



Title: Raptor Research Methods

SOP Number: 043

Purpose: To describe procedures for field studies of birds of prey (e.g., raptors), which include species in the Accipitriformes (hawks, kites, eagles), Falconiformes (falcons), and Strigiformes (owls). Procedures described here are accepted practices established by the Raptor Research Foundation in the volume Raptor Research and Management Techniques (D.M Bird and K. Bildstein 2007), by the Ornithological Council's guidelines for the use of wild birds in research (Gaunt and Oring 2010), and by The North American Banding Council's manual for raptor banding techniques (Hull and Bloom 2001), with the animal care and welfare issues directly related to birds of prey as discussed by Boal et al. (2010).

HEALTH AND SAFETY

Most raptors kill prey with their feet; thus, their feet are very powerful, have sharp talons (i.e., claws), and are behaviorally used as a defensive weapon. Control of the legs and feet of a captured raptor is a primary concern for the safety of research personnel. Some raptors will use their beak as a weapon. For Accipitriformes and Falconiformes, this can be reduced by the use of a falconry hood. A falconry hood is a leather or cloth instrument placed over the raptor's head to block out light and reduce visually induced stress. Not all diurnal raptors require hooding, and the experience of the researcher and reference to the literature is important for minimizing risk of injury to research personnel and stress to study animals. See section 5.0 below for suggested handling procedures.

Few avian diseases are transmittable to humans. For safety concerns regarding transmittal of disease, the information on avian diseases provided by the Animal Care and Use Committee should be referenced.

PERSONNEL/TRAINING RESPONSIBILITIES

Personnel should be trained by persons experienced in capture, handling, and processing raptors.

CAPTURE

There are many methods employed to capture raptors (Bloom 1987, Hull and Bloom 2001, Bird and Bildstein 2007). Methods used are dependent upon the species being studied and the time of year.

- A. Bal-Chatratri Trap. A bal-chatri trap is a wire (e.g., hardware cloth, chicken wire) cage with monofilament nooses attached to the top and sides (Bloom 1987). The bal-chatri is an effective, versatile, and safe trapping method for birds of prey (Bloom 1987, Gaunt and Oring 1999, Hull and Bloom 2001). An improved bal-chatri is a 'cage-within-a-cage' structure in which an inner cage containing the lure animal is separated from the outer cage by ½ inch. This reduces the risk of a talon from the raptor coming into contact with the lure animal.

1. Trapping with the bal-chatri.

- a. The bal-chatri is placed in view of a target raptor. The raptor is attracted by a lure animal(s) placed inside the trap (4.8). While trying to capture the lure animal, the raptor's feet become ensnared in the monofilament nooses. Although the trapper must move a discrete distance from the trap, the distance will depend on the structure of the immediate landscape as it affects the trapper's ability to observe the trap. Bal-chatri traps must remain under the observation of the trapper(s) at all times to ensure the safety of the lure animals and raptor. The bal-chatri is weighted so that it can be dragged slightly, but not carried away by the raptor.

B. **Noose Carpet.** A noose carpet is a piece of hardware cloth with monofilament nooses tied to it.

1. **Trapping with Noose Carpets.**

- a. The noose carpet is placed on a perch or other structure used by the targeted raptor. When the raptor lands on the noose carpet, its talons become snared in the nooses. The noose carpet is weighted so that it can be dragged slightly, but not carried away by the raptor.

C. **Dho-Gaza Trap.**

1. The dho-gaza is a mist net suspended between two poles. The net detaches from the poles when struck by a raptor. The dho-gaza is one of the most versatile and useful trapping techniques for raptor species (Bloom 1987, Gaunt and Oring 1999, Hull and Bloom 2001).

- a. **Trapping with the dho-gaza: breeding season.**

- i. Most diurnal raptor species become agitated and attempt to drive away great horned owls (*Bubo virginianus*) that come near their nests because the owls are perceived as a threat to the nestlings. A nesting raptor will also try to drive other raptors from its nest area. Thus, great horned owls or diurnal raptors are excellent lure animals for dho-gaza traps but can only be used by special permit from the U.S. Fish and Wildlife Service. The dho-gaza trap is employed by placing the nets near an active raptor nest, then tethering a great horned owl or conspecific raptor to a perch in front of the nets. The nesting raptor will swoop over the head of the lure bird in an attempt to drive it from the nest area. As the raptor passes over the lure bird it flies into the dho-gaza net.

- b. **Trapping with the dho-gaza: nonbreeding season.**

- ii. During the non-breeding season, foraging raptors can be lured into a dho-gaza net with a lure animal that would be normal prey for the raptor. The dho-gaza net is set up between the raptor and the

tethered lure animal. As the raptor flies in to attempt to capture the lure animal it becomes captured in the net.

D. Bow Net.

1. Bow nets consist of 2 semi-circular arcs of light metal or other material (e.g., PVC) with netting strung loosely between them (Bloom 1987). Hinges and springs connect the two semi-circles together at their bases. The lower half of the bow is attached to the ground with stakes. The upper half is bent over the lower half and latched into place.
2. Trapping with the Bow Net.
 - a. A lure animal is tethered or contained in a wire cage inside the hemisphere of the semi-circle to attract the raptor to the trap. When the raptor attempts to capture the lure animal, it either triggers the trap or the researcher manually springs the net. The hinged springs drive the upper half of the semi-circle over the raptor, effectively spreading the net over it.

E. Box Trap.

1. This type of trap is frequently referred to as a 'Swedish Goshawk Trap' and can be built in a variety of configurations. It is a box-like frame covered with netting and with a collapsing top or falling ends. The material of the frame can be made of various materials (e.g., wood, PVC) but the netting must be of fabric or plastic. Wire (e.g., chicken wire, hardware cloth) is not acceptable as injury to the feet and head of the raptor will result.
2. Trapping with a Box Trap.
 - a. The box trap is set in an area likely to be visited by raptors. It is one of the only trap types that can be left unattended for 3-4 hours if in a shaded and protected area. Inside the box is a cage with lure animals. When a raptor enters the trap to try to catch the lure animal(s), the top or sides close. The raptor is captured and contained unharmed in the trap and protected from other predators until the researcher returns.

F. Walk-in Trap.

1. Walk in traps are effective traps for burrowing owls.
2. The trap is a screen mesh cage placed over the burrowing owl's burrow. It has a one-way door in the bottom of the trap. As the owl exits the burrow it pushes the trap door to one side. Once the owl is through the door, the door falls back into place, preventing the owl from returning back down the burrow.

G. Hand Capture.

1. Hand capture is employed when capturing nestling raptors at the nest.

H. Lure Animals.

1. Lure animals are necessary for trapping raptors. Typical lure animals include the gerbil (*Gerbillus* spp.), house mouse (*Mus musculus*), house sparrow (*Passer domesticus*), European starling (*Sturnus vulgaris*), and pigeon (*Columba livia*) (Bloom 1987) for bal-chatri traps and bow nets. House sparrows, starlings, pigeons and chickens are also used in dho-gaza traps during the nonbreeding season, and in box traps. Great horned owls or other raptors are used as lure animals for dho-gaza traps during the breeding season. Any raptor used for trapping with dho-gaza traps are usually captive individuals that have been rehabilitated from injuries but are not releasable. Raptors used as lure animals are typically obtained from licensed wildlife rehabilitators and held under special use permits issued by the U.S. Fish and Wildlife Service.

2. Lure Animal Safety.

- a. There are no published guidelines as to acceptable lengths of time that a trap may be set with a lure animal. It is not feasible due to the variability in trap locations, lure animal, and environmental conditions the researcher may encounter. Trapping efforts are therefore subject to researcher experience, and discretion. In all cases, if the lure animals demonstrate any indication of overheating or chilling, the trap attempt should end and the lure animals returned to their cages.

HANDLING AND MARKING

Thousands of raptors are captured, measured, and banded each year at migration stations and by individual researchers (Hull and Bloom 2001). Common methods of capture and restraint for the purposes of banding have very little risk to the welfare of raptors (Bloom 1987, Hull and Bloom 2001). The greatest risk to a raptor that has been captured is overheating (Bloom 1987). Therefore, it is prudent that all captured raptors be processed quickly and in shade if available.

A. Restraint.

1. The most common methods of restraint are holding the bird and, for diurnal raptors, placing a falconry hood on the bird's head. For owls a light weight, darkly colored cloth may be draped over the head so as to remove visual stimulation and help calm the bird.
2. The wings may be restrained by 'socking' the bird; this involves sliding a nylon or cotton stocking over the bird's body starting at the head. The tube-like structure of the sock restricts the wing movement of the bird.
3. Specialized wraps (referred to as 'Abas') are also available from specialty suppliers. However, for banding and measuring, most birds only need to be held (Bloom 1987, Hull and Bloom 2001).

B. Banding.

1. Banding is the process of attaching a size-specific aluminum, numerically coded band to the leg of the bird (Young and Kochert 1987, North American Banding Council 2001). Research involving the banding of raptors requires possession of a federal banding permit issued by the U.S. Geological Surveys' Bird Banding Laboratory (BBL). State permits may also be required; in Texas, a scientific permit from the Texas Parks and Wildlife Department is required for any banding activities.
2. Additional banding with color-coded and/or alpha-numerically coded bands that allows visual identification of individual birds, (Young and Kochert 1987, North American Banding Council 2001) requires special authorization from the BBL.

C. Radio Telemetry.

1. Attaching GPS/GSM/VHF transmitters to wildlife species is an important research technique and requires authorization from the BBL. Except under special conditions, transmitters shall not weigh in excess of 3% of the raptors body weight (Kenward 2001).
2. Backpack Radio Attachment.
 - a. This is a frequently used method of radio attachment that allows attaching a transmitter to a bird for long periods of time (Kenward 2001).
 - b. The transmitter is placed between the wings on the back of the raptor. Teflon ribbons are attached to each side of the transmitter, going over and under the wings and attaching over the breastbone of the bird in an 'X' configuration; each transmitter is custom fitted to the individual bird being radio tagged to ensure a proper fit.
 - c. This method should only be used by someone with prior experience with the technique or has received instruction from someone who has.
3. Tail Mount Attachment.
 - a. Attaching transmitters to the tail of raptors is a common method for short-term studies; although still viable for some studies, the method is becoming antiquated.
 - b. Tail-mount attachment of transmitters involves placing a transmitter along the proximal end of the rachis of one of the central tail feathers.
 - c. Epoxy is placed in a groove on the transmitter and against the rachis. The antenna of the transmitter is laid along the length of the rachis and attached at two to four points by tying with dental floss and super-gluing the nodes.
 - d. The duration of studies using the tail-mount system is limited by the annual molt of the raptor, during which the transmitter will be lost with the tail feather.
4. Leg-loop Harness.
 - a. This is a figure-eight leg-loop harness originally designed for use on passerine and shorebirds (Rappole and Tipton 1991, Sanzenbacher et

al. 2000); it has since been found to be a useful method for some raptors (Walls and Kenward 2007).

- b. The leg-loop harness is constructed from a non-abrasive material; usually Teflon ribbon.
- c. The ribbon is threaded through the three mounting loops built into the transmitters.
- d. The two leg-loops are slipped over each leg of the raptor and cinched down snugly and evenly at the transmitter, with the transmitter located over the synsacrum area anterior to the uropygial gland.
- e. Once adjusted, a knot is tied to secure the loops, the free ends are cut and superglued.
- a. Before using this technique, personnel should receive training from an experienced individual and will require specific permitting from the BBL.

BLOOD SAMPLING

Individual raptors will be weighed prior to sample collection. Blood samples are typically collected non-lethally via brachial or median metatarsal veni-puncture (Monks and Forbes 2007). No more than 1% of body weight will be collected at one time (i.e., 1 ml from a 100-gram bird) (McGuill and Rowan 1989). The blood sampling component of this SOP is derived primarily from The Institute of Environmental and Human Health (TIEHH) blood sampling protocol (SOP IN-3-08-01).

A. Blood Sampling.

1. Blood sampling information (project number, animal ID number, sample identification number, amount, date, time post dose etc.) will be recorded on the appropriate data sheets as specified by study protocol.
2. Site Preparation.
 - a. The raptor will be restrained by an assistant as described in Handling and Marking, A.1. Dab the area to be sampled (the brachial or median metatarsal vein) with approximately one-half cc of alcohol prior to sampling. Move the feathers away from the vessel to be sampled.
3. Drawing Sample.
 - a. Insert the needle, then slowly withdraw the plunger at a rate that allows the incoming blood to keep up with the pull of the plunger. Do not create a large vacuum in the syringe, as this will cause the needle's bevel to adhere to the side of the vessel, blocking the flow of blood into the syringe. Once the blood is drawn, remove the needle from the vessel and apply light pressure to the injection site with a piece of clean cotton, maintaining pressure until all bleeding stops (approximately 30 seconds).

EUTHANASIA

It is very rare for a raptor to be injured or killed during trapping or handling. Raptors are federally and state protected species and death is not an expected endpoint in any field study

of raptors, including capture, handling, marking and radio-tagging. Therefore, raptors will be euthanized only if they experience debilitating injury during the capture and handling process. Any raptor injured will be assessed as to extent of injury. If the injury appears to be one from which the raptor may recover, it will be transported to a trained, state and federally licensed wildlife rehabilitator.

In the event a raptor experiences a debilitating injury during capture and handling, it will be humanely euthanized. Many techniques for euthanasia have been reviewed by the American Veterinary Medical Association (Andrews et al. 1993). Relatively few are appropriate for birds, and none consider the needs of field studies. If the injury occurs within reasonable access to a veterinary or wildlife rehabilitation facility, euthanasia will be by overdose with an anesthetic, either injected or gaseous (including carbon dioxide) or administration of a specific euthanasia compound (usually based on barbiturates). In field studies of raptors, euthanasia is a procedure for rapid alleviation of pain and suffering. Hence, speed is important; an animal already dying from severe trauma should be terminated by the fastest available method compatible with preserving the desired portions of the specimen. In the event that a situation arises requiring on site field euthanization, the method will be cervical dislocation. This method is approved as a physical method of euthanasia for small birds when necessary in field situations (AVMA Guidelines for euthanasia of animals: 2020 edition; page 81). Any incident in which euthanization is required will be reported to the TTU IACUC.

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