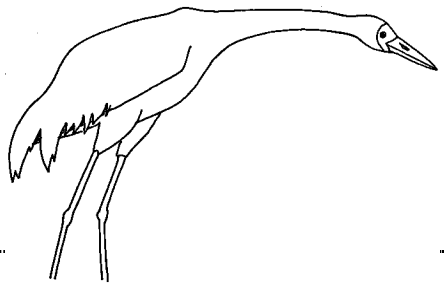
Special Techniques, Part E: Flight Restraint



David H. Ellis and F. Joshua Dein

Many techniques are available for preventing escape of captive cranes. These include tenotomy, tenectomy, wing clipping, confinement under nets, amputation, brailing, and vane trimming (Ellis and Dein 1991). The advantages and limitations of each technique are presented.

Flight Restraint Methods

Techniques for birds include: (1) **limited amputation** (removal of a portion of the wing: the most common form is pinioning which involves removal of the hand) (Young 1948; Schwarte 1965; Sedgewick 1967; Williamson and Russell 1971; Robinson and Buzikowski 1975; Osinskij and Taran 1978; Madill 1981; Wallach and Boever 1983; Amand 1986); (2) **tenotomy** (severing the extensors of the hand) (Schroeder and Koch 1940; Miller 1973); (3) **tenectomy** (removal of a portion of the extensors of the hand) (Schwarte 1965; Sedgewick 1967; Miller 1973; Amand 1986); (4) **patagiectomy** (removal of the patagial membrane and apposition of the radius and humerus) (Sedgewick 1967; Mangili 1971; Robinson 1975; Madill 1981); (5) **functional ankylosis** (fixing the ulna, carpal, and metacarpal bones with stainless steel wire) (Sedgewick 1967); (6) **wing (feather) clipping** (cutting the distal portions of the primary and secondary feathers) (Young 1948; Schwarte 1965; Sedgewick 1967; Gandal and Amand 1982; Amand 1986; Harrison and Harrison 1986); (7) **brailing** (binding one wing) (Schwarte 1965; Zwank and Derrickson 1981; Amand 1986); (8) **vane trimming**, which renders young cranes flightless from fledging until they can be safely wing clipped (when their quills are fully grown); and (9) confinement under **nets**.

Radical amputation of the wing also renders birds flightless, but is seldom used because captive birds are usually confined for propagation or display purposes, uses which presumably would be impaired by extensive mutilation. One less radical form of amputation, **pinioning** (removal of all or a portion of the hand, wing below the wrists) of neonatal chicks, is routinely performed at the New York Zoological Society (Sheppard and Bruning 1983).

Recommended Methods

Patuxent and ICF do not use or recommend radical amputation, tenectomy, patagiectomy, or ankylosis. We use each of the techniques discussed below.

Netted Pens

Nets are used for birds that are designated for release or for full-winged captive breeders. We recommend using nylon coverings for chain link pens. These pens are constructed typically of 2.4-m (8-ft) tall chain link. Nets are supported by 1-cm (0.375-in) plastic-coated steel cables crossing the pens at approximately 6.1-m (20-ft) intervals. In some pens, interior poles are used to support netting.

We use 5.1-cm (2-in) mesh woven-nylon nets, and recommend this **mesh size** as a maximum. Birds held experimentally under nets with larger mesh have been occasionally snared in the net and held suspended by one or both wrists (G. W. Archibald and S. R. Swengel, ICF, personal communication). With 5.1-cm (2-in) mesh, birds which spring up against the nets occasionally pass their heads through the mesh and are momentarily held suspended. Sandhill Cranes pull free under their own weight as do most Whooping Cranes. Rarely, however, a Whooping Crane is held suspended until pulled free by a caretaker. We have incurred no known injuries from these incidents, but believe that this problem can be avoided using a slightly smaller mesh for large cranes.

Netted pens allow birds to be full-winged and therefore presumably better able to balance during copulation. Chances of reproducing naturally (without artificial insemination) are thereby increased.

In cooler environments where snow or ice storms are likely, netted pens, unless heavily braced, can collapse. We recommend either permanent interior support posts or a sufficiently large work force with sufficient temporary vertical support posts to maintain netted pens during snow or ice.

Tenotomy

A veterinarian or other trained person uses a thermo-cautery instrument (Fig. 11E.1) to sever the *tendo longa* and destroy the synovial capsule of the wrist (*junctura carpi*). The operation should be performed with a local anesthetic. We infiltrate the site with 2-3 mL of 2% lidocaine HCl, wait 5 min, and freeze the skin surface with an ethyl chloride spray immediately before surgery. Young birds are typically tenotomized in the fall of their first year. After tenotomy, the wing is taped tightly folded for six weeks to promote ankylosis. A successful tenotomy allows for only limited wing extension capability (Fig. 11E.2).

Some tenotomized cranes are, in a strong wind, still capable of limited flight. To prevent the escape of such birds, we clip the primaries of the tenotomized wing after each molt.

Fig. 11E.2. *Wing extension capability in a properly tenotomized bird (Jane Nicolich with Greater Sandhill Crane). See also Fig. 3.6.* Photo David H. Ellis

Wing Clipping

Wing clipping is used for birds that will be held flightless for at least three years (the normal maximum amount of time required between molts), but may be designated for flight thereafter. Two variations of clipping are available. Either all 10 primaries and most or all of the distal secondaries from one wing are cut with scissors (Fig. 11E.3) or all primaries except the three most distal and all of the secondaries are cut. Birds with exceptional escape capabilities are wing clipped more extensively. Typically, each rachis is cut about 2.5 cm (1 in) from its point of emergence from the integument.

When clipping, **special care** is taken to avoid cutting any feather that is still growing. Profuse and prolonged bleeding from the quill occurs if this precaution is not taken. To stop bleeding, the feather should be pulled from the follicle. To prevent cutting the rachis too soon, the wing is spread and the underside of the wing is inspected to identify blood quills. Feathers that are still growing are temporarily vane trimmed, as described below, and later clipped when feathers are hard-penned (i.e., fully grown and free of blood in the calamus).

Fig. 11E.1. *A tenotomy is performed on the folded wing with a thermo-cautery instrument.* Photo David H. Ellis

Vane Trimming

Vane trimming temporarily grounds birds while their flight feathers (primaries and secondaries) are growing. Once the flight feathers are hard-penned, the rachises are clipped (Fig. 11E.3).

In this process (Fig. 11E.4), a portion of the vanes of the primaries and the distal three to six secondaries of

Fig. 11E.3. *A wing-clipped wing.* Photo David H. Ellis

Fig. 11E.4. *A vane-trimmed wing (see also Fig. 1.16).* Photo David H. Ellis

one wing are trimmed with scissors. The rachis and the feather tip is left untrimmed to prevent birds in social groups from striking pen mates with sharp rachis tips. As illustrated, the outer vane of the five most distal primaries is left intact to prevent breakage of the rachises. Vanes are usually trimmed when birds are 60-70 days old.

Brailing

This technique is used for temporarily restraining fledglings, flighted adults, and birds during shipment. Shipped birds are usually brailed on one wing. For birds brailed long term, brails are changed to the opposite wing at regular intervals (usually every two weeks) to prevent stiffening of the immobilized wing. Epperson (1982 *unpubl.*) found significant but reversible impairment in wing extension capability in birds brailed only two weeks. Birds typically regained full flight capability within 1 to 2 weeks of brail removal.

The **procedure** requires a brail and a riveting device. The brail is a narrow band of flexible plastic 2 cm x 37.8 cm (0.75 in x 15 in) and about 1 mm thick. It is pre-drilled with holes about 1 cm apart. We use a commercially available rivet gun to secure the brail. Leather straps and other riveting or sewing devices can be readily substituted as long as the conditions for proper fit, described next, are met.

When brailing a crane, one caretaker holds the bird immobile while a second inspects the wing to be certain that less than 4 cm of the rachis of each primary is still filled with blood. If the blood-filled zone in some of the quills is more extensive than 4 cm, brailing is postponed to avoid damage to growing feathers. If the bird is ready to be brailed, the brail is inserted between the bases of the third and fourth most distal primaries (numbers 7 and 8), and the strap is formed into a loose loop over the patagium. With the wing folded, the rivet, with one washer on the shaft, is placed through two of the pre-drilled holes in the brail. By probing upward with the free hand, a path is opened for the rivet to pass between the feathers and through a third hole in the brail on the underside of the wing. The loops above and below the rivet should be about equal size. The washer is placed on the rivet and fastened. The trailing end of the brail should point downward and be trimmed to within 3 cm of the rivet. To remove a brail, cut the upper loop (Fig. 11E.5) and slide the brail off the primaries. The final positions of the brail, rivet, and body parts are illustrated in Fig. 11E.6.

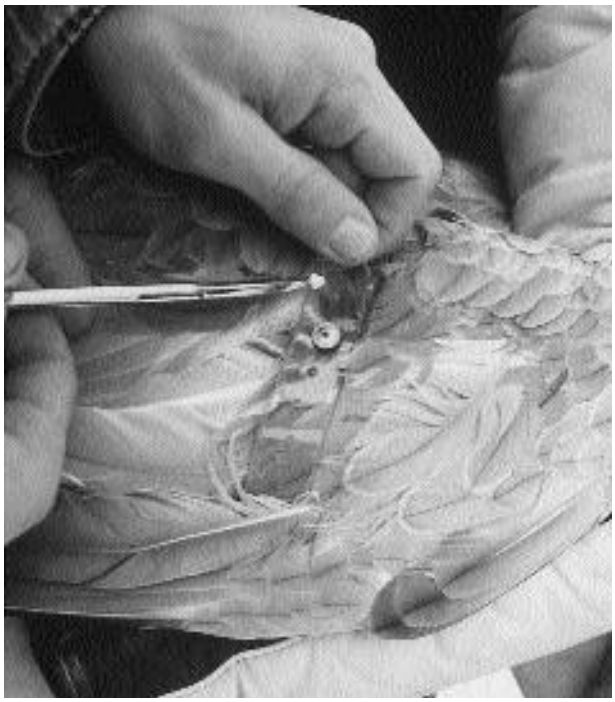


Fig. 11E.5. *Removing a properly fitting brail.* Photo David H. Ellis

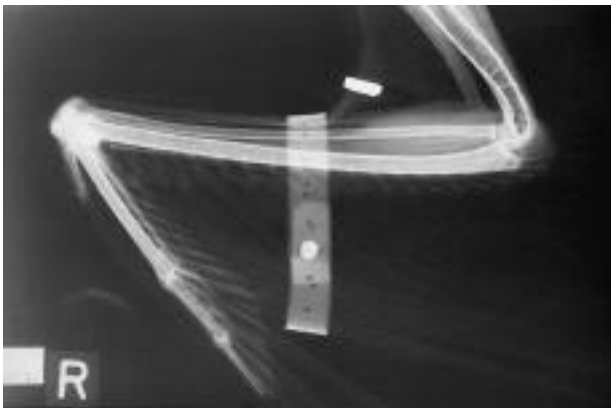


Fig. 11E.6. *Radiograph of a brailed wing.* Photo F. Joshua Dein

Proper fit is important. If the brail is too loose, it will slide toward the humerus until the primaries are free; if too tight, it may restrict circulation in the wrist and hand or cut into the skin. The fit is checked by placing two fingers in the upper loop on the dorsal surface of the wing. If the fingers slide under easily but snugly, the fit is good. If the fingers do not slide easily under the upper loop, the brail should be removed.

Upon release, brailed birds (especially those brailed for the first time) will stumble or even fall when they fail to spread the now brailed wing for balance. Also, during the first 10 minutes or so after release, birds strain at the brail and preen vigorously at the site of the brail. After a few hours, however, the birds typically pay little attention to the brail.

Over 300 previously brailed cranes have been released to the wild (see Chapter 11D). Many of these have survived several years after release. Occasionally, a bird shows slight (but long-term) **impairment** in its ability to extend the hand of one wing following a lengthy brailing period. Such individuals do well in non-migratory flocks, but we suspect that they would be significantly impaired if migratory. Sometimes during brailing, the patagium or the integument between the primaries is damaged by a brail. Such wounds are rare: only once has a bird been so incapacitated by this kind of injury that it was not released.

Literature Cited

Amand, W. B. 1986. Surgical problems (Galliformes). Pages 473-475 *in* M. E. Fowler, editor. Zoo and wild animal medicine. 2nd ed. W. B. Saunders, Philadelphia, Pa.

Ellis, D. H., and F. J. Dein. 1991. Flight restraint techniques for captive cranes. Pages 447-451 *in* J. Harris, editor. Proceedings 1987 Crane Workshop. International Crane Foundation, Baraboo, Wis.

Epperson, R. G., Jr. 1982 unpubl. Evaluation of the effects of restraining flight in young cranes using wing brails. U.S. Fish and Wildlife Service, Patuxent Wildlife Research Center. 13 pp.

Gandal, L. P., and W. B. Amand. 1982. Anesthetic and surgical techniques. Pages 304-328 *in* M. L. Petrak, editor. Diseases of cage and aviary birds. 2nd ed. Lea and Febiger, Philadelphia, Pa.

Harrison, G. J., and L. R. Harrison. 1986. Management procedures. Pages 85-100 *in* G. L. Harrison and L. R. Harrison, editors. Clinical avian medicine and surgery. W. B. Saunders, Philadelphia, Pa.

Madill, D. N. 1981. Surgical procedures. Pages 211-212 *in* T. G. Hungerford, editor. Refresher course on aviary and caged birds. Proceedings No. 55, University of Sydney, Post Graduate Committee in Veterinary Science, Sydney, N.S.W., Australia.

Mangili, G. 1971. Unilateral patagiectomy: a new method of preventing flight in captive birds. International Zoo Yearbook 11:252-254.

Miller, J. C. 1973. The importance of immobilizing wings after tenectomy and tenotomy. Veterinary Medicine and Small Animal Clinician 68:35-38.

Osinskij, L. P., and V. S. Taran. 1978. On methods of partial amputation of hand in birds. [In Russian.] Vestnik Zoologii 1978(4):69-72.

Robinson, P. T. 1975. Unilateral patagiectomy: a technique for deflighting large birds. Veterinary Medicine and Small Animal Clinician 70:143-145.

Robinson, P. T., and R. B. Buzikowski. 1975. Pinioning young birds with hemostatic clips. Veterinary Medicine and Small Animal Clinician 70:1415-1417.

Schroeder, C. R., and K. Koch. 1940. Preventing flight in birds by tenotomy. Journal of the American Veterinary Medical Association 97:169-170.

Schwarte, L. H. 1965. Poultry surgery. Pages 1149-1161 *in* H. E. Biester and L. H. Schwarte, editors. Diseases of poultry. 5th ed. Iowa State University Press, Ames.

Sedgewick, C. J. 1967. Deflighting pet birds. Modern Veterinary Practice 48(3):38-40.

Sheppard, C. and D. Bruning. 1983. Development of techniques to aid the long-term survival of White-naped and other rare crane species. Pages 203-207 *in* Proceedings of the Annual Conference of the American Association of Zoological Parks and Aquariums.

Wallach, J. D., and W. Boever. 1983. Diseases of exotic animals: medical and surgical management. W. B. Saunders, Philadelphia, Pa. 1,159 pp.

Williamson, W. M., and W. C. Russell. 1971. Prevention of flight in older captive birds. Journal of the American Veterinary Medical Association 159:596-598.

Young, W. A. 1948. Wing amputation of birds in lieu of pinioning. Journal of the American Veterinary Medical Association 112:224-226.

Zwank, P. J., and S. R. Derrickson. 1981. Gentle release of captive, parent-reared Sandhill Cranes into the wild. Pages 112-116 *in* J. C. Lewis, editor. Proceedings 1981 Crane Workshop. National Audubon Society, Tavernier, Fla.