

# Band Wear In Common Ravens

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## ABSTRACT

We observed band wear on Common Ravens (*Corvus corax*) banded with aluminum USGS and alpha-numeric color anodized bands in northwestern Wyoming. Both bands began to exhibit sharp edges less than one year after banding and anodized color bands began to lose color in similar time. We suggest that banders use hard metal and engraved plastic color bands for Common Ravens instead of aluminum bands.

## INTRODUCTION

Safe banding techniques are crucial to professional and conscientious research studies. Long-lasting marking techniques are vital to studies involving long-lived species. As bands wear, they have the potential to injure birds (Sedgwick and Klus 1997). Further, if bands wear prematurely, they may be lost and/or become unreadable. Population models often depend on bands and markers lasting throughout the lifespan of the study. Lost bands can seriously compromise survival estimates and management recommendations therein (Nelson et al. 1980, Collins 2007).

Band wear is reported commonly among species that spend much time in and around water (e.g., Anderson 1980, Hatch and Nisbet 1983, Dolbeer and Belant 1994, Collins 2007) and has been attributed to corrosion by salt water and substrates, such as sand and rocks (Harris 1980, Jehl 1990). Band wear and loss is not often reported for land birds. Of the few reported cases we found in upland birds, two of three species belonged to the family Corvidae (Bergstrom 1964, Rowley 1966). Unfortunately, many corvid species can be difficult to recapture to assess the safety and longevity of bands and other markers, as is the case with the Common Raven (*Corvus corax*).

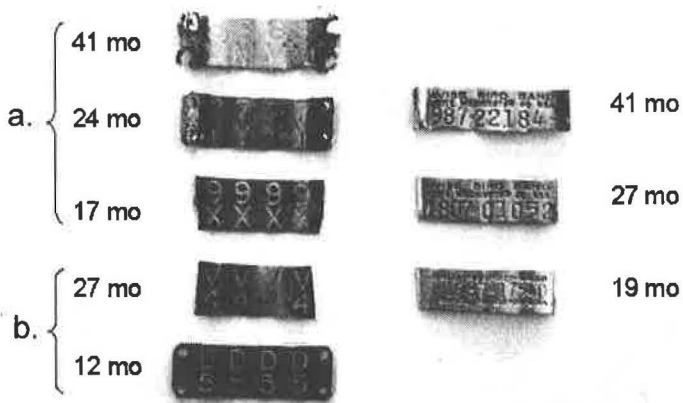
Common Ravens have been documented to live as long as 44 yr in captivity (Heinrich 1989) and banding records indicate that the longest lifespan for a wild raven is 13+yr (Klimkiewicz 2007). Ratcliffe (1997) estimates the potential maximum age of wild ravens to be 25-30 yr, indicating that bands must be able to retain their integrity for this length of time for studies of this species. We report on use and appropriateness of several types of bands used with Common Ravens as it relates to band wear.

## MATERIALS & METHODS

We banded Common Ravens in Jackson Hole, WY. The base elevation of this mountain valley is approximately 2100 m. The area experiences long, cold winters with high snow accumulations (avg. annual snowfall = approx. 3.8 m). The area is home to a very dense, non-migratory population of breeding ravens (Dunk et al. 1994, Bedrosian 2005, unpubl. data). Sub-adult ravens (0 – 3 yr) within our study area are highly gregarious and have large annual home ranges (e.g., ~400 km<sup>2</sup>, unpubl. data). Adult, breeding ravens (older than three yr) typically occupy small seasonal home ranges encompassing their nest sites, but make large distance movements during the fall and winter months, presumably to aggregated food resources.

We began banding ravens in 2002. From 2002 through 25 Nov 2005, we used United States Geological Survey (USGS) aluminum, lock-on bands and in combination with color anodized aluminum, rivet-on, alpha-numeric bands (Acraft Sign & Nameplate Co., Ltd., Edmonton, AB) from 2002 until 16 May 2005. After noticing the band wear problem and contacting the manufacturer of the color anodized aluminum bands (Acraft Sign & Nameplate Co., Ltd.), they suggested the anodizing process on the bands may have been initially flawed and they manufactured a different batch of color anodized bands for us (Figure 1, a & b). We used this new batch of bands from 1 Jun 2004 through 16 May 2005. Because we noticed band

wear on both the USGS and color anodized bands, we began using butt-end, stainless steel USGS and plastic, rivet-on color bands (Forsman et al. 1996; Figure 2) after 16 May 2005.



**Fig. 1.** Aluminum color anodized (left) and aluminum USGS (right) bands recovered from Common Ravens in NW Wyoming. Two different manufacturing batches of color anodizing (a and b) were used to determine if the anodizing process was compromised and increased the rate of band wear. Both types of bands exhibited erosion on the margins, but surface wear was much more pronounced on the color bands.

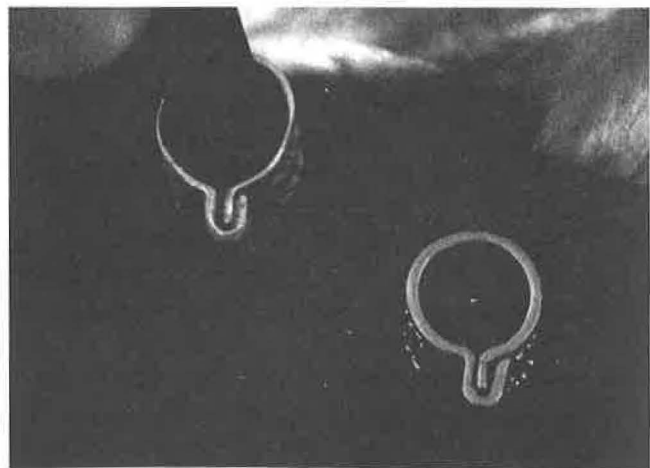


**Fig. 2.** Example of a plastic, rivet-on, color band used on Common Ravens after determining that aluminum bands exhibited wear in less than one year after banding.

## RESULTS

Since 2002, we have banded a total of 871 individual ravens. We banded a total of 179 ravens with a combination of aluminum USGS and color anodized bands (pre-16 May 2005) and 692 were banded with a combination of stainless steel USGS and plastic color bands (post-16 May 2005). We have re-sighted at least 139 individuals and recaptured 55 individuals (16% and 6% of total banded, respectively). During re-sightings, we noticed band wear and color loss from everywhere on the aluminum color anodized bands except for the rivet area (Figure 1).

We found wear and color loss on aluminum color anodized bands in as little as nine months, regardless of manufacturing batch (Figure 1). The color anodized bands wore down at a faster rate than aluminum USGS bands. However, for all bands, the first area that began to wear was the bottom edge of the band, which became sharp and slowly began to erode (Figure 3). On the outside of the bands, we noticed that the area on the bottom of the tab would wear first. All aluminum bands recovered (both USGS and color anodized; n = 29 individuals) exhibited wear, which appeared to increase with age of the band (Figure 1).



**Fig. 3.** Example of an aluminum Common Raven band that had worn to produce a sharp edge on the bottom of the band after being on the bird for approximately 25 months. Inset of a new band is provided for comparison.

Of 26 recaptures that involved ravens banded with a combination of stainless steel USGS bands and plastic color bands, we have not noticed wear on the USGS bands. We have noticed some wear on

the plastic color bands 13 mo post-banding. However, the extent of wear was far less than that of color anodized bands and was concentrated near the rivet and tab. We have re-sighted plastic color bands as long as 16 mo after banding and have not noticed a reduction in our ability to identify the band symbols.

## DISCUSSION

Of Common Raven studies involving banding across North America (CA, WA, MI, AK, and ID), to our knowledge no one else has observed this type of wear, but few recaptures have been made in most studies (S. Backensto, pers. comm., W. Boarman, pers. comm., K. Engle, pers. comm., J. Marzluff, pers. comm., and W. Webb, pers. comm.) In Greenland, this type of wear has been observed on both aluminum color anodized bands (Acraft Sign & Nameplate Co., Ltd.) and aluminum bands issued by Denmark (M. Restani, pers. comm.) Further, in Germany, T. Grünkorn (pers. comm.) has seen similar wear in aluminum bands and estimates that the bands would be lost in 10 to 15 yr. Ravens spend a large portion of their time walking on the ground and bands can acquire abrasions from a variety of substrates, including glacial sand, talus rock, river beds and ice (Boarman and Heinrich 1999, M. Restani, pers. comm., authors, pers. obs.).

Regardless of the abrasive material that causes the wear, our observations may be important to others studying corvids that need long-lasting markers. Since changing to stainless steel USGS bands, we have not observed any wear. The plastic, rivet-on bands seem to wear at a slower rate than the aluminum color bands, but the longevity of these bands is still unknown. On all bands with a rivet or lock-on tab, wear occurred on the lower section of the tab, indicating that the band is weighted down in that section and rubbing on the leg and/or other substrates. Some researchers have had success with wrap-around plastic engraved bands, but the adhesives used on such bands are very difficult to apply while banding in or near freezing temperatures (J. Marzluff, pers. comm.). However, the increased weight of the section that overlaps to allow for the adhesive will likely weigh the band down on that side, increasing the chance for uneven wear.

We suggest that researchers banding Common Ravens, and possibly other corvids, use hard metal (stainless steel or incoloy) bands rather than aluminum bands. We also recommend engraved plastic bands over anodized aluminum bands (Figure 2). While the longevity of these bands still needs further evaluation, we have observed an increased life expectancy of plastic bands when compared to aluminum bands.

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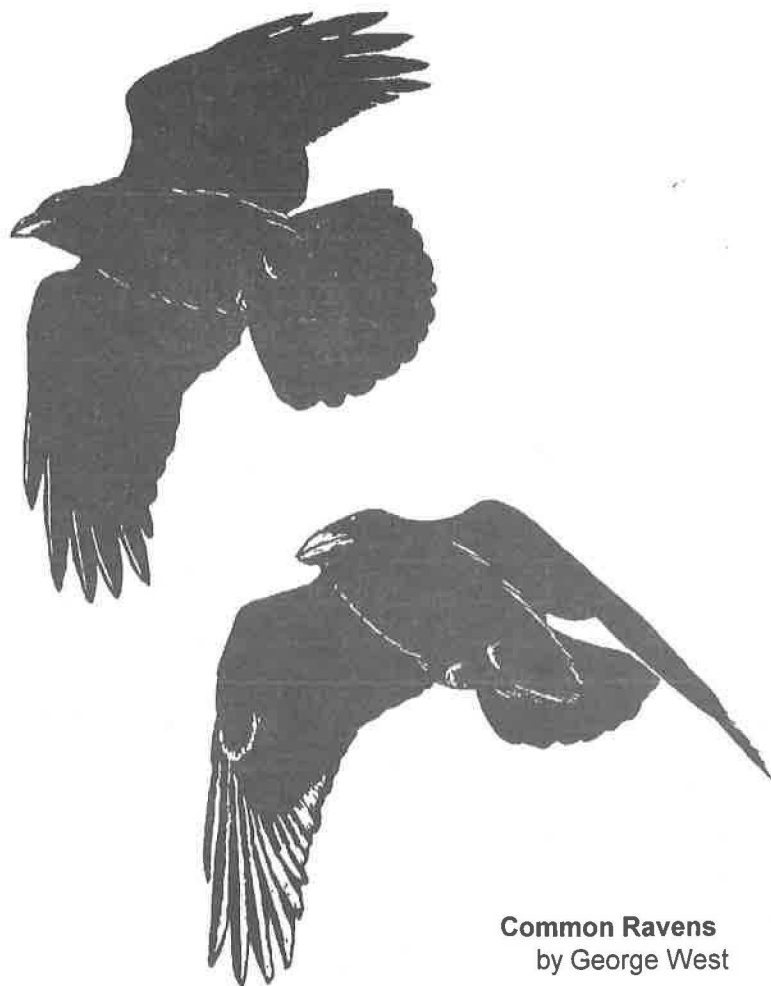
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**Common Ravens**  
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