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TECHNIQUES FOR CAPTURING COMMON BARN-OWLS

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Improved research techniques will aid in the study and management of Common Barn-Owl (*Tyto alba*) populations. Many aspects of barn-owl behavior, population dynamics, and ecology are unknown or poorly understood; and, to an extent, these voids exist because of (1) the difficulty of studying a nocturnal species and (2) the lack of effort and absence of specific techniques to consistently capture adult owls. Assumptions may be made about barn-owl pair-bonds, nest-site fidelity, dispersion, longevity, parental care, and range; but only through capture and recapture of adults (sometimes in combination with radiotelemetry) can these components of barn-owl natural history and ecology be fully addressed. In this paper, we will describe various techniques and considerations, when attempting to capture adult barn-owls at roost and nest sites, that resulted from our study of a Common Barn-Owl population in SW New Jersey, 1980–1985 (Colvin 1984, Colvin et al. 1984, Hegdal and Blaskiewicz 1984).

METHODS

Hoop nets.—Long-handled, aluminum, hoop nets (e.g., landing net) were fitted with a bag of mist netting (10.2 cm mesh). Handles of these nets were 92 cm long (2.5 cm diameter); hoop diameters were 50 to 110 cm. Lengths of conduit, 1.5 or 3.0 m long (1.9 cm diameter), were inserted into the handles to provide extension when necessary. Day-roosting owls were flushed into hoop nets placed over silo, barn, or water tank exits. Owls brooding or roosting in tree cavities or enclosed nest boxes commonly were captured in this manner. At night, hoop nets were used inside barns or at tree-cavity nest sites to block exits once an owl had entered.

Mist nets.—Mist nets most often used were 2.1 × 5.5 m or 2.1 × 9.1 m (10.2 cm mesh). When used in farm yards, they were placed in probable owl flight paths, often determined from observations of owls at night. In many cases, double-tiered mist nets were used, and telescoping poles (conduit, 3 m sections, 1.3 and 1.9 cm diameters) with hose clamps provided a working height up to 5.8 m.

For night capture inside barns, a single mist net (2.1 × 5.5 m) was placed high and across the width of the barn. A rope tied to the top-center of the net was used to pull it to the barn peak. Placed near the center of the barn, the net either caught the owl or blocked its quick exit, allowing time for individuals with hoop nets at the ends of the barn to block exits. Additional mist nets (or straw bales, plywood) covered major doorways and holes that were not entrance points but might be used as exits (most entrance points were high and at peaks).

A mist net, pulley system also was used at night to block window exits in barns. A section of mist netting (e.g., 1.5 × 2 m) was attached between 2 poles (2.5 cm diameter, 1.5 m in length) and rope (approx. 15 m long) was tied to each end of 1 pole. These ropes then were laced through pulleys that were nailed to the barn wall to the side of, and above, the particular window. One of the ropes passed through a single-runner pulley and then across and through the second pulley which had 2 runners; both ropes then were tied together, and thus could be pulled simultaneously. Two additional ropes were tied at an angle between the inside barn wall near the pulleys and the barn floor. Ends of the poles were rested on the angled ropes and the netting was hoisted up and hung below the window. The mist net then could be quickly raised to block the window, without entanglement on the barn wall, when an owl entered the barn.

Trap doors.—In circumstances where owls used small holes, such as entrances to nest boxes (approx. 15 × 15 cm) in barn walls (Colvin 1983), we used a trap-door device made by modifying a snap trap (rat size, 8.3 × 17.0 cm). The leading end of the snap trap (5.5 cm) was cut off, leaving the mechanical end intact (12.0 cm). Also, the bait portion of the trigger was cut off leaving 2.0 cm. A sturdy piece of cardboard was folded over the U-bar and attached securely with tape and wire. The trigger arm passed through a hole punched in the center of the cardboard. The completed cardboard door was approximately 18 cm wide and 20 cm long; it was painted either red, gray, or white to match the barn color. Two holes were drilled in the wooden portion of the trap, so that it could be attached with screws to the outside barn wall to the right (because of the trigger orientation) of the nest box entrance. A block of wood the same size and color as the trap, or sometimes an unset trap, was nailed to the barn wall for 1–3 nights prior to trapping for the owls to adjust to it. Before sunset on the day of capture, the block of wood was replaced by the trap door and the young were confined to the rear half of the nest box by cardboard (15–25 cm high). A fine dark string was run at a 45° angle from the trap's trigger, and then through a series of eye screws to the ground or into the barn, where it could be pulled, springing the trap door when an adult owl entered the box with prey for the young. Additionally, a 20 × 35 cm pressure pad (4 mm masonite) was placed in the front half of the nest box below the entranceway. The underside of the pad had 3 microswitches wired in parallel and connected by 15 m of 20-ga speaker wire to a 12-volt battery with an indicator light and optional buzzer. Small pieces of foam rubber, also attached to the pad's underside, kept the switches off. When an adult owl stepped on the pad, the foam rubber was depressed, at least 1 switch activated, and the light and/or buzzer turned on, signaling the appropriate time to spring the trap door.

A trap-door system was used also in the entryway of a silo top. This involved a 0.7 × 0.7 m door that we attached above the silo opening, and which could be opened and closed by pulling or releasing a rope

that extended from the door, through a pulley system, to the inside silo base. When an owl entered the silo at night, the rope was released, closing the door and sealing the silo.

Noose carpets.—Noose carpets were used at night at tree cavity entrances and regular perching locations (e.g., window ledges, tree limbs). They were made of hardware cloth (12 mm square screening) that was cut to fit placement location. Length varied from 15 to 60 cm; width ranged from 6 to 15 cm. Nooses were made of monofilament fishing line (5.4 kg test) (Berger and Mueller 1959, Jenkins 1979). Open nooses had a 4- to 5-cm diameter. The carpet was attached to the tree or building by a 2-m elastic cord (available from a fabric store) and also by a much longer non-elastic cord (heavy-duty string). The elastic cord prevented the owl from pulling against a solid object and being injured or possibly escaping; the non-elastic cord acted as a safety device in case the elastic broke. A fishing weight (60–90 g) was attached to noose carpets to increase their weight, and thereby helped to close the nooses quickly, and keep them snug on the owl's foot, when the owl flushed.

Hand.—During the day, owls could be cornered or blocked in enclosed nest boxes or tree cavities and captured by hand. Sometimes an extended reach was supplied by a length of coat-hanger wire (approx. 1 m) with a bent, U-shaped, end (U length approx. 4 cm, width approx. 1 cm). This "chicken catcher" was slipped around the owl's leg and allowed extraction of both adults and young. It was attached to a pole if the cavity was exceptionally deep.

With an enclosed nest box mounted against an inside barn wall (Colvin 1983), it was possible during the day to block the nest box entrance from outside the barn with a block of wood attached to the end of a long pole (i.e., telescoping lengths of conduit), quietly place and climb a ladder, move the block aside, and peek in the box without breaking the plane of the entrance. If an adult female was present but with eggs or young <2 wks of age, the entrance again was blocked, the ladder removed, and the block quietly moved away. If such were the findings at tree cavities, we quietly climbed back down and removed the ladder.

Release.—Owls captured at the top of silos, water towers, or trees were placed in zippered, cotton pillow cases and lowered to the ground with rope and pulley for banding, measuring, and radio-instrumentation. Those captured during the day were released inside the structure where captured, while those captured at night were released outside at the site.

RESULTS AND DISCUSSION

We had 293 captures of adult Common Barn-Owls and 10 of free-flying juveniles. This represented 193 different individuals: 183 adults (102 females, 81 males) and 10 juveniles. Forty-six percent of the captures were made during the day, 54% at night. The technique that we chose day or night, and for various capture sites (e.g., barn, silo, tree cavity, nest box, water tank), depended upon our experience of the most effective tool given that situation. We consider hoop nets to be versatile

tools during the day (83% of our day captures). Use of a block of wood on a long pole to cover a nest box entrance is the most simplistic and sure process for capturing a barn-owl; we anticipate much greater use of this daytime technique now that 74% of our population is nesting in boxes. Among 66 day-capture attempts 1984–1985, 65% were successful including 12 of 13 at nest boxes (92%), 17 of 26 at barns (65%), 3 of 5 at tree cavities (60%), and 11 of 22 at silos (50%). These proportions of successful day captures indicate the relative ease and likelihood of successful capture among various types of roost and nest sites. The number of capture attempts at these locations reflects where we could locate roosting and nesting owls, and not where barn-owls most commonly roosted or nested (Colvin et al. 1984).

Trap doors accounted for 44% of our night captures and this is the technique that we recommend for nest boxes. A noose carpet provides an option for nest boxes, especially when an owl will land on a nest box entrance but avoids entering. Noose carpets also were effective at tree cavity entrances and other perching locations. Mist nets and hoop nets worked well inside barns if captors reacted quickly to the sudden presence of an owl in the barn, and if there were no exit points unblocked. We do not recommend the use of mist nets outside of structures (i.e., barn) if other options are available, since this process is less sure and controllable than other capture methods. Also, setting up mist nets, and taking them down in the dark, usually is more time consuming than other techniques; use of mist nets should be considered secondarily. Among 45 night-capture attempts at nest sites in 1985 (and based on 5 yrs of experience on which technique is most effective at various types of nest sites), 29 nights of trap door use resulted in 40 captures, 14 nights of noose carpet use resulted in 10 captures, and 2 nights of mist net/hoop net use resulted in 3 captures.

Although Common Barn-Owls are highly nocturnal in North America, we recommend night captures at roost and nest sites only if daytime efforts fail. Capture attempts during the day are much easier and less time consuming than at night when owls are active. In 1984–1985, our average day-capture attempt took 0.5 hours (2.3 people) to prepare and complete, and this resulted in 0.8 hours of work per owl captured. In contrast, in 1985, the average night-capture attempt involved 6.0 hours (1.5 people) and this resulted in 4.9 hours of work per owl captured.

Often females can be captured during the day when brooding or roosting with young (especially when young are <4 wk old). Fifty-one percent of all female captures were made during the day as compared to 34% of all male captures. However, we found that both adults tend to roost away from the nest site (i.e., farmstead) as nesting progresses (especially when young are >4 wk old). Diurnal roost sites of adults may be as far as 8 km from the nest (Hegdal and Blaskiewicz 1984). Thus, although more complicated and time consuming, night capture often is necessary.

Most night captures of adults (81%) were made during the first foraging period, within 1–3.5 h after sunset, as adults brought prey to their

young. We have observed, through radiotelemetry with 43 adults and night-capture efforts, that feeding activity by adult barn-owls declines after midnight and thus the opportunity for capture also declines, at least until the early morning feeding period (1–2.5 h before sunrise). Therefore, we principally directed our capture activities at the first half of the night. Mean capture time (25 May–15 July, 1982–1985) was 2248 h (2 h 18 min after sunset) and range was 2045–0340 h (20 min after sunset to 1 h 20 min before sunrise, $n = 116$).

Male barn-owls generally brought the majority of prey to the young; in the latter half of nesting, females may not participate in bringing prey to the nest (Colvin 1984). Therefore, males were often taken at night, particularly late in the nesting period as the young neared fledging, whereas the likelihood of capturing the female at night often diminished. However, when we captured or observed both adults at a nest in a single night, the female generally visited the nest first (84% of the time in a sample of 37 pairs; $\chi^2 = 15.568$, $P < 0.001$). Thus, capture efforts can be directed at the first or second bird to arrive, depending upon which mate has already been caught. When determinable (25 May–15 July, 1982–1985), average time of first arrival during the first foraging period was 2134 h, 1 h 4 min after sunset, for females ($n = 29$) and 2200 h, 1 h 30 min after sunset, for males ($n = 40$).

Although males can be captured from nearby structures without disturbing incubation, capture of females during incubation may cause nest abandonment. Eight times we captured incubating females (3 of them had clutches that had begun to hatch) and all but 1 abandoned. We blocked the 1 female that did not abandon into its nest box for 15 min after capture and she did not flush. Others were not blocked into boxes or cavities when released and all flushed. Additionally, in 3 of 8 cases when we inadvertently flushed an incubating female, without attempting capture, abandonment resulted. Although we and others have observed considerable variation in the inclination of incubating barn-owls to flush, we believe any activity that may cause a female with eggs or newly hatched young to flush should be avoided. In general, we followed and recommend the procedures for minimizing disturbance to nesting birds outlined by Fyfe and Olendorff (1976). For example, we avoided disturbance and capture activities in the immediate post-hatching period (young <2 wk old). Also, capture of adults at nest sites late in the nesting period (young >7 wk old) should be avoided, because the young may leave the nest prematurely. Capture activities at nest sites during the post-hatching period generally should not last all night because this may limit the adults' ability to feed young that night. We necessarily conducted some prolonged capture activities at night; however, in these cases, we always fed the young.

Knowledge of barn-owl vocalizations can be essential to the post-hatch timing of adult capture and can greatly facilitate locating barn-owl nests. This is particularly so for any nest site, such as a shallow tree cavity (<1 m deep), where if checked during the day, there is a strong possibility

of flushing an incubating female. Young barn-owls consistently give a rasping begging call throughout much of the night. However, because adult females also give this call sporadically during courtship, incubation, and immediate post-hatching periods, care must be taken to listen for multiple voices. The begging calls of a female usually sound lower in tone and more robust than that of a young. Also, when a nest site is approached at night, adult alarm calls (intense shrieks) are highly suggestive that young have hatched.

To conduct vocalization surveillance at potential nest sites, we equipped a truck with a roof-mounted, 64 cm, aluminum parabolic reflector that could be rotated from inside the vehicle. A microphone was mounted on the parabola, and a headset was used inside the vehicle. Sometimes we used a hand-held, plastic parabolic reflector, but, most commonly, we simply listened by ear.

Noise by captors must be limited during the capture process. Although unusual noises will draw the attention of day-roosting owls, common sounds such as tractors and lawnmowers sometimes can provide excellent backgrounds, during which trees or silos can be climbed. When using an extension ladder, it must be placed and climbed slowly and quietly.

For night capture, equipment and individuals should be situated by sunset. Individiuals involved in the capture process should be well hidden or at least situated where they will not be in the owl's direct view and make no movement or noise. We camouflaged ourselves with bee helmets and dark clothing to hide our form and limit harassment by insects that might cause us to move. Whenever possible, we hid inside buildings, and in some cases we used night-vision goggles and radio communication to help observe and coordinate events during the night.

An adult barn-owl may readily change its roost site after a daytime capture attempt. For example, among 34 of 45 unsuccessful daytime attempts (75%), we did not find the owl at the same day roost within 1–2 mo. Additionally, barn-owls quickly become trap-shy after unsuccessful night-capture attempts. When an adult responds with repetitive alarm calls to the capture set-up or captors at a nest site, capture activities should cease; further efforts that night usually are unsuccessful. By continuing these efforts, there is considerable risk of enhancing trap-shyness. Barn-owls are capable of locating hidden captors on subsequent nights and may respond with alarm calls to them and equipment (e.g., unoccupied vehicles, nets, and ladders) associated with previous capture attempts. Therefore, we typically allowed at least 3 nights between capture attempts at the same nest site, sometimes changed capture methods, and always tried to change where or how we hid.

No owls were injured during our capture activities. However, we experienced great need for safety precautions for ourselves. Considerable climbing was required and was potentially hazardous, particularly when trying to capture and control an adult owl at the top of a silo or in a tree. Additionally, night capture often involved many hours in trees, on ladders, or in barns, and disorientation in the dark often resulted, proving

hazardous when sudden efforts were required to capture an owl. Climbing belts and rope were used in many situations to prevent falls.

Others have used different techniques to capture Common Barn-Owls. Barn-owls nesting in cut banks in Colorado have been captured by lowering an individual by rope down the bank face, blocking the cavity with a hoop net or by hand, and removing owls either by hand or by snaring their foot with a noose pole (B. Millsap, pers. comm.). Millsap also had some success in adult capture near nest sites, shortly after young had fledged, using a dho-gaza trap (Hamerstrom 1963, Clark 1981) with a tethered Great Horned Owl (*Bubo virginianus*). Also, verbail traps (Stewart et al. 1945) and mist nets have been used in southern New Jersey in foraging areas (e.g., salt marsh) to capture owls during fall migration (K. Duffy, pers. comm.). Martin (1986) modified and used a Swedish goshawk trap (Meng 1971), and principally used nest boxes with trap doors, to remove barn-owls from inside of warehouses in southern California. Verbails, mist nets, noose carpets, and bal-chatri traps (Berger and Mueller 1959) have been used during the nesting season in savannah rangeland of southern California (P. Bloom, pers. comm.). Bloom has successfully used noose carpets at tree nest sites, sometimes using an artificial perch upon which he placed the noose carpet. Bloom also reported excellent success using bal-chatri traps containing a gerbil (*Meriones* sp.), an albino house mouse (*Mus musculus*), and dry leaves near nests and in roosting and foraging areas. He attached an elastic cord to an anchor point, as previously described for noose carpets, and often camouflaged the bal-chatri with leaves or grass. However, barn-owls ignored bal-chatri traps in our similar attempts to use them on farmsteads in New Jersey.

SUMMARY

During spring and summer 1980–1985, 303 captures of 193 different Common Barn-Owls were made in southwest New Jersey, including 293 captures of adults (183 different individuals) and 10 captures of fledged birds of the year. Most daytime captures were made at roost or nest sites with hoop nets. Captures made at night were at nest sites and included use of trap doors, noose carpets, hoop nets, and mist nets. The technique choosen for night capture depended upon nest location; trap doors worked well with nest boxes, noose carpets were successful at nest box and tree cavity entrances as well as perching locations, and hoop nets and mist nets were effective inside barns. Well planned, executed, and successful capture methods require experience and often a team approach, but should provide a mechanism for investigating barn-owl natural history, ecology, and population demographics.

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