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A FLOATING-FISH SNARE FOR CAPTURING BALD EAGLES

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ABSTRACT.—Bald Eagles (*Haliaeetus leucocephalus*) were captured using a system of 4 monofilament snares fixed on a small (20–24 cm) floating fish attached by monofilament and shock cord to a free-floating (or anchored) driftwood log. When an eagle strikes the bait and begins to fly away, the snare loops close around the bird's toes as the line tightens. Resistance of the shock cord and log then slows the bird's flight until it is forced into the water. Snare sets were placed in view of perched birds and were effective at capturing specific individuals. Capture success averaged 50% of all birds that struck the bait. Floating-fish snares are useful where topographical features, eagle foraging habits, or trap fouling by non-target terrestrial species make open water sets more effective. Non-target aquatic species occasionally fouled sets.

Common methods of capturing the Bald Eagle (*Haliaeetus leucocephalus*) have included padded leg-hold traps, perch snares, modified bal-chatris, cannon nets and floating-fish snares (Southern 1963, 1964; Robards 1966; Frenzel and Anthony 1982; Young 1983; Harmata 1985; Hodges et al. 1987). Among techniques, padded leg-hold traps and floating-fish snares have become the most widely used. Leg-hold traps are useful in areas where water is frozen or otherwise unavailable and in areas where shallow water sets can be made before daylight. Floating-fish snares are often necessary where steep-gradient beaches, shoreline vegetation, visibility, or eagle foraging habits make open-water sets more effective.

Southern (1963, 1964) provided the first published accounts of capture attempts using a floating-fish snare, but his efforts were unsuccessful. The late Fred C. Robards was, to our knowledge, the first to use a floating-fish snare to successfully capture Bald Eagles. In the late 1960s Robards experimented with and managed to capture several birds using a floating Herring (*Clupea pallasii*) with a single monofilament snare loop attached and reeled in and out with a fishing rod from a small boat. The floating-fish snare technique has since become widely known as the "Robards method." For years, the Robards method was spread among Bald Eagle researchers by word of mouth. More recently, Frenzel and Anthony (1982) provided a brief description of a 2-noosed variation of Robard's (unpublished) technique.

We have experimented with many variations of Robard's technique, variations which, even though very subtle, can affect capture success significantly. With any animal capturing technique it is advantageous to 1) minimize trauma and handling time, and (2) maximize efficiency, ease of use, versatility and effectiveness. Of all design variations of floating-fish snares we have used, the one described here best meets these criteria.

MATERIALS AND CONSTRUCTION

Attention to detail is critical as poorly crafted baits will result in a low capture rate. We used fresh or frozen bait Herring 20–24 cm in length for trapping in marine waters and similar sized salmonid fishes for inland lakes and rivers (equivalent sized fish species preferred by local eagles should be used). Larger fish are not recommended because of difficulty with predicting where the talons will strike. Fresh fish were more durable and easier to work with.

To insert the buoyant material into the fish, a transverse incision just posterior to the pectoral fins on the ventral side was made. Entrails were removed, and a buoyant plug, carved to fit into the resulting cavity, was inserted (Fig. 1D, arrow).

Snare loops were made from 14 kg (30 lb) breaking strength, cryptic-colored monofilament. For each of the 4 loops, we cut an approximately 80 cm length of monofilament, formed the first knot (Fig. 1A arrow) and tightened firmly. The resulting loop formed a slip knot which was tightened to maintain a snare loop dia of 10–12 cm. If the finished snare loop did not lay smooth and flat, rotating the slip knot about the shank of the loop to remove twist in the line usually remedied the problem. New monofilament sold on large dia spools was easier to work with than old or tightly wound line that was kinky and less supple.

To affix snares on a fish, we used a small dia nail (4 penny) (or leg band pop-rivet) to punch passageways for snare loop ends. Two holes 1 cm apart passed through the center line of the fish, ventral to dorsal, and through the styrofoam in the gut cavity. On either side a total of 4 holes were made through the body wall (Fig. 1B). Each snare loop end was then threaded through a side hole into the body cavity and out the center hole ventrally, then back down through the center hole and styrofoam to exit dorsally (Fig. 1B, D). Threading in this manner insured that

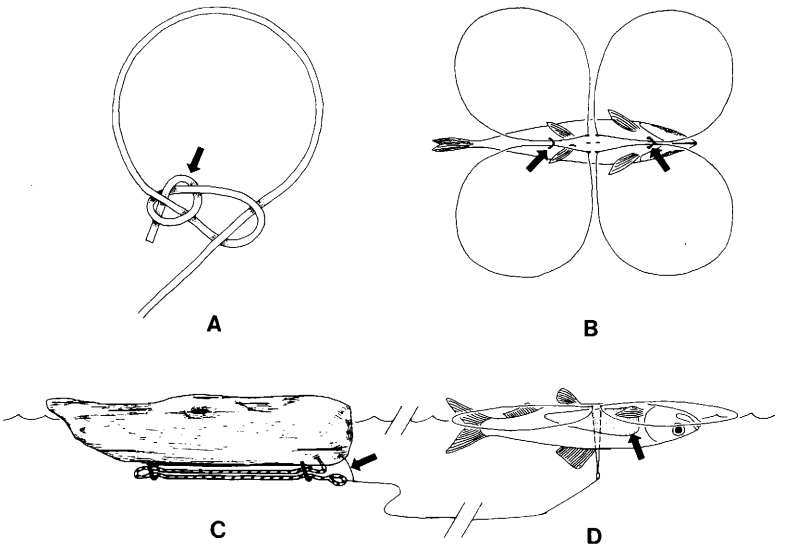

Figure 1. Floating-fish snare system for capturing Bald Eagles: (A) snare loop slip knot; (B) top view of fish snare, (C) log/shock cord unit; and (D) side view of fish snare.

loops would lie in the plane of the water's surface when the bait fish was floating belly-up (Fig. 1D).

Once loops were in place, the 4 ends exiting dorsally were tied together and into a loop with an overhand knot. Ordinary household staples, bent in the middle and slightly pinched through the skin of the fish, worked well for holding the snare loops in place (Fig. 1B, arrows), or to close gaps where the plug was inserted into the gut cavity.

Our capture logs measured approximately 80 × 15 cm and weighed 3.5 kg. Weight was functionally more important than size. Nails (16 penny) were partially driven into the log and bent over to form loops that temporarily held the coiled shock cord in place on the underside (Fig. 1C). We used 1.5 m of 6.5 mm shock cord. Approximately 10 m of 18 kg (40 lb) monofilament connected the log/shock cord unit to the floating-fish snare. Finally, a short length of 4.5 kg (10 lb) monofilament was used to temporarily bypass the shock cord, connecting the fish snare line directly to the log (Fig. 1C, arrow). After a strike, an abrupt tightening of line and closing of snare loops resulted as the eagle attempted to fly away with the fish. The bypass would then break, and the shock cord and movement of the log on the surface would smooth the eagle's descent into the water. Without the bypass, eagles appeared to feel the resistance of the shock cord and sometimes dropped the fish before the snare loops had closed.

A word of caution regarding the use of buoyant plugs in floating fish snares is warranted. We used styrofoam for plugs, which was buoyant and easily worked. But since some baits are taken by birds that strike and are not caught, the possibility of adults and nestlings ingesting plugs may be of concern. When baits are so taken, the styrofoam plug is generally left behind, still attached to the snare lines, which emphasizes an important reason for running lines through the plug when preparing baits. However, on a few occasions the snare loops closed and pulled through the plug allowing the eagle to fly away with the plugged fish. In one instance we observed the bird dropping the plug as it consumed the fish. Other observations of feeding captive and wild eagles indicate that non-food items are usually discarded or, if ingested, are immediately regurgitated (A. R. Harmata, pers. comm.). Nevertheless, potential for birds ingesting the styrofoam exists, and precautions should be taken to avoid possible deleterious effects If plugs are made from styrofoam, only good quality, high-density material should be used. Plugs should always consist of a single piece of material to increase the likelihood of a plug being regurgitated if ingested. Baits used for chumming purposes should not contain styrofoam.

Another, more desirable alternative that we have not yet investigated would be to carve plugs from a lightweight but durable, buoyant wood. Passageways for the snare loop ends could then be drilled to a dia that would stop the slip knots from pulling through the plug. This would effectively fix the plug to the snares and eliminate potential for birds to fly away with a plugged bait.

USE

Eagles selected for capture were usually perched along the shoreline in a hunting or lookout position. The snare was placed 75–150 m (or further for eagles with greater flushing distances) offshore, at an angle that would allow wind, river, or tidal currents to move the bait toward a target bird. Monitoring took place at a distance of 0.5 to 1.0 km. If the first set failed or drifted out of the area, replacing the snare progressively closer to the bird usually resulted in a strike.

Once caught, eagles floated with their wings outstretched and heads well above the water, occasionally swimming toward shore or flying short distances before being pulled back into the water by the shock cord and weight of the log. Snares should be set far enough from shore and continuously monitored to ensure that snared birds can be retrieved before they reach the shore. To retrieve a snared eagle we first approached the log, then grabbed the connecting line and slowly reeled in the bird with the log remaining afloat. If the bird attempted to fly, we could simply release the line and let the log and shock cord force the eagle back into the water. Because snared birds are relatively free of constraint and capable of inflicting serious injury, only individuals with considerable experience in handling large raptors should attempt to retrieve eagles from the water.

In areas where water depth and current are not prohibitive the log/shock cord unit can be fixed in place with an anchor and additional shock cord. Additional shock cord between anchor and log is needed because the log will no longer be free to skim across the water. Too little give in the system will result in broken lines and, possibly, injured eagles. The anchor effectively eliminates drift of the system out of the area and can be used to place snares in favorite hunting areas before daylight. Such may be advantageous in areas where eagles are not habituated to boats and flush at distances that preclude placing a snare in full view of a perched bird.

During our studies, capture rate was influenced by several factors, including experience, skill and persistence of the trapper and quality of bait preparation. Trapping success was best away from food concentrations during winter and spring when eagles were food stressed. Unfortunately, we kept no records of the proportion of all eagles that actually struck the bait. However, if alternative food sources were not abundant, most birds readily took the bait. Providing fish of equivalent size and species without snares attached, sometimes over a period of several days, increased chances of capturing eagles that were reluctant to strike. Occasionally, non-target species, primarily gulls (*Larus* spp.), fouled sets, but more often their interest in the bait elicited strikes from eagles. Others have experienced greater interference from gulls (B. R. McClelland, pers. comm.) as well as inadvertent captures of Ospreys (*Pandion haliaeetus*) (Frenzel and Anthony 1982) while using floating-fish snares.

Capture success (percentage of strikes that resulted in successful capture) was 50% (N = 15) during one study (Cain 1985) and was estimated to be from 30–50% (N = 60) during another on-going study where sets without breakaway line were used (P. F. Schempf pers. comm.). J. Crenshaw (pers. comm.) also reported a capture success of 50% (N = 15) using a similar 2-noosed variation. Others have estimated success rates of from 25% (Bloom 1987, citing pers. comm. from W. G. Hunt, L. Young, and R. Jackman) to nearly 100% ("if nooses and lines are set in proper positions" [Frenzel and Anthony 1982]) for floating-fish snares. We found that incidences of birds striking the bait and not getting caught were due to a number of factors, including the bird dropping the bait before snare loops had closed, snare loops sliding off the foot or toes, or the bird breaking the snare line with its beak after being forced into the water. Only 1 injury occurred during the capture of 90 eagles in 3 separate studies: a small cut on the phalanx of a bird caused by the monofilament snare line (Cain 1985; J. Crenshaw pers. comm.; P. F. Schempf pers. comm.).

The primary advantage of floating-fish snares over other Bald Eagle capture techniques is the ability to use open water as a trapping medium. In most areas, especially during the nesting season, Bald Eagles forage over open water, and thus floating fish snares appear more natural than terrestrial based systems. Open water sets also eliminate problems with non-target terrestrial species fouling traps. However, problems with non-target aquatic species persist. Where eagles are habituated to boat traffic, fish snares offer an effective means of selecting for specific, individual birds. Snares can be quickly and easily placed while making a slow pass by a target bird, greatly reducing the chance of non-target capture. The first author captured target birds from each of 6 pre-selected nest territories using our method. Finally, where eagles feed on spawning salmonids, floating-fish snares may select for adult birds, since subadults are more likely to forage on beached fish (Young 1983).

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