of Field Ornithologist mist nests with dimensions 12 x 2.6 m of 36-mm mesh. One trapping day consisted of 16 mist nests opened for 8 hours. We recorded raptor captures during 15,360 hours of net use.

Captures and implications

From 1989 to 1993, we trapped 191 raptors at Tikal National Park using an array of trap types and techniques described (Table 1). In this tropical environment, 136 (71.2%) raptors ranging from small forest-falcons to large hawk-eagles were trapped with bal-chatris (Table 1). Another trap type that yielded satisfactory results was the noose carpet and its modifications. Noose carpets placed at nests, at entrances or branches to nests, or on resting perches worked well for trapping some raptors. Using line trapping, 6 birds were caught in a 1-month test period, including 3 roadside hawks (*Buteo magnirostris*), 2 barred forest-falcons (*M. ruficollis*) and 1 bicolored hawk (*Accipiter bicolor*). All mist netting produced just 5 captures (2 roadside hawks, 1 barred forest-falcon, 1 bicolored hawk, and 1 plumbeous kite [*Ictinia plumbea*]).

The most effective and versatile trap and simplest to set in this tropical forest was the bal-chatri or a modification of it. Also, the bal-chatri was used most often because building materials were readily available and construction was easy and inexpensive.

We do not encourage the use of mist nets for trapping raptors. The effort and time to set, close, and maintain mist nets was unproductive compared to bal-chatris. Other traps used were also less effective except the wire hoop trap for forest-falcons.

Special precautions are needed in the tropics because of extreme environmental conditions. Sunlight is often intense and can harm a lure animal. We recommend placing traps in the shade and providing water for bait animals, especially when traps are set in trees. Reflection of sunlight off leaves and the warmer temperatures in the upper canopy can cause dehydration. All reptiles used as lure animals should be positioned out of the direct sunlight because even a few minutes exposure to direct sun can kill them. Frequent and conscientious trap checking should reduce injury to and discomfort of the lure animal.

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