Managing Crane Pair Formation at the International Crane Foundation

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Understanding compatibility among cranes in a pairing situation is a valuable component to crane captive breeding programs (Derrickson and Carpenter, 1987). By studying cranes at this point in their life cycle, one can better prevent future management problems and enhance opportunities for successful breeding of pairs. Managing newly forming crane pairs can be instantaneous and trouble-free or it can drag on for weeks, with no guarantee of strong pair-bond formation. After all, the cranes have the final say in whether or not they find attractive the mate one has chosen for them. The person in charge can best serve the cranes by understanding the socialization process through proper interpretation of their behavior. At the International Crane Foundation (ICF), we choose an approach conservative enough to ensure safety, yet flexible enough to deal with each unique pairing situation.

A description of basic crane biology puts the captive pairing process in context. First, we know that a female crane must normally be strongly pair-bonded with a mate before she is physiologically capable of egg production. This makes sense in terms of energy conservation since successfully passing on her genes requires intensive investment by both male and female in:

- defending a breeding territory
- behavioral synchronization leading to development of the female reproductive tract
- copulation
- selecting and maintaining a nest site
- incubating the eggs
- rearing and protecting the chick(s) for up to 11 months

Cranes become sexually mature at between 2-4 years of age depending upon the species. Males produce sperm at 2-3 years of age and will continue to do so outside of a pair bond (Mirande, Gee, Burke, Whitlock 1996). At around one and a half years of age, the time of fall migration for temperate species, cranes will begin to seek out potential mates. The staging areas along migratory flyways thus serve as densely populated gatherings where young or solitary cranes assume the business of mate selection.

In captivity, these dynamics differ radically. As such, pairs are matched based on the three following criteria:

- **Genetics**-ensuring that future offspring will be genetically fit.
- **Behavior**-seeking birds with a complimentary balance of dominance/submission and confidence levels.
- **Age/Rearing History**-i.e. pairing a younger female with an older confident male may decrease the time to first laying. Wild caught birds may calm down more in captivity if paired with hand-reared birds (Derrickson and Carpenter, 1987).

Cranes are, as a general rule, monogamous. They may spend many years paired together if they share a strong pair bond. As such, it seems logical that in the wild they would choose mates exhibiting traits conducive to long-term relationships. This is played out in a period of assessment during the pair-formation process (Nesbitt and Archibald, 1981; Mirande and Archibald, 1990; Nelson, Small, Ellis, 1995). In one study, marked female Florida Sandhill and Greater Sandhill Cranes, on average, associated with between 3.6 and 6.0 potential mates before developing long-term relationships (Nesbitt and Wenner, 1987). In captivity, however, when caretakers place cranes X and Y together, mate selection has already been taken care of. Therefore, we need to understand the process by which cranes express whether or not they will develop a strong pair bond.

The preferred strategy for pairing at ICF is called "Forced Pairing," resulting in 71% of pairs laying eggs as contrasted to the "Flock Separation" method, averaging a 25% laying success rate (Mirande and Archibald, 1990). With "Forced Pairing," the aviculturist acts as matchmaker and chaperon to the birds (Burke, pers. com., 1992). The birds are first placed in a subdivided pen (total pen size at ICF is 50' x 60' with a 14' x 14' adjoining house). The female occupies the back half and the male occupies the front half (house interior is halved). This simulates the position taken by the male in the wild when defending a mate.

Photo by International Crane Foundation (ICF)

Ritualized Preen in Eurasian Crane Grus orus.

The male is placed in the pen a few weeks early to allow for the development of territoriality. With the male already settled in and the new female settling in, observations are made of their interactions through the divider fence from a nearby blind. Data collection is usually performed by continuous sampling for one hour periods.

Cranes are strong visual communicators, so if it first appears that one bird sees the other as an intruder and not as a potential mate (shown by the display of agonistic behaviors), a visual barrier such as tennis wind break netting is placed between them. This greatly reduces stress levels and risk of injury.

At this stage the birds may express themselves via a large repertoire of behaviors in an attempt to "feel each other out." Some cranes will indicate that they want to pair up immediately (thus showing few, if any, agonistic behaviors), while others may display aggressively for several weeks (poorer candidates for socialization at such a time). Expect to see some of the following behaviors ranging from low to high intensity. The frequency of most of these behaviors is generally greater at the onset of the socialization process and lessens with time. Some are performed simultaneously or sequentially.

Repertoire of Behaviors

Head Rub

The first behavior often seen in the less dominant or less confident of two unfamiliar birds when placed next to each other. This is a sign of nervous tension redirected into a neutral or submissive activity.

Ruffle-Bow (Up or Down) Threat

A low intensity threat seen early on which assumes two forms depending on species and individual. The bird raises it's feathers and ruffles them with increasing speed until the whole body is shaking (Swengel, Archibald, Ellis, Smith, 1996). This lasts 2-3 seconds and may be accompanied by bowing of the head with the neck oriented up or downward, preening vigorously and usually growling. The feathers slick back soon after the ruffle has passed. This is fairly common in the White-naped *Grus vipio* and Sandhill *Arus canadensis* Cranes.

Ruffle-Shake

In submissive cranes at the early stage of the socialization process, what appears similar to a ruffle-bow threat is actually a "ruffle-shake." This may serve in the bird's effort to regain its composure after feeling threatened. It is characterized by ruffling of the wings and tail feathers and a horizontal body axis and retracted neck and crown (in *Grus* sp.). The feathers may continue to be held in a loose and ruf-

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fled state. It very much resembles the typical posture of first year chicks in the company of older or dominant birds. It may be interspersed with the "head rub" behavior. When this occurs after capture and restraint, we tend to say that the crane has been "knocked down," implying a temporary psychological set back to which even a very dominant and aggressive crane can succumb if it is overly stressed.

Crown Expansion

This is probably the most widely recognized threat in *Grus* species. The bare skin patch located on top of the head of many species is expanded along the back of the head while simultaneously engorging with blood. The degree to which this bright red crown is expanded indicates different levels of aggression. Often, the back of the head is oriented towards a foe to ensure more effective crown presentation.

Ritualized Preen *(Swengel, et. al., 1996) or* ***Preen Display*** *(Nelson, et. al. 1995).*

This may be interspersed with the ruffle-bow threat. Though it looks similar to true maintenance preening, it differs in being a more vigorous stereotyped response to an individual which has upset the crane. Often the crane looks up, makes direct eye contact with its foe, then resumes the nibble preen several times in succession. It is described in Whooping Cranes *Grus americana* by Nelson et. al. as "a continuum from placement of the bill along the scapulars to perfunctory nibbling of the tertial and primary feathers" (1987). This is also referred to as the "drop wing" threat in species such as the Siberian Crane *G. leucogeranus* and Black-necked Crane *G. nigricollis*, which both exhibit an exaggerated wing extension held in place for several seconds.

Threat Walk *or* ***Vertical Strut*** *(Swengel, et. al., 1996)*

This is a more aggressive behavior where the crane walks in a stiff-legged rocking motion, with its neck often held in a crooked posture. This often occurs along the perimeter of its territory (i.e. the enclosure fence) and is directed specifically toward another crane (or crane keeper). Often, it is accompanied by an expanded crown and raised tertial feathers. In the Hooded *G. monachus* and Black-necked Cranes *G. nigricollis*, the thigh feathers will also be raised simultaneously.

To better understand individual crane behaviors, it helps to be aware of the orientation or direction of behaviors and under which circumstances they are displayed. The same behavior may be positive or negative with regards to pair formation depending on the situation. They may also be influenced by weather and social context (Nelson, et. al., 1995) or other unforeseen factors. Becoming familiar with individual birds through frequent observation greatly helps one to better predict sequences of events when the birds are later placed together in the same pen.

Highly Agonistic Threats

In captivity, very intense agonistic threats are not commonly seen during crane pair formation. They seem, rather, to be reserved for use by more established pairs against an outside threat such as an aviculturist approaching a pen. However, in a pairing situation, if there is a large difference in the birds' confidence levels or if a bird does not respond "correctly" (i.e. miscommunication between parent-reared and human-imprinted cranes), high intensity threats or attack may ensue. If these are seen at any stage in the pairing process, one should not advance the process until these behaviors cease.

The following are high intensity agonistic threats to especially watch out for during a pair socialization.

Crouch Threat

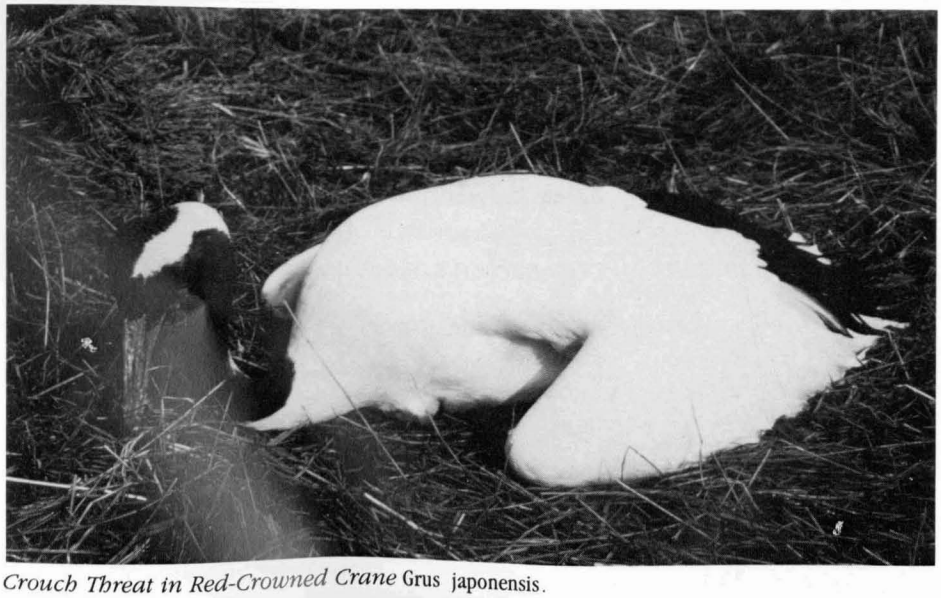
In captivity this occurs usually after many lesser threats have not achieved the aim of driving an intruder from a crane's territory. The crane quickly drops to the ground with wings slightly extended and beak tip poked into the ground. Caution should be taken because the crane may suddenly lift up and attack immediately following this threat. One theory holds that this threat has evolved in mimicry of an incubating bird—an obvious high risk for a crane intruding upon such a bird's territory (Ellis, Swengel, Archibald, Kepler, in press).

Stomp Threat

This usually occurs within a few yards of an intruder, with the crane stamping both feet in rapid succession and often growling at the same time.

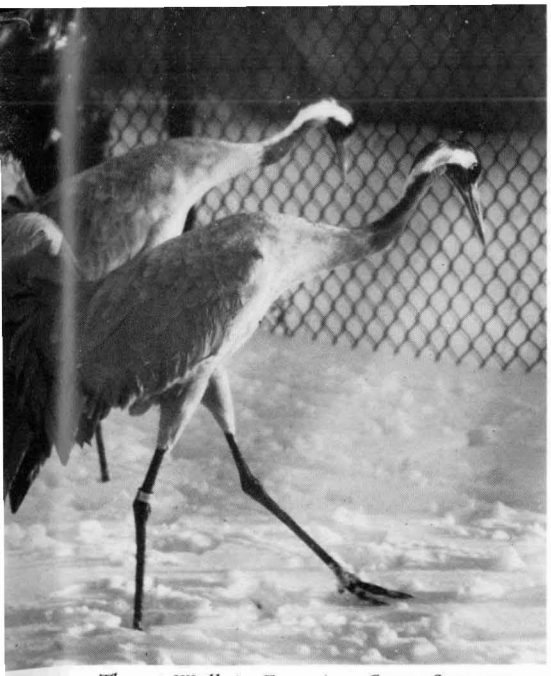
Charge Threat

An impressive threat where a crane runs or flies toward an intruder, landing just shy of it. This may be immediately followed by the stomp threat, ritualized preen, rufflebow, butterfly threat or attack. When witnessed live, the intensity of these threats is very apparent. One might call these the "last straw group" after which the probability of attack increases dramatically—something to be well aware of



Photos by International Crane Foundation (ICF)

Crouch Threat in Red-Crowned Crane Grus japonensis.



Threat Walk in Eurasian Crane Grus grus.

when socializing new crane pairs.

This abbreviated list serves as an overview of the most common threats to look out for during the initial pairing process. Again, if the more severe of these threats are seen between two birds, they are clearly stating that they're not ready to be placed together. Give them more time on opposite sides of the divider fence and re-evaluate at a later date.

Assuming that there are now no agonistic behavioral displays and that each bird knows where it and the other stand with respect to dominance, they have likely begun to show interest in each other.

This is measured in terms of:

- proximity
- synchronous activity
- presence/absence of threats between the birds
- presence/absence of joint threats by the pair toward others

These are good general indicators in the assessment of pair-bond formation among cranes (Derrickson and Carpenter 1987). It may be hours, days or months before one notices changes in the patterns of these activities.

Positive first signs are usually that one bird paces the divider fence in an attempt to be closer to the other, but obviously not if concurrently displaying threat behaviors to that bird! As one crane becomes interested in another, it attempts to shrink the distance between them. For two birds that like each other, a proximity of four to six feet between them is common as they perform various activities or stand along the divider fence. Cranes with a developing pair bond will begin to synchronize daily activities such as dancing, walking, bathing, eating, roosting, loafing, and maintenance preening.

Another sign of pair bond development is the increase in joint vocalizations. This includes "guard calls" and "contact calls." A "guard call" is a sudden single note call given by each crane where one follows the other a fraction of a second later (Archibald, 1976). This would be in response to the approach of an intruder or an unidentified disturbance. "Contact calls" are a vocalization usually made while relaxed. It is a short soft "prrrt" sound given by one or both birds during maintenance activities such as foraging while the birds are in close proximity.

The most promising sign that a pair bond is strengthening is the presence of the "unison call." This is an antiphonal duet where the male emits one note to every one, two or three notes emitted by the female, depending on the species (Archibald, 1976). It is a territorial proclamation (also reinforces a pair bond following copulation) and suggests that the pair is beginning to view their separate enclosures as one greater single territory. By taking other behavioral factors into account, one can determine if the unison call or guard call is a positive sign or an agonistic response between the birds. With younger birds or those less confident about defending a territory, the unison call may not appear until weeks or months after beginning a socialization. If a unison call never develops between a pair, it is likely that they will not experience nesting success and the manager may wish to consider repairing them if other methods can't induce this expression of being strongly pair-bonded.

If at this point one is confident that both birds can spend time in the same pen with minimal risk of injury, then the more dominant bird (usually the male) is introduced into the other's pen (Mirande and Archibald, 1990). Theoretically, this gives the less dominant bird more confidence in the form of a "home court advantage" (Burke, pers. comm, 1992). Make sure that the pen does not contain any narrow angles or entanglements where one crane may become trapped by the other. The cranes are supervised from a blind in case any problems should arise. This lowers the risk of observer bias by not being noticed by the cranes. After an hour of observation, they are again separated.

Even if the dominant bird appears to show interest in the other one, in this new scenario he may still physically displace it and give it soft open-bill jabs to the wing area. One may also occasionally witness low-intensity threats such as the ruffle threat given by either bird. In this way, the dominant bird reasserts its dominance in this new pen half. A submissive crane that responds to such treatment with its own defensive low intensity threats (such as returning a ruffle threat) and lack of overt fear often proves the best match. The avoidance of a disparaging difference in levels of dominance and submission in each bird is critical at this stage (Kepler, 1978). This is because when two cranes are placed in the same pen, it may create a sudden increase in tension, raising the chance of injury by attack or by fleeing attack.

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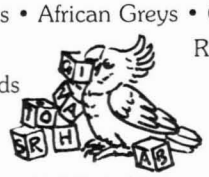

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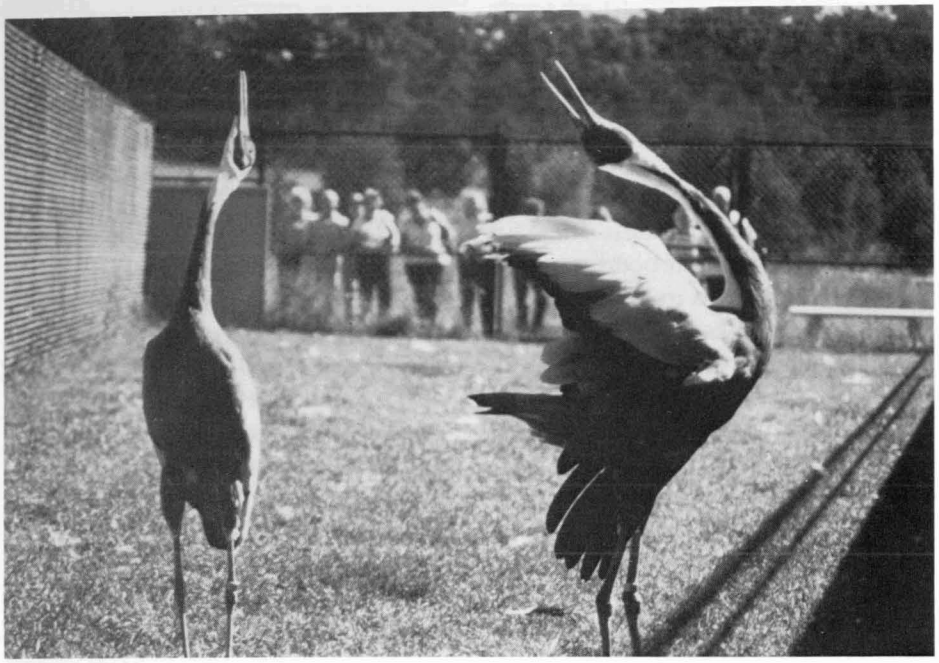

Photo by International Crane Foundation (ICF)

Unison Call in White-naped Crane Grus vipio.

Tension is often released through dance behavior. Dance, in fact, is largely a chain of many different threat behaviors spontaneously strung together with a couple of trademark play or dance moves thrown in. It probably also serves as an expression of elation. The most important point here is that a crane is obviously excited when dance behavior is exhibited. This is a good time to see how the birds engage one another and if both seem to be comfortable in such an interactive setting. In a crane with low confidence, dance may become overly stressful, causing the bird to panic and flee. This, however, may invite chase by the dominant crane. If this occurs, especially in a confined setting, they must be separated immediately as the pursuing crane may attack and/or kill the fleeing crane.

Such are the limits of pairing these birds in captivity. An event such as this can also negate weeks of progress in pair bond development (Mirande and Archibald, 1990). Fortunately, this rarely occurs. If it does, then the confidence level of the weaker bird must be increased before placing the birds together again.

A technique the author uses at this point is to dig a well draining shallow pond (a continual flow will prevent stagnation of water). This lessens the spectre of aggression by providing a new stimulus to engage the cranes in a meaningful activity. Natural foraging in the pond probably helps to redirect possible aggression and also provides an opportunity for increased synchronous behavior. Due to its novelty, the pond appeals strongly to the birds. It just needs to be made large enough to accommodate both birds, preventing any territorial challenge over it.

One manipulation that may help a crane with low confidence is the construction of a one foot tall earthen "calling" mound placed on its side of the divider fence. In cranes, dominance is strongly correlated with height so this may help the bird to feel more secure by becoming taller in front of the dominant crane. Observations are important here to make sure this manipulation doesn't merely raise aggression in the dominant bird. After several uneventful supervised socializations, the aviculturist is ready to leave the birds together unsupervised.

It is important to note that the cranes should only be allowed unsupervised time if the aviculturist is confident that they have already worked out which bird is dominant, making the chance of an unsupervised dominance challenge miniscule. They can be placed together and checked on from every hour down to just a few times a day before separation. This process evolves with how comfortable the manager feels about the pair and ends with the birds finally being left together overnight. If the next morning the birds are fine, they are considered a pair. You have done all you can do up to this point. Continue to keep a close watch on them.

Now the pair is moved to a new enclosure with no visual access to other cranes (Derrickson et. al., 1987). This step will strengthen the pair bond as they now have a brand new territory to investigate and defend. To encourage greater confidence in the pair, enter the pen only when absolutely necessary for the next few months. A few earthen mounds around the pen may give them preferred lookout points. Only when cranes feel that they can confidently maintain a territory (beginning with a strong pair bond) will they begin to exhibit sexual behavior. This assumes that they are normal in all other capacities. It is not uncommon for sexually mature cranes to skip one or more breeding seasons following a new pairing and pen move.

With 11 of all 15 crane species now proposed for listing as "threatened" or "endangered" under revised IUCN

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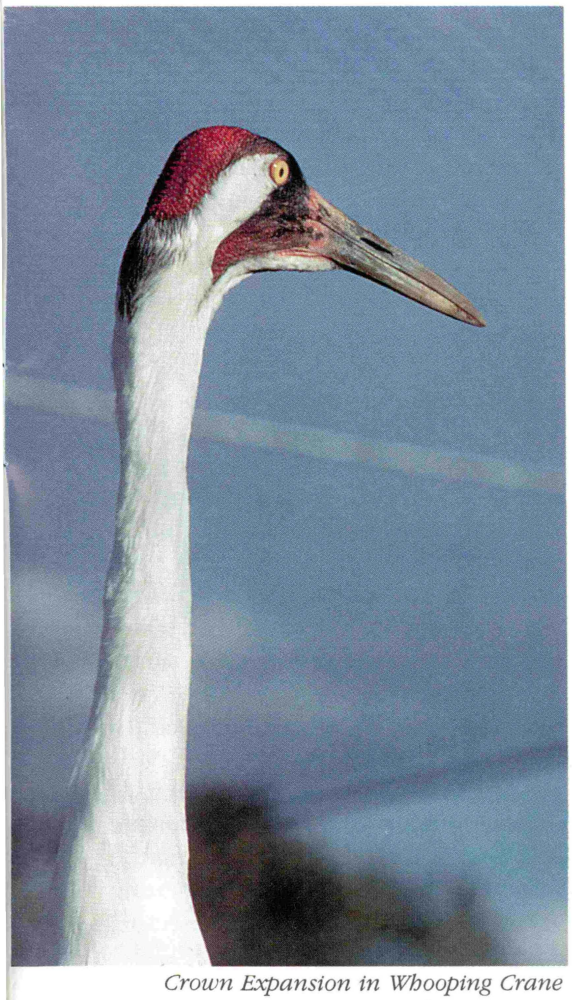
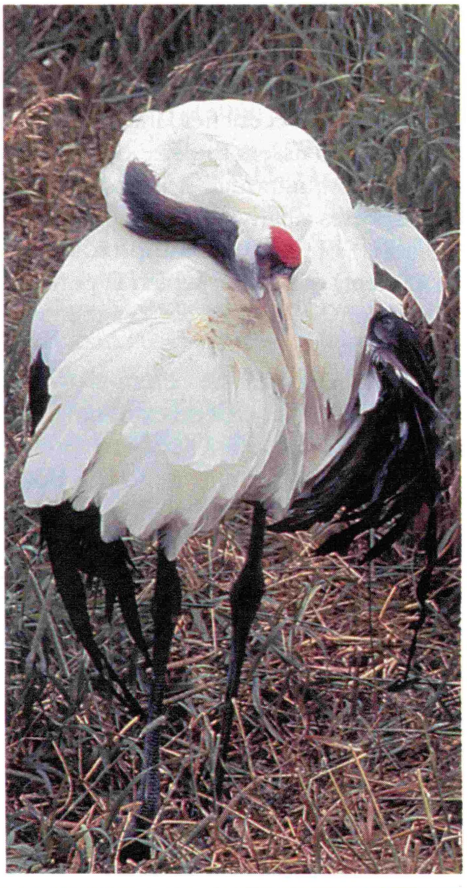


Crown Expansion in Whooping Crane Grus americana.

guidelines (Meine and Archibald, 1996), captive specimens are increasingly valuable in terms of genetics and future release projects. Employing extra caution during the pairing process can largely eliminate the risk of injury or death by ensuring strong pair bonds from the beginning. This in turn increases the chances for earlier and more consistent breeding success.

Happy pairing!



Head Rub in Red-crowned Crane Grus japonensis.

Photos by International Crane Foundation (ICF)

Ruffle Shake in Sandhill Crane Grus canadensis.

Bibliography

Archibald, G.W. Crane taxonomy as revealed by the unison call. Pp. 225-251 in PROCEEDINGS OF THE 1975 INTERNATIONAL CRANE WORKSHOP. J.C. Lewis, ed. Stillwater, Oklahoma, Oklahoma State University Publishing and Printing, 1976.

Derrickson, S.R.; Carpenter, J.W. Behavioral management of captive sandhill cranes-factors influencing propagation and reintroduction. Pp. 493-511 in PROCEEDINGS OF THE 1983 INTERNATIONAL CRANE WORKSHOP. G.W. Archibald and R.F. Pasquier, eds., Baraboo, Wisconsin, International Crane Foundation, 1987.

Ellis, D.H.; Swengel, S.R.; Archibald, G.W.; Kepler, C.B. A sociogram for the cranes of the world. BEHAVIORAL PROCESSES (in press).

Kepler, C.B. Captive propagation of whooping cranes-a behavioral approach. Pp. 231-241. ENDANGERED BIRDS-MANAGEMENT TECHNIQUES FOR PRESERVING THREATENED SPECIES. Temple, S.A. ed. University of Wisconsin Press, Madison, Wisconsin, 1978

Meine, C.D., Archibald, G.W. Conservation biology of cranes. Pp.133 in THE CRANES-STATUS SURVEY AND CONSERVATION ACTION PLAN. C.D. Meine and G.W. Archibald, eds., IUCN, Gland, Switzerland and Cambridge, U.K., 1996.

Mirande, C.M.; Archibald, G.W. Sexual maturity and pair formation in captive cranes at the International Crane Foundation. Pp. 216225 in AMERICAN ASSOCIATION OF ZOOLOGICAL PARKS AND AQUARIUMS 1990 ANNUAL CONFERENCE PROCEEDINGS. Wheeling, West Virginia, American Association of Zoological Parks and Aquariums, 1990.

Mirande, C.M.; Gee, F.G.; Burke, A.; Whitlock, P. Egg and semen production. Pp. 45-58 in CRANES-THEIR BIOLOGY HUSBANDRY, AND CONSERVATION. D.H. Ellis, G.F. Gee, C.M. Mirande, eds., Department of the Interior, National Biological Service, Washington, D.C. and the International Crane Foundation, Baraboo, Wisconsin, 1 996.

Nelson, J.T.; Small, C.R.; Ellis, D.H. Quantitative assessment of pair formation behavior in captive whooping cranes (Grus americana). Pp. 107-114 in ZOO BIOLOGY. D.G. Lindburg, ed., Zoological Society of San Diego, 1995.

Nesbitt, S.A.; Wenner, A.S. Pair formation and mate fidelity in sandhill cranes. Pp. 117-122 in PROCEEDINGS OF THE 1985 CRANE WORKSHOP. J.C. Lewis, ed., Grand Island, Nebraska, Platte River Whooping Crane Maintenance Trust, 1987.

Swengel, S.R.; Archibald, G.W.; Ellis D.H. Behavioral Management. Ch. 6 in CRANE PROPAGATION AND HUSBANDRY. D.H. Ellis, G.F. Gee, and C.M. Mirande, eds., 1996.