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A LEG-NOOSE FOR CAPTURING ADULT KITTIWAKES AT THE NEST

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Abstract.—We developed a leg-noose for capturing adult Black-legged Kittiwakes (*Rissa tridactyla*), a cliff-nesting, colonial seabird. The capture device consisted of an adjustable wire base secured to the rim of the nest. The base is simple to construct, and we describe three design options. The base held open a circular noose that was used to snare a kittiwake around the tarsometatarsi. A spool of line attached to the noose permitted the capturer to move away from the colony, encouraging the birds' return. Using this device, we captured 75 kittiwakes in 1996 and 1997. In particular, the leg-noose proved invaluable in the safe capture and recapture of specific individuals for our study that could not be captured by noose-pole. This leg-noose concept is versatile and could be adapted for capture of other nesting avian species.

LAZO CORREDIZO PARA ATRAPAR, POR LAS PATAS, A INDIVIDUOS DE *RISSA TRIDACTYLA* EN SUS NIDOS

Sinopsis.—Desarrollamos un lazo corredizo para atrapar, por las patas, adultos de *Rissa tridactyla* en sus nidos. El aparato de captura consiste de un alambre ajustable, que se coloca en el margen del nido. La base de la estructura es fácil de construir y se describen en este trabajo tres tipos diferentes para su selección. La base mantiene abierta un lazo corredizo circular que fue utilizado para capturar a las aves por el tarsometatarso. Un carrete de línea unido al lazo permitió que el investigador se moviera a una distancia prudente de la colonia para permitir que el ave regresara a su nido. Utilizando este aparato, se capturaron 75 individuos durante el 1996 y 1997. Este tipo de lazo corredizo resultó ser de gran utilidad y seguro para la captura y recaptura de individuos particulares que no pudieron ser capturados utilizando otras técnicas. Este nuevo concepto es versátil y se puede adaptar para capturar a otras especies de aves en sus nidos.

The study of avian ecology increasingly demands that birds be captured and handled for banding, measurement, blood or tissue sampling, and instrument attachment. Because seabirds are long-lived, philopatric, often accessible and present in great numbers at a breeding colony, their capture offers excellent opportunities for long-term ecological research and monitoring. Cliff-nesting seabirds have been captured in previous studies using a noose-pole (Hogan 1985, Jacobsen et al. 1995, Irons 1998), rocket-net (Hatch et al. 1993, Golet et al. 1998), mist-net (Roberts and Hatch 1993), and noose-mat (Roberts and Hatch 1993). However, noose-poles tend to flush most birds in the area, leaving available for capture only those individuals tolerant of such a disturbance, rocket-nets and mist-nets are indiscriminate, and noose-mats require that a bird snare itself.

Certain studies require that either specific birds or birds in specific areas be captured. As part of a study of the reproductive and foraging ecology of Black-legged Kittiwakes (*Rissa tridactyla*), we captured adult birds at several breeding colonies in Prince William Sound, Alaska during

1996 and 1997. To facilitate capture of specific birds, we created a leg-noose trap that fits on the rim of a kittiwake nest and can be remotely triggered.

TRAP DESIGN AND OPERATION

The leg-noose consists of two basic parts, the base and the noose (Fig. 1). The base has several noose-supports that keep the noose open and anchors that secure the trap in place. The end of the noose passes through a line-guide and is attached with a swivel to a line wound on a spool or reel.

We created three different leg-noose designs, described below in the order that they were developed. We assembled the prototype using galvanized steel wire (2-mm diameter), foam pieces (from Pelican Case® products), lag-bolts (8 mm × 51 mm), and duct-tape. We constructed a base by shaping the wire into spring-like coils so that a three-dimensional circle was formed (Fig. 1a). We made rectangular noose-supports from foam, with a slit on the top running one-third its length, and attached these to the base simply by running the wire through the foam so that the noose-supports were free to slide along the base. For a line-guide, we formed two eyelets at opposite ends of a 5-cm long steel wire attached to the base by a loop in the middle of the wire, which we taped to a piece of foam for stability. We used wire to attach four lag-bolts to the base for anchoring the trap to the nest. We used braided Dacron® line (Western Filament®; 36 kg test) for the noose and tied this to a swivel (prevented line from twisting) and leader clip, which allowed attachment to either clear monofilament line (9 kg test) or buoyant line (9 kg test).

In the second design, we constructed a simple adjustable base (Fig. 1b) out of wire by forming a circle with overlapping ends, held in place by two nylon cable ties (127 mm × 3.2 mm; 13.5-kg pull). The cable ties were tight enough to keep the ends from slipping and expanding the circle, but loose enough to allow adjustment. The noose-supports and line-guide were fashioned and attached as described above, with the exception that the foam pieces were T-shaped. We attached four wire loops around the base, which allowed us to position the anchors before affixing the base to the nest with lag-bolts.

The third, less conspicuous design requires several noose-supports, a single anchor/line-guide, and a fishing rod and reel (Fig. 1c). There is no base in this design and the noose-supports are made of wire so that they can be inserted directly into the nest material. The line-guide is attached to the only anchor. The fishing gear is used to set the noose and the bird should be held to the nest by the anchor/line-guide. If the bird

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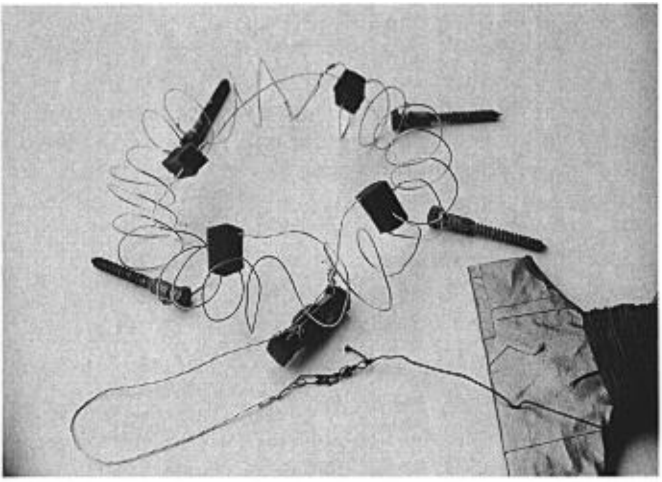
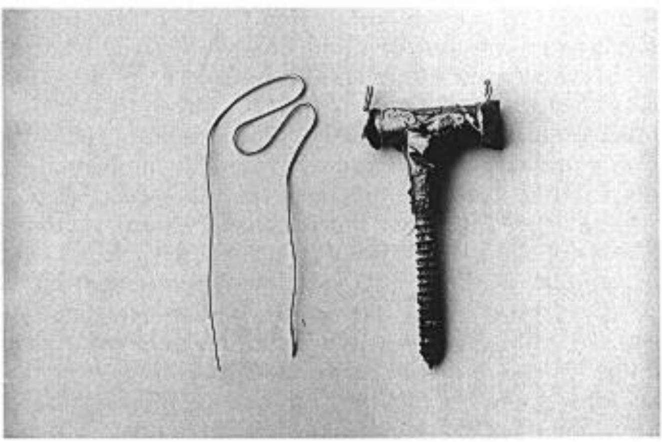
FIGURE 1. Three leg-noose designs used to capture Black-legged Kittiwakes on their nests. The trap concept remained the same, although the base designs varied from (a) coiled, (b) flat, and (c) no base in order to reduce the conspicuousness of the trap.





breaks away from the nest it can be controlled by rod and reel as it glides to the water.

To set the leg-noose, the base should be attached to the nest bowl using the anchors. The noose is held in position by leading it through the line-guide (oriented toward the direction of pull), expanding it to the width of the base, and gently placing in the noose-supports. The line is then spooled out to a suitable location. Once the bird has landed within the noose, the line should be quickly, but steadily, reeled in until the noose closes around the legs (tarsometatarsi). Gaining control of the bird should be swift and immediate and, once in hand, the noose may be loosened and removed.

FIELD RESULTS AND DISCUSSION

Kittiwakes construct nests on small ledges of oceanside cliffs from mud and vegetation. Accessibility and structure varied widely among nests, requiring the leg-noose setup to vary accordingly. To allow use of the trap, nests must be: accessible by foot, ladder, boat, or other means; strong enough to support the leg-noose anchors; and visible from a nearby, but inconspicuous location.

In 1996 and 1997 we captured 75 adult kittiwakes at three breeding colonies with the leg-noose. Adult birds were captured from 37 nests containing eggs, 18 nests containing chicks or chicks and eggs, and 20 empty nests. None of the captured birds appeared to have been injured, and there were no observed differences between the post-capture behavior of those birds captured by leg-noose versus birds captured by noose-pole or uncaptured birds. We did not see any evidence of destroyed or damaged nests in 1996, but in 1997 we damaged two nests, destroying four eggs (described below).

We recorded capture effort as attempts per successful capture in 1997 and calculated means for each method. We did not monitor capture effort in 1996. Capture effort using the leg-noose (1.4 attempts/capture, n = 57) was similar to effort using the noose-pole (1.6 attempts/capture, n = 179). The noose-pole was a more efficient method to capture many kittiwakes in a limited amount of time, thus we used it to capture large numbers of previously uncaptured adults and to recapture adults that did not exhibit trap shyness.

Our studies required the capture and attachment of radio-transmitters to previously radio-tagged adults and/or banded individuals of known-age. We observed birds becoming trap weary after successive capture attempts within and among years. This progressed until nearly all birds in certain sections of the colonies would flush at the sight of a noose-pole, preventing capture. In these situations the leg-noose proved invaluable. For example, we recorded six individuals in which repeated capture attempts ($\bar{x}$ = 3.3) with the noose-pole failed and success was achieved in fewer attempts ($\bar{x}$ = 1.7) by immediately employing the leg-noose. Even with the leg-noose some kittiwakes acquired trap shyness, hence the development of lower profile designs. Of the 75 adult capture events using the leg-noose in 1996 and 1997, 51 were recaptures from previous years. It would have been near impossible to safely capture and/or recapture those specific birds that we targeted with any other method, especially in as few attempts. Thus, we feel the leg-noose was less disturbing to the colony than any other available methods.

The leg-noose was also used extensively during a 1998 study of the metabolic requirements of breeding kittiwake adults. The investigators employed doubly-labeled water techniques that required the capture and recapture of individuals within a 48-h period. Inherently, the recapture process and the potential disturbance that is involved (kittiwakes will usually either maintain vigilant flight or raft in the water until the disturbance ends) must be relatively quick so that the metabolic rates of the experimental birds are not artificially raised. Of 42 adults recaptured, it was estimated that 13 were caught by leg-noose. The leg-noose proved to be a reliable alternative for birds that had been captured with the noose-pole less than 48 h previous.

Trapping technique varied depending on site-specific requirements and individual birds. Access to nests with suitable blinds far enough from the nest to encourage landing, but close enough to allow an efficient capture and retrieval, was the foremost difficulty encountered while working on land. Some captures required a third individual to watch the nest from a boat and relay signals or radio messages to the capturers hiding out of view of the nest. When calm seas allowed, we successfully used inflatable boats to access nests and capture birds. While waiting for the birds to return, tension on the line caused by the drifting boat created difficulties. To alleviate this problem, we used buoyant line and maneuvered the boat against the current and/or wind. When capturing by boat at a large active colony, we unintentionally captured two birds that flew into and became entangled in the monofilament line. Movement of the trigger line occasionally frightened birds and successful attempts were made to conceal the line in natural crevices on the colony. It also was helpful to keep the line taught so there was minimal line movement when tightening the noose during capture.

After the noose is reeled in and the bird has fallen just over the edge of the nest, the force created by the weight of the bird and the tension on the line is transferred to the anchors holding the base on the nest. Therefore, the nest must be strong and the base must be securely anchored. When possible we used irregular features in the rock to help hold the trap in place. Sometimes nests were too thin or fragile to secure the leg-noose. In this case, modifications to the third design allowed the bird to be snared and fly from the nest with little or no stress on the nest structure. It was also important that tension on the line be sustained either by the individual who reeled in the line while a coworker gained control of the bird, or by a weighted object placed on the line, if a person was capturing alone. This minimized the chance that a struggling bird would damage either itself or its nest. It is important that the noose cinches around both legs, otherwise the adult may remain upright on one leg and create enough force with its wings to lift either the trap off the nest or both the trap and the nest off the cliff. This was how we damaged the two nests mentioned above.

The three leg-noose designs performed with distinct advantages and trade-offs. All designs showed increased success if: the base was adjusted to fit on the outside top edge of the nest bowl, giving the bird an area to land; the noose-supports positioned the noose high on the legs and clear of nest material; attempts were made to camouflage the trap with nest material and/or paints; efforts were made to conceal the movement of the line being pulled by the capturer from the view of birds in vicinity of the trap. The second and third trap designs proved highly adjustable and inconspicuous, and even non-breeding adults frequently returned to the nest when the leg noose was in place. However, these designs were not as strong or efficient for capturing birds compared to the original design, likely because the noose was positioned higher on the legs atop the coiled base, and due to the easier nest setup of this design. Preference varied among capturers and both technique and efficiency improved with increased familiarity of each design.

It was easier to capture incubating birds than birds rearing chicks with the leg-noose. If present, we left eggs in the nest during capture but removed chicks before capture. We observed that adult birds returned more often to nests with the eggs than nests where chicks had been removed. To capture birds on failed nests we placed an egg in the nest bowl, which caused some birds who were previously trap wary to return to their nest. We sometimes replaced live eggs with a decoy egg while the leg-noose was set to reduce the potential of destroying eggs. We achieved limited success by placing a chick decoy in the nest.

We recommend the leg-noose as a reliable method for capturing kittiwakes that can not be captured with a noose-pole or other methods, and where nest structure and location permit traps to be set. Using the leg-noose allowed us to select a nest, set the trap, and move out of view and/or direct influence from the colony. As other kittiwakes returned to their nests, the selected bird usually returned with them and landed within the noose. It was invaluable in the capture and recapture of specific birds for radio-elemetry, behavioral observation, and doubly-labeled water experiments.

This leg-noose design may prove effective for capturing other avian species where conditions permit. Among seabirds, cliff-nesting cormorants and fulmars, and ground-nesting gulls and terns would seem likely candidates for the leg-noose. This method, however, could be adapted for any bird with an accessible nesting platform. Kittiwakes are relatively small birds and have little strength when suspended upside down by the leg-noose. Stronger anchoring and materials would be required for larger seabirds that prove too heavy or powerful for the leg-noose described here, especially for capturing ground-nesting birds that may remain upright after the noose is tightened.

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