

# RE-INTRODUCTION ISSUES

## Crane re-introduction reviewed

### Introduction

Experiments in re-introducing cranes into the wild have been carried out since the mid-1970's with the goal of creating new populations of endangered crane species. Three main practices have been used in rearing cranes for release:

1. hand rearing;
2. parent rearing;
3. cross fostering.

Although initial hard releases of captive reared birds proved unsuccessful<sup>1</sup>, gentle releases proved more successful. Prior to 1985, hand-reared chicks were not considered suitable for re-introduction due to poor survival and imprinting problems. In 1985, based on classical imprinting knowledge<sup>2</sup> and comparative developmental theory<sup>3</sup>, the author developed an innovative method for hand rearing cranes to prevent improper imprinting and produce cranes suitable for release into the wild. This method used puppets, sounds and costumes without overt exposure to humans<sup>4</sup>. Prior to this, a method of cross-fostering whooping crane eggs by sandhill parents had been used in an attempt to create a migratory flock of whooping cranes<sup>5</sup>.

Despite the fact that rearing methods were so important in all re-introductions, only one study of chick development had been done when the author began such studies in 1984<sup>6</sup>. The use of costume rearing over the last 11 years has proved extremely successful as measured by a consistent 83-100% survival rate of such young released in the wild<sup>7,8</sup>. Since the original study<sup>4</sup> and because of the problems with cross fostering<sup>9</sup>, the author believes that it is time to review these studies for successes and failures, to direct future crane re-introductions.

### Costume Method of Isolation Rearing

*Original Costume Experiment (1984-86)* - While the idea of using a costume in conjunction with puppets, sounds and models is deceptively simple, the developmental processes involved are very complex. Even with high survival rates, it is only possible to guess at what is happening behaviourally. In the original experiment<sup>4</sup>, eggs were taken from the wild and transferred to incubators. Brooding calls were played to the eggs two days before hatching. The newly hatched chicks

were then housed with a mounted crane body with an audio speaker in the breast. A dangling modified puppet was attached to the model with its beak hanging over the food dish. The chicks were fed with a puppet through a hole in the door while brooding calls were played. Attempts were made to prevent the crane chicks from hearing human conversation. The caretaker only entered the enclosure when wearing a gray sack costume embellished with feathers. One arm was cloth covered, simulating a wing and the other was inserted in the puppet. The puppet was used to feed the chick or direct it to food or other activities by pointing and moving the bill. The enclosure included a heat lamp, thermometer and food and water dishes<sup>4</sup>.

At four weeks, the chicks were led outside their enclosure into a field situation. They were given a 'frightening' experience by being chased by humans between four to nine weeks<sup>10</sup>. Later, at nine weeks, the chicks were moved to a field release site. They were maintained in a six foot high chicken wire enclosure, 100 feet in diameter and were locked in small adjacent wooden cages each night until they could fly. Because they could easily be controlled by the costumed caretaker, the chicks were never brailed. During this time, they were fed inside each evening to facilitate locking them in. By 14 weeks, all chicks began exiting the enclosure at will and flying within the Necedah National Wildlife Refuge, Wisconsin. At this time, they were in a reattachment period and remained close to the costumed parent<sup>4</sup>. They were then 'released' by removing the costumed parent. This period was based upon earlier studies of regressive or reattachment periods in mammals and birds<sup>11</sup>. Within two weeks they had joined wild crane flocks.

Of six birds fledged, five were known to survive at least one year and return to the breeding grounds from a wintering area. This is a minimum survival rate of 83%. At the time this was a surprising and encouraging result.

*Experiments with Migratory Sandhill Cranes (1988-90)* - A winter release of seven sandhill crane chicks was attempted using the costume method<sup>12</sup>. Due to a drought and predation, survival was poor. Release of cranes on their wintering grounds does not look promising because the surviving chicks did not complete northward migration with wild cranes but maintained an attraction to their natal area. Cranes transported by truck to Nebraska in spring actually returned shortly to Texas, their natal area.

*Migratory Siberian Cranes in Russia (1994-95)* - The costume method of rearing has been used with Siberian cranes both in captivity and for releases in the wild<sup>13</sup>. Three chicks were successfully costume reared in an area adjacent to a Siberian crane family but they never migrated with wild cranes. The programme has continued from 1991-1995 at Kunovat with no successful telemetry follow up, thus there is no indication of survival rates of success.

#### **Sedentary Mississippi Sandhill Crane Releases: Parent and Costume Reared (1982-91)**

Mississippi sandhill cranes have been captive reared and released into the wild since 1981<sup>14</sup>. Before 1990, all the released cranes were parent reared in captivity. During that time 66 cranes were released with a minimum survival rate after one year of 62%. During 1990 and 1991, 37 (both parent reared

and costume reared) cranes were released with a 76% minimum survival rate after one year. That increased survival was due to the costume reared cranes which had a 100% survival rate after one year during 1990 and 88% the following year.

#### **Cross Fostered Migratory Whooping Cranes at Grays Lake (1975-89)**

The idea of cross fostering, in which sandhill crane eggs are replaced with whooping crane eggs, to allow the foster parents to rear the endangered progeny, was suggested in 1954. Although a creative idea, later research suggested it was not a promising plan because of problems with potential species misidentification by the birds. Classical imprinting studies by ethologists and psychologists in the 1960's<sup>3</sup>, were ignored when the cross fostering experiment began in Grays Lake in 1975. At that time, no preliminary study of crane development had been done, so the experiment was initiated deficient of the most important information needed for its success.

This long term experiment was a dismal failure. Of 289 whooper eggs transferred to Grays Lake, 209 hatched (72%). Only 84 chicks or 40% of those hatched of 29% of the original eggs fledged<sup>15</sup>. To date, after the use of almost 300 whooping crane eggs and a cost of approximately \$2 million, only three adults are known to be alive and the only breeding has been a whooping crane male that bred with a sandhill crane and produced a hybrid (Swengel, pers. comm.). Despite this record, cross fostering is still discussed as a viable possibility.

#### **Sedentary Whooping Cranes in Florida (1982-1994)**

Preliminary studies on establishing experimental non-migratory sandhill cranes in Florida were done in 1982-1987<sup>16</sup>. Greater sandhill crane eggs cross fostered by Florida sandhills survived postfledging at an 80% rate. However, the overall survival rate of rearing was less successful, with only five chicks surviving of the original 34 eggs translocated (15%) and only four surviving of the 18 which hatched (22%). Of the 27 yearlings which were captive reared and released, 15 survived one year (56%).

Despite the high survival rates of migratory chicks as recorded by Horwich (1989) and Urbanek and Bookhout (1992), the creation of a non-migratory population was preferred because of risks noted during migration in the Grays lake experiment<sup>14</sup>. The Kissimmee Prairie, Florida, was selected despite the known risks of Venezuelan equine encephalitis, avian tuberculosis and bobcat predation<sup>15</sup>. Between 1992-1995, 52 whooping cranes were released with a survival rate after one year of 36% in 1993, 32% in 1994 and 47% in 1995 with an average of 38% survival. The survival difference between the rearing methods was dramatic with only 13% of parent reared birds<sup>17</sup> surviving as compared to 43% of the costume reared birds. Despite some predator control, bobcat predation accounted for most of the crane deaths. Once transferred to Florida, there was no consistent use of the costume, which was used only on occasion to feed and coax the chicks to a feeding station. However, a decoy in a pond was used unsuccessfully to draw the chicks to roost in the pond for protection against predators. All chicks were initially brailed for a month to prevent their flying.

#### **Discussion**

A clear pattern emerges from the research conducted on experimental crane releases. The costume isolation rearing

method as described by the author<sup>4</sup> has had major success in all cases used during summer releases with an average of over 85% survival rate after one year in migratory populations and even higher rates in non-migratory experiments. When not used, or used improperly, survival rates after one year were much lower. Cross fostering has proved to be a dismal failure and should not be used. The latter experiments should have been terminated after between five to seven years when no breeding occurred and probably should not have been initiated based on knowledge of the effects improper imprinting had on sexual selection in other avian species.

From successful experiments, the author, Urbanek, and the researchers supplementing the Mississippi sandhill population, have learned the following things which would forecast a successful migratory whooping crane population at Seney, Michigan or some other northern site and an improved survival rate in the sedentary whooping crane experiment in Florida:

1. the costume rearing technique seems to maintain the necessary long term control and security of attachment and therefore offers the most protection following release into the wild. It is thought that the use of wire fences during rearing also conditions naïve chicks to wires which have been a major factor in some crane deaths in other studies;
2. the technique also seems to prevent improper sociosexual imprinting. The author believes that this is due to the grouping of individuals of the same species during the reattachment periods, one of which seems to occur at fledging, during the fall migration. Anecdotal evidence of one sandhill crane chick, who was rescued from a barnyard where he was associating with a flock of turkeys, indicated a potential for identifying with the wrong species had he not been recaptured and released again with wild cranes.

With proper usage, the costume rearing method has had the potential to create a viable migratory whooping crane population since 1990. The author considered Urbanek's suggested activities for initiating a successful migratory whooping crane flock. These included:

1. the use of a dummy model to induce roosting in safer areas;
2. the maintenance of long term control of the released birds with the costume;
3. the development of guide birds which had learned the migratory route from wild birds and could act as guides to new costume reared chicks.

Added to the success of the Urbanek studies is the possibility of using ultralight aircraft to lead young cranes to the wintering area during their first migration. The potential of this became obvious to the author when he first heard of Bill Lishman's work leading geese with an ultralight airplane. The author's correspondence with him in early 1991, led to his ideas being incorporated into a proposal to lead cranes during migration. His methods have been used with a poor survival rate in the Rocky Mountains, but if done with the proper guidance it could be used in conjunction with the costume rearing technique to re-introduce cranes on new migration

routes to wintering areas that currently have no cranes.

- <sup>1</sup> Nesbitt, S. A. 1979. Notes on suitability of captive-reared sandhill cranes for release into the wild. Pp. 85-88 in J. C. Lewis, ed. Proc. 1978 Crane Workshop. Colorado State Univ. Printing Serv., Ft. Collins.
- <sup>2</sup> Hess, E. H. 1973. Imprinting. D. Van Nostrand Company NY.
- <sup>3</sup> Horwich, R. H. 1974. Regressive periods in primate behavioural development with reference to other mammals. *Primates* 15: 141-149.
- <sup>4</sup> Horwich, R. H. 1989. Use of surrogate parental models and age periods in a successful release of hand-reared sandhill cranes. *Zoo Biology* 8: 379-390.
- <sup>5</sup> Drewien, R. C. and E. G. Bizeau. 1978. Cross-fostering whooping cranes to sandhill crane foster parents. Pp 201-222 in S. A. Temple, ed. *Endangered Bird Management Techniques for Preserving Threatened Species*, Univ. Wisc. Press, Madison.
- <sup>6</sup> Voss, K. S. 1976. Behaviour of the Greater Sandhill Crane, M. S. Thesis, University of Wisconsin, Madison.
- <sup>7</sup> Horwich, R. H., Wood, J. and R. Anderson. 1992. Successful release of sandhill crane chicks, hand-reared with artificial stimuli. Proc. 1988 North American Crane Workshop, (D. Wood ed.) pp. 255-261.
- <sup>8</sup> Urbanek, R. P. and T. A. Bookhout, 1992. Development of an isolation-rearing/gentle release procedure for re-introducing migratory cranes. Proc. 1992 North American Crane Workshop 6: 120-130.)
- <sup>9</sup> Horwich, R. H. 1986. Re-introduction of sandhill cranes to the wild. *ICF Bugle* 12: 1,4-5.
- <sup>10</sup> Erickson, D., Boll, F. and R. H. Horwich, 1988. Raising Crane (video). Ootek Productions, Sauk City, WI.
- <sup>11</sup> Horwich, 1974; Horwich, R. H., Cogswell, J. H. S. Burrows, J. and N. Mitchell. 1982. Seasonal variation in mother-daughter groupings in Siberian ibex (*Capra ibex siberica*). *Zoo Biology* 1: 345-354.
- <sup>12</sup> Nagendran, M. 1992. Winter release of isolation-reared greater sandhill cranes in south Texas. Proc. 1992 North American Crane Workshop 6: 131-134.
- <sup>13</sup> Nagendran, M. 1991 Isolation - rearing and release of Siberian cranes. April 1, 1991-September 30, 1991 MSc.
- <sup>14</sup> Ellis, D. H. et al., 1992a. Techniques for rearing and releasing non-migratory cranes: lessons from the Mississippi sandhill crane program. Proc. 1992 North American Crane Workshop 6: 135-141.
- <sup>15</sup> Ellis, D.H., Lewis, J. C., Gee, G. F. and D. G. Smith. 1992b. Population recovery of the whooping crane with emphasis on re-introduction efforts: past and present. Proc. North Am. Crane Workshop 6: 142-150.
- <sup>16</sup> Nesbitt, S. A. and J. W. Carpenter, 1993. Survival and movements of greater sandhill cranes experimentally released in Florida. *J. Wildl. Manage.*, 57: 673-679.
- <sup>17</sup> Nesbitt, S. A. et al. *In Press*. An experimental release of whooping cranes in Florida - the first three years. Proc. North Am. Crane Workshop 7.

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