Marking Crows

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ABSTRACT

I have used various types of leg bands and patagial tags on American Crows (*Corvus brachyrhynchos*) in Encino, CA, and Stillwater, OK, over 17 years. Here I report on the effectiveness of tag types and provide details on successful marking methods. I discuss colored leg bands, pins of tennis string for patagial tags, the tag materials Herculite and Cooley, and cattle ear tags. Cattle ear tags were extremely harmful to crows and should not be used.

INTRODUCTION

The ability to identify animals individually, a prerequisite for many kinds of studies of behavior, is dependent upon a marking system that is visible, durable, and harmless. Patagial tags of different types have been used on many species of birds; and for several species, the tags have been demonstrated to affect negatively the lives of marked individuals (Bartelt and Rusch 1980, Kinkel 1989, Bustnes and Erikstad 1990, McClelland et al. 1994, Brua 1998). As part of field studies of American Crows (*Corvus brachyrhynchos*) in Encino, California, and Stillwater, Oklahoma, over the last 17 years, I have marked individuals with various types of leg bands and patagial tags, and report here on successful and unsuccessful techniques. My experiences with crows should be applicable to other similarly proportioned birds.

METHODS, RESULTS AND DISCUSSION

Upon removing crows from trapping apparatuses, I place them in doubled paper grocery bags, perforated by several holes and stapled closed at top. During the processing of each crow, I place a rubber band around its bill to minimize injuries to the hands of handlers.

Leg bands - In both California and Oklahoma, I have marked each crow with a unique combination of celluloid "Flatband" colored leg bands, purchased from A.C. Hughes Ltd. (Middlesex, England); these are now also available from AFO Banding Supplies (Manomet, MA). Each crow receives two colored bands on each leg in addition to a USFWS metal band. There are eight colors appropriate for crows available from A.C. Hughes white, dark blue, light blue, light green, light pink, red, orange, and mauve; yellow is available only in PVC (see below), black and dark green cannot be seen, and "dark pink" fades unpredictably. AFO Banding Supplies does not offer light green, and lists "mauve" as "purple." The inside diameter of color bands closest to USFWS size 5 (7.0 mm) is 8.0 mm. Color bands must, therefore, be made smaller so that halluxes do not become caught, I secure them closed with acetone. Adhering the two bands on each leg together with acetone minimizes the likelihood that crows will remove them. A. C. Hughes also sells similarly sized leg bands made of PVC ("Darvic"), as do other leg band manufacturers; yet I cannot find a solvent with which to "glue" them closed, and crows pull them off if not secured. Although leg bands often cannot be seen from below, and they disappear in grass longer than 3-5 cm, they are sometimes useful when attempting to identify forward-facing crows, particularly within family groups. I thus avoid color combinations that would place the same color in the same position on different individuals within the same family.

Patagial tags - I first tried patagial tags that wrapped over the leading edge of the humerus and had their ends riveted together between remiges (Kochert et al. 1983). These did not wear well, plumage was disrupted awkwardly, and all 68 tags (on 34 individuals) fell off within 1 - 16 weeks I

subsequently began using tags and pins similar to those being used currently (discussed in detail below); the materials have changed and some details have been modified, but the approach is the same.

Tags are 3.5 x 6.5 cm. Originally, in California, the tags were made of Herculite 80 (Herculite Products, Inc., Emigsville, PA). All four edges of each tag had to be seared (and thus melted) to prevent the Herculite from coming apart; this was extremely tedious (and probably toxic as well). I painted letters on the lower half of the tags (the upper half becomes covered by wing coverts) with Liquitex acrylic paint, and punched a 1 mm hole 5-6 mm from the top edge, in the center. I used pins made from tennis string and plastic nylon washers (to be described below). In the field, I added a washer to the pin to help prevent it from being pulled through the patagium. With an assistant holding the crow, I outstretched a wing and pushed the pointed end of the pin through the center of the patagium from the under surface of the wing to the upper surface. I hung the tag on the pin on the upper surface of the wing, added another plastic washer, and then melted (with a flame) and flattened the tip of the pin so as to hold the tag in place. More than 200 crows in California wore their patagial tags for up to eight years with no visible signs of distress and very little tag loss. Tags did not affect survivorship (Caffrey 1999), nor did they appear to influence social interactions (Caffrey 1992, 2000).

I began marking crows in Oklahoma using the same tags I had used in California. However, the weather in Oklahoma is very variable, daytime temperatures can differ by 22° C from one day to the next, and it can get quite cold. The Liquitex paint began chipping off the Herculite after the first winter, and the Herculite itself began cracking. Over the next year, I tried applying several different types of paint to the impermeable Herculite tags, including Naz-Dar-KC Industrial Lacquer Screen Ink and several acrylic enamels, but all of them chipped or peeled off. I searched for, but could not find at the time, a material to which letters could be applied permanently that was weatherproof, flexible, and light, but thick enough so as not to curl. I thus, regrettably, began using cattle ear tags (Buckly 1998, and references therein) cut to 3.5 x 6.5 cm. I used NEW Z™ tags and applied the letters with a NEW Z No-Fade Ink Marker. Everything else was done as described briefly above. The cattle ear tags were stiffer and heavier than Herculite tags (4.2 g vs. 1.5 g); hence, I put them on a single individual and observed him for eight weeks before I put them on other crows. Subsequently, with no evidence that they were harmful, I marked a total of 48 free-flying individuals with cattle ear tags. A few crows lost a tag within a couple of days or weeks subsequent to marking. I assumed that one of the tennis string pin "heads" had worn, or been chipped, away enough for the washer and tag to come off. I began gluing washers to the flat ends of pins ahead of time, and gluing the outside washers to pin "heads" in the field. Waiting for even "quick drying" glue to dry adds some time to the marking process but is necessary to ensure that wing coverts do not become stuck. In addition, if crows are struggling, their eyes and other feathers may contact the drying glue. Care must be taken (when melting pin tips, as well) to keep crows still and their heads out of the way.

With still no evidence as to the harmful effects of cattle ear tags, I put them on every one of the 40 nestlings I marked in 1999. Half of those are known to have actually fledged, but 19 were never seen outside their nests. Most of them probably never made it out.

Shortly after the end of the nestling-tagging season, I found a cattle-ear-tagged individual, approximately one month postfledging, separated from her family and unable to generate thrust. She could flap somewhat and get up in the air, but could only hover; it was disturbingly strange. I caught her by hand and subsequently rehabilitated her. At about that time, a tag turned up that had been lost by a free-flying individual; the tag and pin unit was intact. That was also the case for two other tags lost (one by a surviving fledgling) and subsequently retrieved: the washers had ripped through the patagia. I immediately began targeting marked individuals for recapture and found that a few individuals were, luckily, relatively unharmed by the tags (although, in all cases, the plumage

directly underneath the tags was damaged badly). Yet many individuals had the inside washer embedded in patagial tissue, which had become swollen and/or calloused, creating a large, bulbous mass of scar tissue with the washer inside. Apparently, the added weight of the cattle ear tag pulling against the inside washer had caused it to dig into the patagium.

I removed the tags and carefully dug out the washers, cleaned the wounds, and released the crows. All patagia of crows that had lost tags and were caught subsequently (n = 46 patagia, some within two weeks of tag loss) had healed and were normal. All crows from which I removed tags (n = 34, including several in very poor condition after having worn cattle ear tags for up to two years) have recovered completely. Over months of unsuccessful trapping attempts, a couple of individuals deteriorated in condition and then disappeared; presumably they are dead. Several other cattle-ear-tagged individuals have disappeared from my study population and are likely dead as well.

At present, I am using Cooley TXN 22 (Cooley Inc., Pawtucket, RI) for the tag material (Fig. 1). Because of the process by which its PVC and polyester reinforcement grid are united, Cooley cut into tag-size pieces (3.5 x 6.5 cm; 1.68 g) should not fall apart and thus the edges of the tags do not require melting. At first I applied letters using an Allflex Tag Pen, but the recommended two coats (for use on cattle ear tags) was not enough to prevent the ink from fading noticeably after only six months. Five coats caused the ink to run within the tag, eventually obliterating details of, and spaces between, the applied letters. I am currently applying three coats of ink with a Mark Penetrator Ear Tag Pen, which dries faster than the ink of Allflex Tag Pens.

For the pins, I cut commercially obtained tennis string (made by various manufacturers) into pieces

Fig. 1. Patagial tag made of Cooley TXN 22. Letters applied with a Super Mark Penetrator Ear Tag Pen.

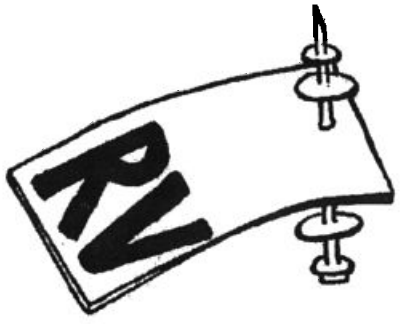

Fig. 2. The tag and pin unit. When intact, from the inside out: pin head glued to plastic washer, soft washer, bird wing, tag, soft washer, plastic washer.

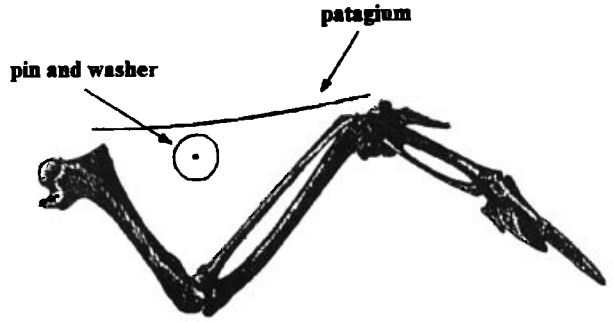

Fig. 3. Pin placement should be such that the washer does not rub against bones or associated tissues.

Fig. 4. Nestling marked with patagial tag made of Cooley TXN 22. This nestling is on the small side of marking size.

27 - 28 mm long, with very sharp points at both ends. I melt and flatten the duller of the two points to resemble a nail head of depth equal to approximately 1.0 mm; this is the end that will be on the inside of the bird's wing, and thus the "head" should be flat, perpendicular to the pin, and fit flush against the adjacent washer. The production of this "head" can be accomplished with or without the washer on the incipeint pin, yet flattening the "head" against the washer (manually) held in place produces a better fit. Plastic washers 1 mm thick with 10 mm diameter and 1 mm hole in the center were purchased from a company from which they are no longer available. I glue a washer and the inside "head" before use. Prepared pins should be no longer than approximately 22 mm, or they bend upon trying to push through the patagium, and no shorter than approximately 20 mm to ensure a large enough "head" on the outside. I have added a soft washer 13.5 mm diameter, cut from Herculite or Cooley, to the proximal side of both plastic washers (Fig. 2) to protect the inside of the patagium and add strength to the unit as a whole. The pin location (Fig. 3) should be directly distal to the elbow joint, approximately 13 -15 mm back. Front the leading edge of the wing if placed too close to leading edge, the tags may disrupt aerodynamics if placed too close to the humerus or the radius, they may cause injury. I moved out of the way as many undercoverts as possible, and pushed the pin through the patagium with the thumb of one hand (my right) while stabilizing its emergence on the upper side of the wing with the fore- and middle fingers of my other hand. After applying the tag, I add a soft washer and then a plastic washer. I use a long-necked butane lighter to melt, and butter knife to flatten, the outside "head." Tags should fit snuggly but not depress plumage. Keeping the flame lit under windy conditions has been difficult; I have improvised windblocks, but a better solution to melting pin heads must surely exist. Finally, I glue the outside plastic washer and pin head together, but leave the tag free to rotate. A few tags of recent design have been lost, and a few recaptured crows have had outside pin heads dangerously small; occasional failure to glue outside washers to pin heads, or possibly differences in tennis string "quality," may be related variables.

I use a different color tag material for each year's cohort; nestlings are marked approximately one week prior to fledging (approximately 28 days posthatching in both California and Oklahoma) I mark nestlings in the same way as adults (Fig. 4), except that I leave 2 - 4 mm of "growing" room between the washers on the under and upper surfaces of the wing. For ease of identification within family groups, I avoid letter combinations that would place the same letter in the same position on different individuals. I do not yet have long-term data on wear and/or fading of these new tags, but have put them on more than 40 individuals in the last year and am very encouraged by the results thus far.

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Habitat Use and Movements of Sharp-shinned and Cooper's Hawks during Autumn at Fort Morgan, Alabama

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ABSTRACT

Three Sharp-shinned Hawks (*Accipiter striatus*) and three Cooper's Hawks (*A. cooperii*) were radio-tagged during autumn at a site in Alabama along the northern coast of the Gulf of Mexico. Birds were monitored continuously for times ranging from 98 - 1031 min. Both species used forested habitats almost exclusively; one Cooper's Hawk made extensive use of a residential area. Individuals spent >85% of the time perched. Known instances of birds leaving the study area occurred between 10:30 and 13:30 on days with clear skies and strong thermal activity. Roost sites were in pines (*Pinus elliottii*), and three of five roost sites were in forested habitat. Two roost sites of one Cooper's Hawk were in patches of dense vegetation within a residential area. The results suggest that preservation of forested habitats along the northern Gulf coast is important for both species.

The behavior of most raptor species during migratory stopover remains poorly known (Holthuijzen et al. 1985, Goodrich et al. 1996, Niles et al. 1996). Several causes underlie the lack of information about stopover behavior of raptors Although the study of marked birds is essential,capturing individuals of most species is time and labor intensive. Furthermore, the technology necessary to study secretive and wide-ranging species (i.e., radio and satellite telemetry) has become widely available only relatively recently. Finally, experiment protocols (e.g , orientation and activity studies) used with caged passerines are not amenable to the study of raptors.

Radio and satellite telemetry are the only feasible ways to study the behavior of often secretive and wide ranging raptors (e.g., Cochran 1972, 1975, Hunt and Ward 1988, Marzluff et al. 1997), and movement patterns of many common species during different times in their life cycle remain poorly known. Two telemetry studies of the behavior of Sharp-shinned Hawks (*Accipiter striatus*) during autumn stopover are those of Holthuijzen et al. (1985), and Niles (1996); no such