Methods for capturing African fish eagles on water

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Abstract Twelve adult African fish eagles (*Haliaeetus vocifer*) were captured on water using a floating fish "snare vest" on Lake Victoria near Entebbe and Lake Mburo in Uganda. The snare vest comprised 8–12 monofilament nylon snares attached to a floating 15–25-cm Nile tilapia (*Oreochromis niloticus*). Capture success was 17% of birds that struck the bait at Lake Mburo and 10% at Lake Victoria. The success rate was dependent on multifactorial local site conditions, operator experience, and snare design. The methods described are the first detailed report on the capture of this species, and the snare vest highlights subtle variations in technique from those reported for the capture of other large eagle species.

Key words African fish eagle, floating fish snare capture methods, *Haliaeetus vocifer*, snare vest, Uganda

The African fish eagle (*Haliaeetus vocifer*) is a large (2.1–3.6 kg), highly territorial, tertiary avian predator with a wide distribution along lakes and waterways throughout sub-Saharan Africa (Brown 1980). The fish eagle is reported to be predominantly piscivorous (Stewart et al. 1997). A number of authors have described the biology of the species in various locations (Brown and Hopcraft 1973, Brown 1980, Sumba 1988, Krueger 1997). We required a capture method for this species in order to collect blood and feather samples for an eco-toxicological study. At our study sites we never observed fish eagles taking prey except over water. Multiple attempts to entice adult fish eagles to a fish-baited bow net set at various locations on land failed. Therefore, due to the research samples required and the fish eagle's dietary preferences, we required a safe and efficient method of capturing adult fish eagles on water.

Numerous reports describe the use of snares to capture raptors (Prevost 1984, Hodges et al. 1987, Bub 1991, Thorstrom 1996). Fewer describe the capture of large raptors on open water (Frenzel and Anthony 1982, Bloom 1987, Cain and Hodges 1989). The snare vest we describe to capture fish eagles is a modified version of that described by Cain and Hodges (1989) for the capture of bald eagles (*H. leucocephalus*), which differ in behavior, habitat, and size from African fish eagles. No known studies have described in detail the temporary capture of adult and nestling African fish eagles for scientific research.

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Methods

African fish eagles were captured at Lake Mburo, a 6-km-long freshwater lake in a 256-km^2 national park in southwestern Uganda, and on Lake Victoria at Entebbe, Uganda, from Nfo Island (0°00′N, 32°26′E) to Kisubi Bay (0°05′N, 32°35′E). Fish eagles were sampled in July, August, and December 2002 at Lake Mburo and August 2002 and January 2003 at Entebbe. Forty-five percent of birds were sampled between 0600 and 1200 hours and 55% between 1200–1800 hours.

Adult fish eagles were captured on the water using a "snare vest" technique. At Lake Mburo, a 3-man, 3 × 1.46-m inflatable boat with a 5-horsepower (hp) outboard motor (SeaEagle Boats, Port Jefferson, N.Y.) was used. At Entebbe, a 4-man, 6.1-m local fishing vessel powered by outboard motors from 5–40 hp was used. Nile tilapia *(Oreochromis niloticus)* 15 to 25 cm in length and weighing approximately 300 to 400 g were fitted with snares. We made a ventral midline incision from the fish's anogenital opening to the lateral fins and removed the viscera. We inserted styrofoam and small pebbles in the coelomic cavity and mouth so the fish would float laterally on the water surface (Figure 1*a*). The pebbles were placed after the styrofoam in positions and numbers that would best ensure that the fish floated laterally. We sewed the body cavity and mouth closed with a loosely tied simple continuous suture pattern using 3.6-kg (8-lb-test), 0.12-inch-diameter monofilament fishing line (Stren Fishing Lines, Madison, N.C.). Multiple loops used to make the snares were constructed from 11.3-kg (25-lb-test), clear or pale green monofilament nylon, 4.8-mm (0.19-inch)-diameter fishing line (Pure Fishing, Spirit Lake, Ia.). A 60–80-cm piece of 11.3-kg line was cut and a "figure eight" knot tied loosely in one end (Figure 1*b*, *c*). We then placed the end of the line used for the final knot through one circle of the eight to create a slipknot, and excess line was pulled through to make 5–6-cm-diameter snares and a free end of line (Figure 1*d*). We applied tension to the line using hemostats to loosely set the knot, and excess line near the slipknot was cut. Eight to 12 snares were made per fish. The free end of the line was threaded through an eyed needle that was used to penetrate the body of the fish, including the styrofoam in the body cavity. This allowed the line to exit on the underside of the fish as it floated laterally in the water. We placed snares uniformly across the fish, covering its surface. The free ends of the line were brought together and held in place by a lightly clamped hemostat. They were then tied onto themselves with multiple square knots, and the excess line was cut off.

The completed snare vest (Figure 1*a*) was then set aside until just before use. We used 27-kg (60-lb-test), 6.3-mm (0.25-inch)-diameter monofilament fishing line (Danielson Company Inc., Auburn, Wash.) to attach the snare vest to a wooden reel, manually held by an operator. The reel end was attached to an anchor point in the boat to prevent accidental loss by the operator. To prepare the snare vest for immediate use, the free ends of the 11.3-kg snare lines were attached to the 27-kg line by a series of square knots. The snared fish was then placed in the water at distances of 6.1 to 30 m from the boat. Once an eagle was captured, line tension was maintained. Fish eagles swim well, so there was little risk of drowning. We used shoulder-length, Kevlar-lined animal-handling gloves (VetPro Warden gloves, Medical Service Associates, Newington, Conn.) to retrieve the eagle by securing both legs in the tibiotarsal region. Once all samples had been collected and measurements taken and recorded, the eagle was placed in a large cotton sack, weighed, and released from land at the closest point possible to the capture location.

When releasing eagles, it was important to choose the release site carefully. It had to be within the eagle's territory or in an area where the bird would not be attacked by con-specifics. A release site with a view of the water body, and far enough back from the shoreline so the eagle could orient itself before attempting flight, proved optimal. Average time from capture to release was 32 minutes (range 20–45). Optimum time of day for capture at both sites was early morning (0700–0900 hours) and late afternoon (1600–1800 hours), corresponding to observed peak eagle fishing activity.

Results

Twelve adult eagles were captured (10 at Lake Mburo and 2 at Entebbe) using the snare-vest method. The ratio of number of eagles caught to eagle attempts to take the snared fish was 1:6 (17.0 %) at Lake Mburo and 1:10 (10.0 %) for Lake Victoria at Entebbe. The ratio of number of birds caught to number of times the snared fish was offered to a fish eagle, irrespective of whether an attempt was made to catch the snared fish, was 1:8

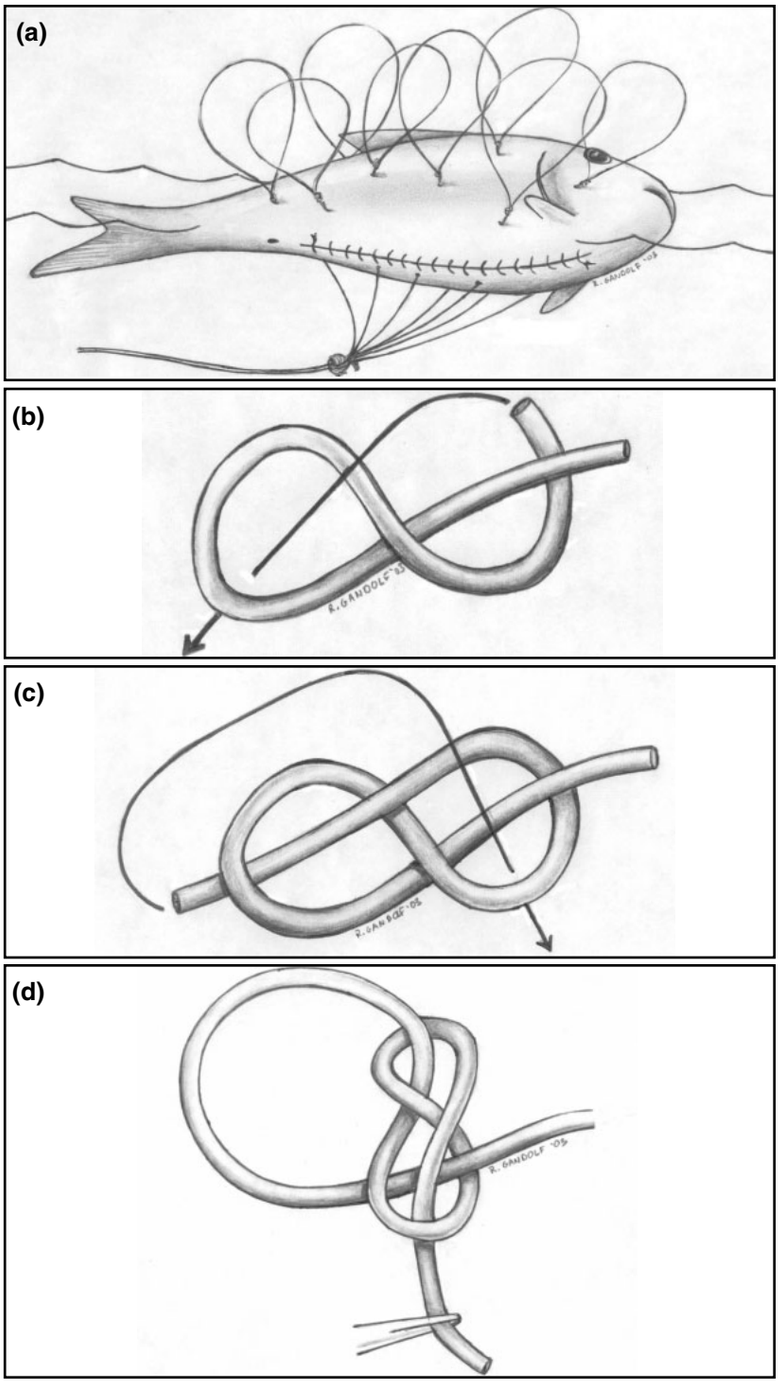

Figure 1. Snare vest utilizes Nile tilapia (*Oreochromis niloticus*). Note that fish floats laterally due to Styrofoam in the coelomic cavity and small pebbles in the mouth. A total of 8 to 12 snares were made per fish (a). A modified "figure-eight" slipknot was used to tie nooses on the snare vest. To create the snares, a 60–80-cm piece of 11.3-kg-test line was cut and a "figure eight" knot tied loosely in one end (b, c top view). The end of the line, used for the final knot, was then placed through one circle of the 8 to create a slipknot, and excess line was pulled through to make 5–6-cm-diameter snares and a free end of line (d bottom view). Drawings by A. R. Gandolf.

(12.5%) for Lake Mburo and 1:36 (2.7%) for Lake Victoria. Eighty capture attempts using this method were made over 10 days at Lake Mburo, and 72 attempts were made over 9 days at Entebbe. Ten eagles (83%) were trapped by a snare encircling the bird's third (middle) digit. There appeared to be no area of the fish that was struck consistently by the birds. In addition to the above results, 24 more capture attempts were made at Lake Mburo with 4 or fewer larger snares (10–12-cm-diameter), with no other changes to the method. None of these attempts proved successful. Similarly, in 10 additional capture attempts at Lake Mburo, fluorescent green fishing line was used when no other line was available. No other variations were made to the technique. No eagles were captured. In total, including the variations just mentioned, 114 capture attempts were made over 10 days at Lake Mburo.

Discussion

A number of variables appear to be important to the success of our method for this species. Small numbers (<5) of larger snares (>8 cm) were not successful during this study compared to larger numbers of smaller snares. However, the use of 4 larger snares has proved successful for the capture of bald eagles, with a reported success rate of 50% of all birds that took the bait (Cain and Hodges 1989). Other studies on bald eagles reported in Cain and Hodges (1989) give capture-success rates varying from

25% to nearly 100%. These rates were higher than those achieved in this study. Reasons for our lower success rate may include the abundance of prey items at our study sites, level of operator experience, variation in local eagle population densities and site conditions, as well as differences in species biology and behavior between bald and fish eagles. Our success with smaller snares may be related to the smaller body weight of the African fish eagle relative to the bald eagle. Similarly, the use of cryptic-colored fishing line also may be important because eagles always aborted their approach to the snare at the last moment when fluorescent line was used. We also found that using line heavier than 11.3 kg made it too difficult to create small, easily knotted snares. However, the small number of eagles captured means that quantitative evaluation of this capture method is difficult. Thus its efficacy when compared to similar methods (Cain and Hodges, 1989) in other species is difficult to determine.

Factors that were not evaluated, but could have contributed to the success rate at each site and overall, were local eagle densities, weather conditions (calm or agitated water), type of boat employed, eagle territoriality, interspecific (black kites [*Milvus migrans*] and Hammerkop [*Scopus umbretta*]) interference with snares, level of human fishing activity (fish eagles are opportunistic scavengers), and operator experience with the method.

The only complication arising from this technique was that on 2 occasions an eagle broke free of the vest with a snare encircled around the third digit. One of these eagles was captured on a subsequent attempt, and the snare was no longer present. It is suspected that the eagles could remove the slipknots with ease; however, this was not proven. Potential complications that to the best of our knowledge did not arise included eagles eating the styrofoam or the fishing line used to suture the body cavity. In future, we would recommend the use of commercially available absorbable suture materials to close the fish's body cavity. Ingestion of styrofoam might have occurred among a few birds that took the snared fish but were not caught. For this reason, sutures were loosely tied and broke upon impact with the eagle's talons, releasing the styrofoam and attached snares. Occasionally, this did not occur. However, we were usually able to observe the eagle eating the snared fish and never observed an eagle ingesting styrofoam.

Snare vesting as described in this paper may be an effective method to catch adult African fish eagles. The method has the advantage of simplicity, being usable in remote field locations where even the most basic equipment can be difficult to procure or replace. Use of a floating log with attached shock cord and bypass line, as described by Cain and Hodges (1989), was not attempted because local site conditions were unsuitable for this method. The often-subtle variations between the methods described here for the capture of adult African fish eagles and those reported for the capture of bald eagles highlight the importance of modifying techniques to suit local site conditions and individual species behavior and biology. With this in mind, our technique could have applicability to the capture of other large piscivorous eagle species.

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