Short Communications

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Using Prey Enclosures to Lure Fish-eating Raptors to Traps

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Many techniques are used for capturing raptors (i.e., Bloom 1987, Bub 1991, Shemnitz 2005, Bloom et al. 2007), although trapping methods often need to be tailored to specific species or even individual birds (Bloom et al. 2007). Raptors are typically captured using nets (e.g., mist net, bow net, dho-gaza) or leg traps (e.g., noose carpet, bal-chatri, padded leg-hold; Bloom et al. 2007). However, some of these methods require extensive or constant monitoring, which reduces efficiency when research budgets are limited (Buck and Craft 1995). Although some traps may be widely applicable and ultimately result in a capture of a particular species, a good trap is one that maximizes capture rate and efficiency while ensuring study animal safety. Additionally, reliance on one trapping method alone for recapture studies can become problematic if individual birds become trap-shy.

The Blakiston's Fish-Owl (*Ketupa blakistoni*) is a large, endemic resident of northeastern Asia. Although most of the global Blakiston's Fish-Owl (hereafter ''fish-owl'') population is found within Russia, little substantive work has been done there on this endangered species (Slaght and Surmach 2008). Other than an opportunistic capture of a fish-owl by one author (SA), prior to the study described here, fish-owls have not been captured for marking and release in Russia. In Japan, fish-owls were captured and released using mist nets at stocked fish ponds (Hayashi 1997), and congeneric Tawny Fish-Owls (*Ketupa flavipes*) were captured in Taiwan using foot-snare traps at fish farms (Sun et al. 2000) by securing snares to the ends of long fishing poles (H. Sun pers. comm.). Fish-owls were historically trapped by the indigenous Udege people of the southern Russian Far East (Vorobev 1954, Mikhailov and Shibnev 1998), and by Manchurians in northeastern China (Meise 1933). These two groups considered fish-owls a food source and captured them with leg-hold traps set on stumps suspected to be fish-owl hunting perches (Slaght and Surmach 2008).

Fish-owls are wary birds that often flush at great distances (>150 m) when approached by humans (J. Slaght unpubl. data). They are year-round residents of mixed species old-growth riparian forest, with winter home ranges (ca. 4–12 linear km along a river) restricted to open-water sections of the river that resist freezing (Pukinskii 1973, Surmach 1998). At other times of the year, fish-owls appear to move more freely and are much more difficult to locate (Slaght and Surmach 2008). Given this limitation, fish-owl capture is best attempted in winter. However, fish-owl foraging areas can consist of multiple small ice openings in rivers spread across several square km, which makes identification of appropriate trap sites difficult. We know of no method either to predict which of the possible foraging areas will be visited, or when they will be visited. As part of a study of fish-owl resource selection in Russia, we incorporated the use of a prey enclosure into our repertoire of capture techniques to address this capture uncertainty. We here describe the materials and protocol for integrating the use of prey enclosures with existing capture techniques, as well as report preliminary results from their initial application.

Study Area

We studied fish-owls at two sites on the eastern slope of the central Sikhote-Alin Mountains in Primorye, Russia: (1) the southern Tunsha and Serebryanka River valleys, near the village Ternei (45° 3′ N, 136° 37′ E), and (2) the Amgu River valley, near the village Amgu (45° 50′ N,

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137° 40′ E). Both sites are <20 km from the Sea of Japan, and, at their widest, the valleys are <1 km across and bordered by low (200–800 m) mountains. All three valleys have been significantly altered by agriculture and logging activities, which have fragmented the previously unbroken landscape of mixed species old-growth forest.

METHODS

We constructed our prey enclosures using galvanized 1.3-cm hardware cloth, a metal material similar to chicken wire that is commonly sold in rolls at hardware stores. To achieve the final dimensions for our prey enclosure (100 × 45 × 13 cm [L × W × H]), we cut a 126 × 71-cm (L × W) rectangular panel of hardware cloth and used wire cutters to make 13-cm-long cuts, 13 cm from each corner (four cuts total, Fig. 1). We then folded the edges of the hardware cloth at these cuts to form an open-top box 13 cm deep and with a base 100 × 45 cm (L × W). We folded the protruding tabs (created when the hardware cloth was cut) and sewed them flush against the sides of the enclosure with 18-kg-weight nylon monofilament fishing line to close cracks that may allow prey lures to escape. Finally, we used fishing line to sew a rectangular frame constructed of straight, thin (5 cm) branches to the top edges of the enclosure. We did this because we found that the prey enclosure's form became bent following several visits from birds as large (3–4 kg) as these fish-owls, and adding this frame helped retain the structural integrity of the enclosure.

We located fish-owl territories during aural surveys from 2006 to 2008. After we located fish owl territories, we identified hunting areas by looking for fish-owl tracks in the snow along stretches of unfrozen, shallow river, following descriptions of fish-owl hunting behavior in Pukinskii (1973) and Slaght and Surmach (2008). After finding sign that suggested fish-owl foraging, we placed a prey enclosure next to the riverbank in water ca. 10 cm deep (Fig. 1). When placing the prey enclosure in a river, we always ensured that water depth did not exceed enclosure height, to prevent our prey lures from escaping. We placed small river rocks and pebbles in the bottom of the prey enclosure for camouflage, and to prevent the enclosure from being pulled downriver in the current. If we found several candidate foraging spots, we set one prey enclosure (without a trap) in each area. We collected live lures by ice-fishing or fishing in nearby unfrozen river pools, and we released 15–30 live prey items into each enclosure. Typically, our lures were lenok (*Brachymystax lenok*), Dolly Varden trout (*Salvelinus malma*), and common minnow (*Phoxinus phoxinus*) between 10–20 cm in length. On one occasion, when we were unable to catch fish, we used 8–10 Far Eastern frogs (*Rana dybowskii*). We left prey species overnight in our enclosures without setting a trap (e.g., noose carpet, mist net).

Each morning, we checked enclosures for sign of fish-owl activity (i.e., fresh tracks in the snow, missing prey lures). If fish-owl sign was not found at any of the sites where prey enclosures were set, we left all enclosures for another night. If fish-owl sign was found (tracks in snow next to trap and prey missing from enclosure) we set our traps at those sites, rebaiting the prey enclosures as necessary, and removing all prey enclosures that were not visited by owls. For trapping sites that were relatively clear of brush and debris we used mist nets to capture fish-owls. Nets were placed on either side of the enclosure and usually set perpendicular to the riverbank. In areas with more dense vegetation and limited space, we used a modified noose carpet following the directions of Bloom et al. (2007). The noose carpet was placed on the riverbank adjacent to the enclosure. We used a 3–5 kg log as a weight, and placed the log as far from the riverbank as possible (Fig. 1), so when the fish-owl became entangled in the nooses and attempted to fly off, the weight pulled the owl away from the water, minimizing chances of drowning or injury in the water. Regardless of trapping method, we used VHF trap monitors (Bloom et al. 2007) that alerted us via VHF receiver when the traps were struck, allowing us to attend the trap within minutes of a fish-owl capture, and reducing potential stress and injury to the owls.

RESULTS

In 13 trapping attempts from February–March 2007 and February–April 2008, we placed 10 prey enclosures in known fish-owl foraging areas. Although one of these enclosures (placed <5 km from Ternei) was stolen, the remaining nine were discovered by fish-owls, and eight resulted in the ultimate capture of a fish-owl (four males, four females, 89% capture success given detection of lures by owls). Four owls were captured using noose carpets (two males, two females), and four owls were captured using mist nets (two males, two females). Most enclosures (89%) were quickly found by fish-owls (within 24 hr of initial placement), and the remaining enclosure (11%) was discovered within 48 hr of initial placement. Fish-owls consumed 46–100% of prey lures (N = 7–20 prey items) after they found the enclosure, which suggests repeated visits or intense foraging at an artificially-rich resource site. When traps or nets were then set near prey enclosures following detection by fish-owls, most (89%) resulted in tripped traps within 2 hr following dusk that night, with the remainder of tripped traps (11%) on the second night. All successful captures occurred within 48 hr of initial prey enclosure placement, with 78% in the first 24 hr. In three cases, fish-owls hit the traps (two noose carpets and one mist net) and escaped, only to return later the same night and be captured in the same traps. On one occasion (an attempted recapture) a fish-owl tripped the trap (a mist net), escaped, and did not return.

In three cases, traps (mist nets) were set without first placing prey enclosures. On two occasions, this strategy was used because fish-owl travel corridors in those territories were well understood; both target owls were captured the same night that the mist nets were set. In the final case, spring flooding resulted in water levels that exceeded the

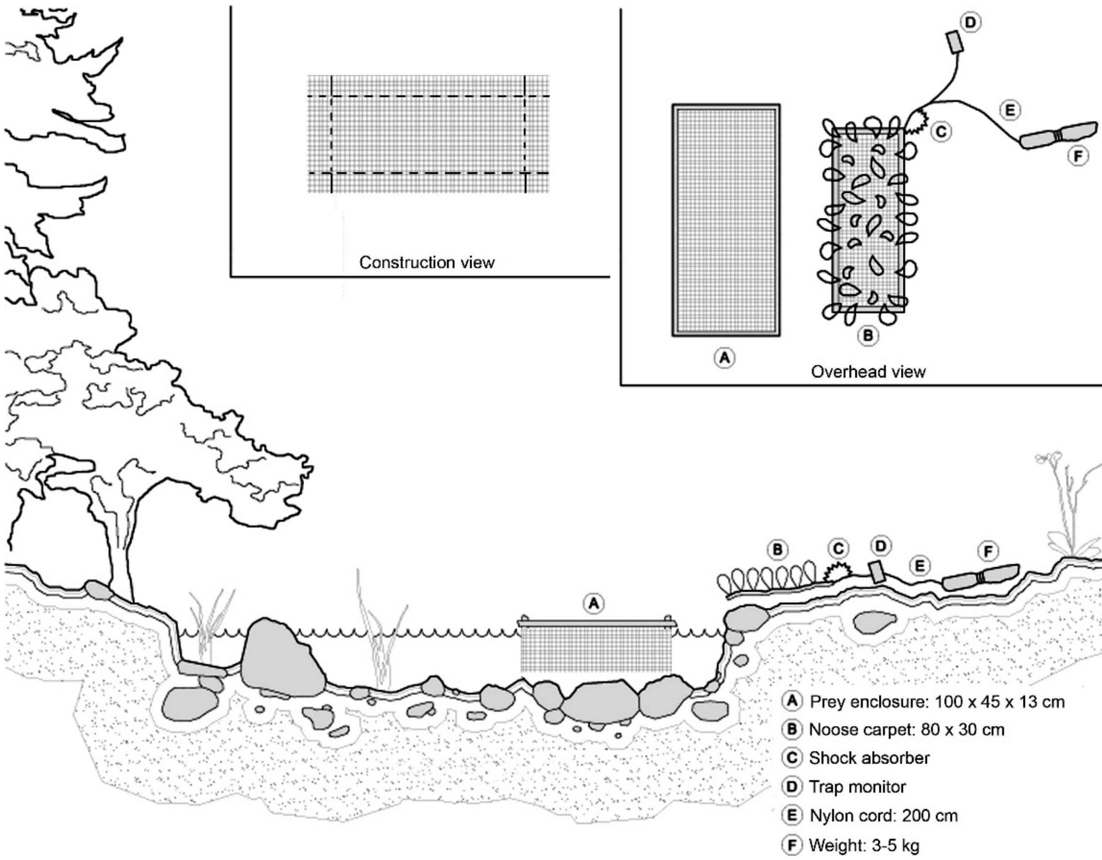

Figure 1. Cross-section of prey enclosure, set here with a noose carpet (Bloom et al. 2007). Insets show construction view (black lines indicate where to cut, dashed lines where to fold), and overhead view of enclosure set with noose carpet.

height of our prey enclosures, and we relied on our incomplete knowledge of travel corridors for placement of mist nets in that territory. The target owl was eventually captured, after 19 d of attempted trapping.

DISCUSSION

In all previously described captures of *Ketupa* species (Meise 1933, Vorobev 1954, Hayashi 1997, Mikhailov and Shibnev 1998, Sun et al. 2000), fish-owls were captured because individual owls' hunting grounds were known. The prey enclosures we built allowed us to determine the conditions and location for capture. Prey enclosures were easy and inexpensive to construct, transport, and repair in the field, and were durable enough for several seasons of use. If desired, a full frame of wood or metal could easily be constructed first, over which one could then bend the hardware cloth to create the enclosure; such a rigid enclosure would preclude the need for reinforcing the frame with branches. However, our method reduced construction time to <30 min, minimized enclosure weight, and successfully contained the live prey. We economized our time and effort because the trap components did not need to be set (and monitored) until after the enclosure had been discovered by fish-owls, which allowed us to attend to other tasks rather than constantly monitoring the traps.

Although our captures occurred in winter, when fish-owl foraging areas were restricted by ice cover along most stretches of river, we believe that prey enclosures could also be used at other times of the year. Most importantly, it was critical to place prey enclosures in areas where they would be discovered by fish-owls (e.g., a favorite hunting site at a river's edge), and where their visit could be detected. For this trap to meet its efficiency potential in the absence of snow, there must be a mechanism for determining whether the enclosure was visited by fish-owls (or a nontarget species). Commercially available camera traps might serve this function; infrared models without a flash would be optimal, as they would be less likely to startle predators visiting the enclosure. Placing enclosures along sandy or muddy banks might be a low-cost alternative (e.g., other fish-owl species often perch over shallow open water near such areas; R. Gutiérrez pers. comm.). In areas without substrate that is naturally impressible, an attractive perch, such as an artificial platform or snag, could be erected above or near the enclosure and covered with a soft substrate (e.g., silt or sand) suitable for recording tracks.

Our prey enclosure, coupled with existing trapping techniques, could potentially be used to capture a variety of piscivorous raptors, such as other fish-owl species (*Ketupa* spp.) and fish-eagles (*Ichthyophaga* spp.) in Asia, fishing-owls (*Scotopelia* spp.) in Africa, and the broadly distributed sea eagles (*Haliaeetus* spp.). We recommend that the prey enclosure be considered if the target species is not efficiently captured using traditional trapping methods alone.

UTILIZACIÓN DE JAULAS CON PRESAS PARA ATRAER RAPACES PISCÍVORAS A LAS TRAMPAS

RESUMEN.—Diseñamos una jaula con presas vivas, que funciona como un atractivo y que complementa los métodos de captura establecidos, para ayudar en las capturas de *Ketupa blakistoni* en Primorye, Rusia. Durante febrero a marzo de 2007 y febrero a abril de 2008, ocho de nueve atractivos detectados por las lechuzas resultaron en una captura subsecuente (89% de éxito). Nuestra jaula también puede facilitar la captura de otras rapaces piscívoras.

[Traducción del equipo editorial]

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