

**FINAL REPORT
2000 GREATER SANDHILL CRANE NESTING SEASON
AT CONBOY LAKE NATIONAL WILDLIFE REFUGE**

Submitted by: Joseph D. Engler, Wildlife Biologist, and Jennifer E. Brady, Biological Technician, USFWS, Ridgefield NWR Complex

INTRODUCTION

Since 1995, the Ridgefield NWR Complex has monitored the only known breeding population of greater sandhill cranes in Washington. This sandhill crane population is classified as endangered by the state of Washington due to its limited range and small extant population. Formerly more widespread, this subspecies is currently known to nest only in the following areas: Conboy Lake NWR within the Glenwood Valley (Klickitat County), Panakanic Valley (Klickitat County), Yakama Indian Nation land (Yakima County), and one site on Department of Natural Resources land (Klickitat County). For the purposes of this report, the "on-refuge" designation pertains to cranes nesting in the entire Glenwood Valley because all individual crane territories lie partially or entirely within the refuge boundary.

METHODS

From 1995-1999, refuge staff regularly monitored the crane population in the Glenwood Valley. Off-refuge sites were monitored sporadically (1-2 times per season) through multi-agency aerial surveys. Beginning 24 February 2000, refuge staff monitored arrival, territory establishment, pair formations, nest building, and colt production of Conboy Lake cranes. Systematic surveys were conducted up to four times per week during the breeding season. Additional observations by other refuge personnel and cooperators were noted as well.

The first comprehensive nesting survey was conducted at the refuge on 27 April. This survey focused on locating all nesting crane pairs. A second refuge-wide survey was conducted on 11 July by refuge staff and a Washington Youth Conservation Corps crew in conjunction with a helicopter survey. This survey focused on attaining a total population count as well as locating colts for banding. During refuge surveys, cranes were counted, color bands recorded, nesting territories were identified when possible, and colt status was evaluated.

This year, two helicopter surveys were conducted on 9 June and 11 July. The purpose of these flights was to verify observations, fill data gaps, locate nest sites, locate new or unconfirmed pairs, and determine off-refuge nesting activity. As part of an ongoing color-banding project on the refuge, four colts were banded in July and August.

All crane observations were documented and mapped. These data will be incorporated into the refuge GIS system in order to assess habitat utilization. Further descriptions of survey methods can be found in previous annual reports.

Sandhill crane survey objectives for the year 2000 included:

- determination of nesting population (on and off refuge)
- evaluation of nest success
- monitoring of colt survival
- continuation of colt color-banding project

RESULTS

Glenwood Valley Production

The first cranes returning to Conboy Lake were documented on 24 February 2000. Ground monitoring and aerial flights identified 16 pairs and 9 non-breeding subadults (including the Green/Black colt, banded in 1999). One new pair was established this year by the 1998 White/Blue color-banded colt. However, observations were inconclusive as to whether the pair attempted to nest. An unknown nest located in the northeast C&H area during the 9 June helicopter flight may also belong to a new pair (C&H-NE). However, due to possible territorial displacement and absence of bands, it is not definitively known whether these particular cranes were new to the refuge or a re-nesting pair from another territory.

Of the 16 territorial pairs in Glenwood Valley, 13 were confirmed as nesting pairs. The first observation of a nest exchange or nest occurred on 11 April. As of 9 June, 10 nests were verified, and 3 additional pairs were known to have nested through the presence of colts. Although actual nests of Troh, Giersch, White/Blue pairs were never confirmed, the former 2 pairs are assumed to have made unsuccessful nesting attempts based on their breeding status from previous years. The Giersch pair was not observed after 20 April, when one crane was observed limping badly from an apparent leg injury. During the breeding season, 4 pairs were documented as re-nesting after initial nest failures. The first nest attempt by the Red/Green (Miller #3) pair in Frazier Meadow was abandoned, and eggshell examination indicated the occurrence of small mammal predation. The Willard, Dean Meadow, and Myers pairs also re-nested after initial failures.

This year, 7 of the 13 known nesting pairs hatched clutches, and 10 colts were initially observed. The first colts (Zeigler) were observed on 18 May and are estimated to have hatched on 11 May. The last observation of the Zeigler cranes was on 31 May when only 1 colt was seen. The Willard nest was confirmed to have hatched on 9 June, but colts were never verified. Both of these pairs perennially disappear during the summer and are possibly rearing colts on private lands inaccessible to observers. The Myers nest was located during the 9 June helicopter survey and was estimated to hatch about 28 June. This is the latest documented nest attempt known to have produced a colt to fledging stage. Despite the lower number of clutches hatched in 2000, monitoring throughout the season confirmed that 6 colts fledged on the refuge (1 more than in 1999).

Finally, five end-of-season surveys conducted in September confirmed the survival of the color-banded Myers colt (White/Black), the C&H colt (Blue/Red), and at least one Arena colt (Green/Red). The last sighting of cranes in the Glenwood Valley occurred on 19 September. During the 26 and 28 September surveys, no cranes were observed.

Table 1 summarizes the population estimate, number of breeding pairs, and production in Washington from 1990-2000. Table 2 summarizes the breeding chronology for individual crane pairs from 1995-2000.

Helicopter Surveys

The first helicopter survey was conducted on 9 June 2000. The flight covered the Glenwood Valley, Yakama Indian Nation land (YIN), Department of Natural Resources land (DNR), and the Panakanic Valley.

Within the Glenwood Valley, the flight confirmed 11 nests (2 of which were second nesting attempts) and 5 colts. It also identified one previously unknown nesting pair in the northeast C&H area (C&H-NE), where one adult was observed on the nest. On the YIN, the Polo Field nest was in a different location than in 1999 and had 1 egg in it. No cranes were observed in the Camas Patch (Dry Creek) which was dry and being grazed by cattle. Also on the YIN, the Two Lakes area was surveyed. No cranes were seen, but it appeared to be favorable nesting habitat. At the Deer Creek site on DNR land, one adult was observed on a nest. The Panakanic pair was observed by landowners early in the season but was not seen thereafter. The outcome of off-refuge nests in 2000 is not known.

The second helicopter survey was conducted on 11 July 2000 and covered the Glenwood Valley, YIN, and the DNR lands. Funding for both flights was provided by Ridgefield NWR, the Washington Department of Fish and Wildlife, and the Yakama Indian Nation. During this flight, the two remaining refuge nests for which data was unavailable were found to be vacant. Since neither adults nor young were confirmed within their territories, these nests were assumed to have failed. Subsequent ground surveys supported this conclusion.

Color-banding Project

Four colts were color-banded in 2000. The two Arena colts were banded on 11 July. One was banded with a Green/Red identifier band, a Blue/White/Blue site band, and a FWS band #599-25722. The second was banded with a Green/Blue identifier band, a Blue/White/Blue site band, and a FWS band #599-25723.

After an unsuccessful banding attempt on 7/11/00 (colt was lost in the grass), the C&H colt was banded on 7/18/00 with a Blue/Red identifier band, a Blue/White/Blue site band, and a FWS band #599-25725. The Myers colt was banded on 8/11/00 with a White/Black identifier band, a Blue/White/Blue site band, and a FWS band #599-25724.

Of the 3 colts banded in 1999, only the Dean Meadow colt (Green/Black) returned to the refuge in 2000. It did not exhibit any sign of a leg injury sustained in September 1999.

A total of 16 crane colts have been color-banded on the refuge since 1996. Five of these were suspected of not having survived to the fall migration. Of the 7 banded colts (pre-2000) that we assumed migrated in the fall, 6 subsequently returned to the Glenwood Valley the following season. The seventh bird though not observed in Washington was observed during the 2000 fall migration in California; its summer whereabouts remains unknown. Three of the 5 (pre-1999) birds returned to the Glenwood Valley for their third year; two have been nesting since 1998, the other returned paired in 2000. One bird that did not return its third year was observed with another bird in Oregon, approximately 59 miles south of the refuge. As follows is a summary of re-sightings and crane status by unique band color code.

- A. Red/Green was banded on 6/26/96. It was observed near the town of Glenn, Glenn County, CA on 14 January 1997. It returned as a non-breeder to Conboy Lake NWR during 1997. This male crane returned to Conboy Lake NWR as a breeder from 1998-2000; so far, it has been unsuccessful in fledging young.
- B. Black/White was banded on 6/26/96 and is the sibling of Red/Green. It was observed near the town of Glenn, Glenn County, CA on 14 January 1997. It returned as a non-breeder to Conboy Lake NWR during 1997. This male crane returned to Conboy Lake NWR as a breeder from 1998-2000; so far, it has been unsuccessful in fledging young.
- C. White/Red was banded on 7/16/97. It returned as a non-breeder in 1998 and it was subsequently observed during the fall migration on 29 September 1998 at Lower Klamath NWR, Siskiyou County, CA. It was not observed in 1999. It was observed with an unmarked bird on 22 May 2000 (FS personnel, Maggie Gould, pers. comm.) and again on 6 June 2000 by Gary Ivey on the Camas Prairie in the Mt. Hood National Forest, Wasco County, OR. White/Red is believed to be a female; nesting was not confirmed for this pair.
- D. Green/White was banded on 7/16/97. It returned as a non-breeder in 1998 and it was subsequently observed during the fall migration on 29 September 1998 at Lower Klamath NWR, Siskiyou County, CA. It was re-observed at Conboy Lake NWR only once per season in both 1998 and 1999. It was not observed in 2000. It is believed to be a male.
- E. White/Blue was banded on 7/2/98. It returned as a non-breeder in 1999 and was observed on 14 November 1999 along Woodbridge Road in San Joaquin County, CA. It returned paired with an unbanded bird to Conboy Lake NWR in 2000; nesting this season was not confirmed.
- F. Green/Black was banded on 7/6/99. It returned as a non-breeder to Conboy Lake NWR during 2000. It did not exhibit any noticeable signs of the leg injury it sustained prior to the fall 1999 migration.
- G. Black/Red was banded on 7/6/99. It did not return to Conboy Lake NWR in 2000. However it was observed at Butte Sink NWR, Sutter County, CA on 3 November 2000.

DISCUSSION

This season marks the sixth year of intensive data collection on the refuge's crane population. This project has documented 1) the existence of a larger breeding population than originally suspected in WA, 2) a relatively high production rate in the overall population, 3) individual pair reproductive rates and some territory data, and 4) a variety of site fidelity, dispersal and migration-related data through the color-banding program.

Based on the data, many recommendations have been offered over the years for improving the collection of population data and acquiring additional data necessary for management purposes. However, due to the lack of consistent staff assistance and oversight, little continuity now exists in the program. While new seasonal observers have done an excellent job on their observations, considerable time is spent each season "learning the refuge", attaining a crane search image, and learning the habitat use and behavioral nuances of individual crane pairs. This has resulted in a wealth of annual data on some pairs but limited data on others. This disparity in data makes it

difficult to assess habitat condition and utilization by cranes, as well as habitat changes that may impact crane productivity.

Since 1995, fifteen breeding territories have been documented on the refuge. Some of these are well defined and occupied annually, while others have experienced various habitat alterations (primarily water levels) that cause nest loss and/or territory abandonment. Water levels play a critical role in nest initiation, placement and survival, as well as in the seasonal availability and productivity of moist foraging and roosting habitat. Cranes utilize a variety of wetland and upland types for these activities including dry grass uplands, partially timbered uplands, emergent marsh and wet meadow. The seasonal availability and condition of these habitats within individual crane territories ultimately dictate crane productivity. Habitat data has not been collected with respect to territory habitat types, though some cursory information may be drawn from observations and GIS mapping; however, the latter has not been completed. Currently water level trends for these various territories are not collected or data is collected only sporadically during the nesting season. While this data is critical for making informed management decisions, current staffing patterns are insufficient to allow a more management-oriented program to evolve.

Recommendation 1: Hire a permanent assistant wildlife biologist for Conboy Lake NWR or in conjunction with a seasonal technician, designate one experienced staff person from the Ridgefield NWR Complex to work at Conboy Lake NWR from 7-10 days per month (April-July). Their primary duties are to fill in population data gaps and initiate a habitat utilization study focusing on identifying home ranges and general habitat types utilized by breeding crane pairs.

Overall, crane productivity since 1995 has been relatively good and the population has exhibited some limited signs of growth. A closer examination of nest success and productivity data reveals a number of interesting and important trends for management consideration. Since 1995, nest success (at least one egg per nest hatching) was 67%, this based on those nesting attempts (n=69) for which we have good data. Nine of fifteen pairs (60%) met or exceeded this nest success rate. However, four pairs produced 73% of the fledglings, with one pair producing 30% of those. Furthermore, three pairs (all adjacent pairs in the northeast section of the valley) have produced 56% of the fledglings during this period. This data indicates that all crane pairs are not created equal. With only a few crane pairs producing the majority of the fledglings, the loss of a single crane pair or its territory could have long-term negative consequences to the population. This productivity data allows the opportunity for a focused study to evaluate the habitat parameters and crane utilization patterns of individual territories based on their productivity.

While pair productivity in part is based on an individual pair's ability to negotiate typical parenting pitfalls, good habitat conditions and their wise use by the pair ultimately dictates productivity. Without further study, habitat requirements can only be surmised for this crane population. This data gap will limit the effectiveness of management efforts to improve overall habitat for the species. It may also prove detrimental should environmental conditions or management efforts jeopardize critical components of key nesting territories.

Recommendation 2: Explore the potential for a graduate student to evaluate habitat characteristics of key crane territories, their size, juxtaposition to one another, nest site and water requirements, and develop an estimate of potential carrying capacity, valley-wide.

During fall 1999, a wetland rehabilitation project was initiated in the northeastern portion of the refuge. While this project produced favorable wetland responses at the target site, it had indirect and potentially deleterious impacts on the hydrology of adjacent wet meadows. One established crane pair appears to have abandoned its territory possibly due to changes in the hydrology of the site. Excessive water retention on the site has raised a number of concerns regarding its impact on wet meadow vegetation, amphibian populations, and its suitability for crane habitat. The exact causes and remedies for this hydrologic issue have not been resolved.

While wetland rehabilitation projects, dike repairs and water manipulations are often necessary components of refuge management, the hydrology at Conboy Lake is not well understood. The valley itself (particularly at key crane territories) is primarily a seasonal wetland with a complex array of marshes, wet meadows, dry grassy uplands, and timbered uplands. The complexity of the wetland systems, the out-dated water management infrastructure, and the lack of on-site staff makes it difficult to effectively monitor and manage water flows throughout the refuge. The system in part has been self-regulating, except along the main drain (Outlet Creek), due to beaver activity and the lack of intensive human manipulation. While not an ideal situation, the crane response in

some areas has been excellent. While adequate water for nest initiation and placement is crucial for protection from predators, rearing habitat needs are less understood. While it is suspected that most roosting occurs in shallow wetlands, once eggs hatch, excessive water levels seem to be deleterious to colt survival. Pondered water during the rearing period limits overall foraging area, particularly for the youngest cranes. Simply stated, increased water surface acreage decreases the available foraging habitat for crane colts. These conditions, though favorable for some species, also tend to concentrate predators such as coyotes into the limited wetland peripheries frequented by cranes. Coyotes are thought to be the primary predator of unfledged cranes in the Glenwood Valley. In general, crane production in the valley has increased during the driest years when monitoring has occurred. It should be recognized that many other factors are influencing crane productivity thus the importance of wet versus dry years should not be oversimplified at this time.

Recommendation 3: *In the short-term, wetland rehabilitation projects, dike modifications, and changes in hydrology need to be focused on less complex, open habitats that provide minimal or poor habitat for cranes and other important species, such as Oregon spotted frogs. Areas with productive crane territories should be avoided until further study identifies their critical habitat components. An in-depth hydrologic and/or engineering assessment is needed in all project areas to maximize the achievement of desired results and assure that indirect impacts to non-target areas are minimized.*

Recommendation 4: *As it pertains in part to Recommendation 3, a number of dike and water management alterations occurred in 2000 within the territories of the two most productive crane pairs in the valley. Monitoring of these alterations and their potential impacts on these crane territories should be a priority in 2001.*

As stated earlier, breeding cranes utilize a variety of habitat types throughout the season, however, current data on the complexity and importance of these various habitats is not understood. Management and habitat restoration activities need to examine the various habitat aspects required by successful crane pairs. Projects aimed at a single result, such as providing seasonal water of specified depths will prove inadequate for cranes, if the wetlands juxtaposition within the surrounding landscape is not evaluated.

Recommendation 5: *In 1998, considerable dredging of Chapman and Holmes Creeks occurred, resulting in the loss of seasonal wetlands and wet meadows south of Kreps Lane. This in turn resulted in the abandonment of two crane territories and the loss of a significant breeding population of Oregon spotted frogs during 1999 and 2000. An in-depth hydrologic and engineering assessment needs to occur in this area including adjacent private lands and conservation easements. A restoration plan, acceptable to both the refuge and private landowners, should be formulated to restore and manage this wetland complex for crane and Oregon spotted frog production.*

Agricultural uses continue to play a key role in the management of crane habitat. While both grazing and haying appear to provide important short grass habitat for foraging cranes, particularly in high density reed canary grass fields, timing of these activities is crucial. Trespass cattle continue to be a problem on the refuge as well as at off-refuge sites.

Recommendation 6: *Upland and wet meadow complexes within nesting territories should be protected from cattle foraging through adequate fencing and seasonal repair. Immediate efforts need to be made to remove trespass cattle and repair points of entry. Haying should not occur until 1 August at the earliest. This date should be extended if the presence of unfledged colts is known.*

The long-term survival and expansion of the Washington population of sandhill cranes depends on off-refuge nesting and foraging sites, as suitable areas within the refuge are limited for continued growth of the population. Productivity data for off-refuge nesting pairs is limited and essentially nothing is known about the habitats that they are utilizing. Many of the crane nesting sites in the WA and OR Cascades are small wetland complexes, unlike that found in the Glenwood Valley. Therefore it is imperative to study these smaller sites to identify potential expansion areas for WA cranes.

Recommendation 7: *Continue to pursue funding and multi-agency collaboration for monitoring off-refuge sites. Input regarding this issue needs to be incorporated into the Washington Recovery Plan for greater sandhill cranes (in draft).*

ACKNOWLEDGEMENTS

We would like to thank the following people for their field monitoring efforts, flight assistance and banding assistance during the 2000 Greater Sandhill Crane Project at Conboy Lake NWR:

David Anderson, Washington Department of Fish and Wildlife
Eric Anderson, Ridgefield National Wildlife Refuge Complex
Jill Begala, volunteer
Heidi Brunkal, Hanford National Wildlife Refuge Complex
Harold E. Cole, Conboy Lake National Wildlife Refuge
Jeff Feen, Yakama Indian Nation
Dan Friesz, Ridgefield National Wildlife Refuge Complex
Dr. Marc P. Hayes, Portland State University
Bill Price, volunteer
Sara Russum, Conboy Lake National Wildlife Refuge
Teunis Wyers, Ridgefield National Wildlife Refuge Complex
Youth Conservation Corps, Glenwood, WA

TABLE 1. Greater Sandhill Crane: Breeding Pairs and Production in Washington, 1990-2000

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
WA Population Estimate ^A	6	8	6	6	8	22	26	34	39	40	47
#Breeding Pairs On-Refuge ()^B	3	3	3	3	3	7 (2)	8 (2)	12	14	13 (1)	13 (3)
#Breeding Pairs Off-Refuge ()^B					1	1 (1)	2 (1)	3	(3)	3 (1)	2 (1)
#Subadult Individuals On-Refuge						0	0	4	5	4	9
# Young Produced*	1	1	3	0	0	1	3	5	5	5	6

1990-1994 data is based on incidental observations; the numbers presented are unconfirmed estimates.

^A - data includes confirmed pairs, unconfirmed pairs, and subadults but does not include young fledged that year

^B - data in parentheses represent territorial pairs without confirmed nesting data

"On-refuge" refers to cranes nesting within the Glenwood Valley

"Off-refuge" refers to cranes nesting outside the Glenwood Valley

* - this number reflects young known or suspected of joining the fall migration

TABLE 2. Summary of Individual Crane Pair Nesting Success and Production, 1995-2000

Pair	Year	Nest Outcome	#Colts Observed	#Colts Fledged
Arena (1990)	1995	hatched	1	0
	1996	hatched	2	2
	1997	failed	0	0
	1998	hatched	2	1
	1999	hatched	2	2
	2000	hatched	2	2
Myer (1990)	1995	hatched	2	1
	1996	hatched	2	0
	1997	hatched	2	1
	1998	failed	0	0
	1999	hatched	1	1
	2000	hatched(r)	2	1
Dean Meadow	1995	hatched	1	0
	1996	hatched	1	0
	1997	hatched	1	0
	1998	hatched	2	1
	1999	hatched	2	1
	2000	failed (r)	0	0
Ziegler	1995	hatched	1	0
	1996	hatched	2	1
	1997	hatched	2	0
	1998	hatched	2	0
	1999	hatched	1	0
	2000	hatched	2	unk
Miller #1 (1993)	1995	hatched	2	0
	1996	failed	0	0
	1997	hatched	1	1
	1998	failed	0	0
	1999	hatched	2	0
	2000	failed	0	0
White/Blue	1998	(-)		
	1999	(-)		
	2000	unknown		

Pair	Year	Nest Outcome	#Colts Observed	#Colts Fledged
Willard (1990)	1995	failed	0	0
	1996	unknown		
	1997	hatched	0	0
	1998	hatched	1	0
	1999	unknown		
	2000	hatched(r)	0	unk
Headquarters	1995	failed	0	0
	1996	failed (r)	0	0
	1997	failed (r)	0	0
	1998	failed (r)	0	0
	1999	hatched	1	0
	2000	failed	0	0
Troh	1995	(-)		
	1996	hatched	1	0
	1997	hatched	1	0
	1998	hatched	1	0
	1999	failed	0	0
	2000	failed	0	0
Dymond (1992)	1995	unknown		
	1996	hatched	0	0
	1997	hatched	0	0
	1998	failed	0	0
	1999	territory drv	(-)	(-)
	2000	territory drv	(-)	(-)
Laurel	1995	unknown		
	1996	unknown		
	1997	hatched	1	1
	1998	hatched	2	2
	1999	hatched(r)	1	0
	2000	hatched	1	unk

TABLE 2. continued

Pair	Year	Nest Outcome	#Colts Observed	#Colts Fledged
C&H	1995	(-)		
	1996	(-)		
	1997	hatched	1	1
	1998	hatched	1	1
	1999	hatched	1	unk
	2000	hatched	1	1
Giersch (1992)	1995	(-)		
	1996	unknown		
	1997	failed	0	0
	1998	hatched	2	1
	1999	hatched *	1	1
	2000	failed	0	0
Miller #2 (Black/White)	1995	(-)		
	1996	(-)		
	1997	(-)		
	1998	failed	0	0
	1999	hatched	1	0
	2000	failed	0	0
Miller #3 (Red/Green)	1995	(-)		
	1996	(-)		
	1997	(-)		
	1998	failed	0	0
	1999	hatched	1	0
	2000	failed (r)	0	0
C&H-NE	1995	(-)		
	1996	(-)		
	1997	(-)		
	1998	(-)		
	1999	(-)		
	2000	failed	0	0

Pair	Year	Nest Outcome	#Colts Observed	#Colts Fledged
Whitcomb (1994)	1995	failed		
	1996	failed		
	1997	failed		
	1998	(-)		
	1999	(-)		
	2000	hatched	2	2
Camas Patch / Dry Creek (YIN)	1995	(-)		
	1996	failed	0	0
	1997	failed	0	0
	1998	no data		
	1999	no data		
	2000	no data		
Polo Fields/ Signal Peak (YIN)	1995	hatched	0	0
	1996	hatched	unk	unk
	1997	hatched	1	1
	1998	no data		
	1999	unknown		
	2000	unknown		
Deer Creek (DNR)	1995	(-)		
	1996	(-)		
	1997	(-)		
	1998	(-)		
	1999	unknown		
	2000	unknown		
Panakanic	1995	(-)		
	1996	(-)		
	1997	hatched	1	0
	1998	unknown		
	1999	unknown		
	2000	unknown		

"unknown" = pair was present in territory, but nesting not confirmed
 (r) = pair re-nested after initial nest failure (-) = pair not established or not identified
 * = the observed colt could not be 100% attributed to this pair
 "no data" = no data collected due to absence of cranes or lack of surveying
 (year) after territory represents suspected year of territory establishment based on pre-1995 surveys

Note: some data may differ from previous years reports, as refinements were made based on new data