

**GROWTH AND DECLINE
IN NESTING WATERBIRD POPULATIONS
IN NEW MEXICO'S RIO GRANDE VALLEY:
1975-2007**

A REPORT TO

**SHARE WITH WILDLIFE
NEW MEXICO DEPARTMENT OF GAME AND FISH
SANTA FE, NEW MEXICO**

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EXECUTIVE SUMMARY

Aerial surveys for, followed by ground counts of, colonially nesting waterbirds were conducted on the Middle and Lower Rio Grande during the 2007 breeding season. Of eight nesting species historically documented, greater numbers of nests were counted in the Lower Rio Grande in only one species, Great Egret, during 2007 than during intermittent surveys conducted since 1973. Comparable numbers of nests were recorded for Neotropic Cormorant and Great Blue Heron, while Double-crested Cormorant, Snowy Egret, and Black-crowned Night-Heron all showed declines in nest numbers of as much as 90%. Little Blue Heron and Cattle Egret, which were previously recorded in at least one year, were not found nesting in 2007, though Cattle Egrets were found to be nesting in the Middle Rio Grande. More regular and systematic population monitoring of colonial waterbirds along the Rio Grande and throughout New Mexico should be undertaken because of the dramatic declines documented in 2007. The intensively managed pool of Caballo Reservoir has potential to be maintained at levels conducive to large nesting colonies during the breeding season, if it can be done without impact on the ability of downstream irrigators to access water when needed during that time period.

Colonial waterbirds are typically piscivorous and must be able to access open water to forage. They evolved the system of colonial nesting wherein territoriality was minimized in order to allow many to benefit from extensive food resources packed into limited area. Nesting aggregations are often multi-species in composition (Frederick et al. 1995); in New Mexico's Rio Grande Valley eight species, Double-crested and Neotropical Cormorants, Great Blue and Little Blue Herons, Great, Snowy, and Cattle Egrets, and Black-crowned Night-Herons (Table 1), have historically nested in trees in mixed colonies (Hundertmark 1975, 1979).

Hundertmark's work (1974, 1975, 1979), mostly from boats, shore, or wading, provided a baseline of nesting populations for Elephant Butte Reservoir, potentially the largest foraging site in the Lower Rio Grande Valley. Coordinated air and boat surveys in 1985 (Schmitt New Mexico Department of Game and Fish, retired., unpubl. data) and aerial surveys in 1998 (NMOS 2007) and 1999 (S. O. Williams III, New Mexico Department of Game and Fish, retired., unpubl. data) were the only documented efforts to monitor waterbird breeding in subsequent years. Thus, this survey, an initial aerial search with ground follow-up observations, provides the first systematic counts of nesting colonial waterbirds in this region in the 21st century.

STUDY AREA

The Rio Grande below Albuquerque extends approximately 320 km to the Texas border. It crosses two National Wildlife Refuges (NWRs), four state waterfowl management areas, four state parks, two mainstem reservoirs (Elephant Butte and Caballo), and large expanses of private, Middle Rio Grande Conservancy District, and Bureau of Reclamation lands. Man-made impoundments occur intermittently in the floodplain. Some on the wildlife refuges and management areas were created intentionally and managed for wildlife. Others were accidentally created by railroad and low-flow channel embankments. For the purposes of this report, the study area was split into the Middle Rio Grande (from Albuquerque to Bosque del Apache NWR), and the Lower Rio Grande (from below Bosque del Apache to the lower end of Caballo Reservoir).

Elephant Butte Dam was completed in 1916 and Caballo Dam was completed in 1940. At peak storage Elephant Butte Reservoir extended 65 km upstream of the dam, creating a large shallow upper lake above 'the Narrows' lined with inundated trees and shrubs ideal for nesting waterbirds. The lake was within 2 m of elevation from being full each breeding season from 1985 through 1998. A long-term drought began in 1999 and the lake receded to below the Narrows in 2002. The upper lake, with its marshy, swampy margins, remained dry through 2007. Caballo Reservoir when full reaches to within 5 km of Elephant Butte Dam. Though it has a capacity of <10% that of Elephant Butte's 2.3 million acre-feet, it is built to hold water released from Elephant Butte Reservoir for power generation during the winter for later downstream use for irrigation; thus it can fluctuate, most commonly, by dropping more than 5 m during a breeding season.

Table 1. Primary foods and documented foraging distances, according to Birds of North America accounts¹, of colonial waterbird species found in the Lower and Middle Rio Grande Valley, New Mexico, 1975-2007.

Common Name	Scientific Name	Primary food	Foraging distance	
			Mean	max.
Neotropic Cormorant	<i>Phalacrocorax brasilianus</i>	fish <24 cm	2	???
Double-crested Cormorant	<i>Phalacrocorax auritus</i>	fish < 40 cm	3	40
Great Blue Heron	<i>Ardea herodias</i>	vertebrates	<3	30
Great Egret	<i>Ardea alba</i>	fish < 30 cm	<10	40
Snowy Egret	<i>Egretta thula</i>	variety < 3 cm	3	???
Little Blue Heron	<i>Egretta caerulea</i>	NA	NA	NA
Cattle Egret	<i>Bubulcus ibis</i>	variety < 3 cm	Less	30
Black-crowned Night-Heron	<i>Nycticorax nycticorax</i>	variety	???	???

¹ Butler 1992, Davis 1993, Hatch and Weseloh 1999, Parsons and Master 2000, McCrimmon et al. 2001, Smith 1995, Telfair 1994, Telfair and Morrison 1995

Gallery forests of cottonwoods (*Populus deltoides* var. *wislizeni*), with an understory of exotic Russian-olive (*Elaeagnus angustifolia*) and tamarisk (*Tamarix* sp.), were the predominant floodplain vegetation in much of the upper half of the survey area. This bosque occasionally reached as much as half a mile from the river channel; it was much more limited south of Caballo Reservoir. Potential nest sites within the reservoirs were inundated (both dead and alive) trees and shrubs of cottonwood, Russian-olive, and tamarisk as well as stands of willow (*Salix* sp.).

METHODS

I conducted a review of published and unpublished literature containing previous observations and survey results for colonial waterbirds within the study area. I tabulated estimated numbers of nesting colonial waterbirds by year and by species from journal articles, reports, and New Mexico Department of Game and Fish (NMDGF) files. Numbers of nests from previous years were used as comparisons for the 2007 aerial survey.

A low altitude aerial survey was conducted 13 May 2007 with two observers in a Cessna 206 fixed-wing aircraft. Survey methods generally followed those described in the North American Colonial Waterbird Monitoring Manual (Steinkamp et al. 2003), with the exception of flight speeds (~ 150 kph), which were limited by the capabilities of the aircraft. Overall, the survey technique did not allow a) time for accurate nest counts, b) sufficiently clear, stable and close views to distinguish similar species, c) the ability to see dark-colored species as effectively as light-colored species, and d) the ability to see nests in colonies in live trees (Frederick et al. 1995, Rodgers et al. 2005). Nonetheless, the survey methods was used to quickly and efficiently locate rookeries for follow-up

ground checks. The area within 400 m to the west of the river was surveyed on the southbound flight, then the same area to the east of the river was surveyed on the northbound flight. Side trips to check potential rookery sites farther from the channel were made as needed. Coordinates of located colonies were recorded with global positioning system (GPS) units.

Each colony found aurally was revisited on 20-21 May and 12-13 June 2007 and monitored through a 15-60X spotting scope from adjacent slopes. Nesting species were identified and counts of active nests by species were recorded.

RESULTS

Aerial surveys identified heron and/or cormorant nesting colonies in five distinct locations; all but one small rookery of two Great Blue Heron nests were previously known. GPS locations of rookeries were provided to NMDGF separately.

Middle Rio Grande

A mixed colony of Cattle Egrets, Snowy Egrets, and Black-crowned Night-Herons on Sevilleta NWR near the San Acacia Diversion Dam, Socorro County, was observed from the air on 13 May 2007 and on a subsequent ground visit on 12 June 2007. This rookery was previously reported as containing as many as 300 nests. The rookery is on the east bank, under the cottonwood canopy 10-50 m back from the edge of the river. On 12 June, approximately 35 nests were seen from 200 m away on the west bank. About two thirds were identified as Cattle Egret nests, and the remaining one-third were likely Snowy Egret nests. Black-crowned Night-Herons were seen entering the rookery as well.

Lower Rio Grande

Four rookeries were found on this river segment. It was also the area that was monitored in previous years. Six of eight historically recorded species were documented in this area in 2007 (Table 2), and trends for each species are summarized below.

Neotropic Cormorant

Neotropic Cormorants were first documented nesting in New Mexico at Elephant Butte Reservoir in 1972 (Hundertmark 1974) and at least six pairs nested in the upper lake in 1975 (Hundertmark 1975). Nesting apparently had only been confirmed once, in 1994 at Bosque del Apache NWR, since 1979 (NMOS 2007). However, Neotropic Cormorants have been reported in New Mexico annually by birdwatchers, especially at Elephant Butte and Caballo Reservoirs, and at Bosque del Apache NWR, with as many as 35 seen at one time (NMOS 2007). The total of five nests documented in 2007, four in Quates Marsh and one in Elephant Butte Reservoir, was comparable to total of six documented in 1975 (Table 2).

Table 2. Documented nests, based on counts or the minimum estimate, of eight colonial waterbird species between San Marcial and Caballo Dam, New Mexico; intermittently from 1975 to 2007.

Common Name	1975	1979	1985	1998	1999	2007
Neotropic Cormorant	6	1	-	-	-	5
Double-crested Cormorant	260	280	-	-	-	38
Cormorant species			350	206	146	
Great Blue Heron	-	-	-	-	57	22
Great Egret	5	3	-	-	10	38
Snowy Egret	200	91	-	-	198	1
Little Blue Heron	2	-	-	-	-	0
Cattle Egret	3	1	-	-	-	0
Black-crowned Night-Heron	300	250	-	-	-	17

Double-crested Cormorant

Double-crested Cormorants were first documented in New Mexico in 1913. In 1937, 200 birds were reported nesting in the Lower Rio Grande Valley (Hundertmark 1975). Between 1975 and 2007 the number of cormorant nests likely peaked in 1996, at an estimated 600 pairs (Wires et al. 2001), but has declined steadily during the past decade (Table 2, Fig. 1). The 2007 count of 38 active nests in the Lower Rio Grande Valley was only about 5-10% of the minimum count of 350 in 1985 and the 1996 estimate.

Cormorant colony locations varied greatly year-to-year, depending on where suitable overwater nest sites were available. In the 1970s, nest sites were abundant on Elephant Butte Marsh (1973-75) and Caballo Lake (1979; Hundertmark 1975, 1979). However, in 1999, as Elephant Butte Reservoir began to decline, about 100 cormorant nests were at Quates Marsh near San Marcial, 46 were below Elephant Butte Dam on Caballo or Mims Lakes and none were seen on Elephant Butte Reservoir (S. O. Williams III, unpubl. data). Of the 38 nests counted in 2007, 8 were on Caballo, 19 were on Elephant Butte, and 11 were at Quates.

Great Blue Heron

Great Blue Herons were not recorded nesting anywhere in the Lower Rio Grande Valley in the 1970s (Hundertmark 1975, 1979). Williams (unpubl. data) recorded 57 nests in 1999, including 38 in Las Animas Creek west of Caballo Lake. In 2007, 20 nests were found at Quates Marsh and two more 6 km east; Las Animas Creek was not surveyed.

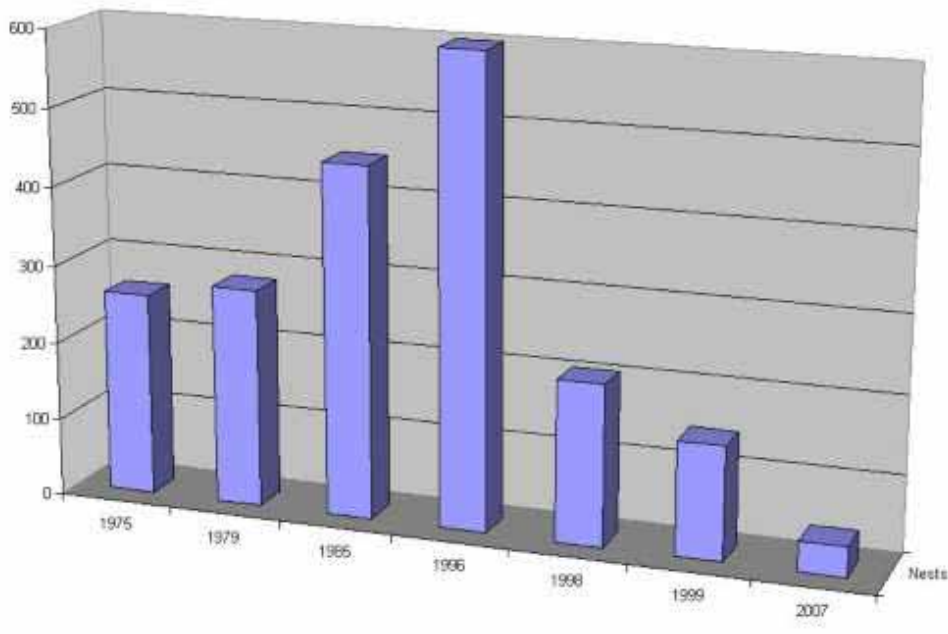


Figure 1. Counts or estimates of cormorant nests in the Lower Rio Grande Valley, New Mexico, 1975-2007.

Great Egret

Hundertmark (1975) found Great Egrets to be uncommon, with only 5 nests located in 1975 and 3 in 1979. Williams (unpubl. data) estimated that only 5% of 200 white egret nests at Quates Marsh in 1999 were of this species, yet the estimate of 10 was double the 1970s counts. In a ground count on 13 June 2007, virtually all of the ≥ 35 white egret nests located were of Great Egrets, a 3.5 fold increase over the 1999 estimate.

Snowy Egret

Snowy Egrets were prolific breeders in the Lower Rio Grande Valley, with several hundred nests reported in 1975 and 1999 (Table 2). In 2007, no active nests were confirmed on 13 June in Quates Marsh, the only area where white egrets were seen during aerial surveys. Snowy Egrets were in the area and might have attempted nesting, but not in the nearly the numbers reported in earlier decades.

Little Blue Heron, Cattle Egret

Neither of these species was found nesting in the Lower Rio Grande Valley in significant numbers in the past (Table 2). Neither species was observed during the limited survey time available in 2007.

Black-crowned Night-Heron

This species was an abundant nester in Elephant Butte Marsh in the 1970s. Night-heron nests are often low and in leafy vegetation, so they are difficult to find from the air (Steinkamp et al. 2003). Therefore even though they were not documented during aerial surveys between 1985-1999 (Table 2) does not prove they were absent. While they were also not observed during the 2007 aerial survey, 17 occupied nests were counted in Quates Marsh on 13 June 2007; only ~5% of the 1970s estimates of 250-300 nests (Hundertmark 1975, 1979).

DISCUSSION

Lower Rio Grande Valley

Thirty-three breeding seasons have elapsed since Hundertmark (1975) waded into Elephant Butte Marsh in 1975. In a third of a century, we have data from only six of those breeding seasons, and half of those were one day aerial surveys, “snapshots” rather than “movies” of an entire breeding effort for a year, much less for 33 years. All of these breeding season data were obtained using the same general approach of locating colonial waterbird rookeries and counting numbers of each species of waterbirds at these rookery areas. However, counts of breeding waterbirds varied by survey method (i.e., aerial, ground or boat), time of year, survey extent, and type of data collected (e.g., number of individual adults vs. productivity of nests). Thus, while trends for some species are relatively clear and undeniable, there is much more that we don’t know than what we do.

By 2007, Elephant Butte Reservoir had been in existence for 91 years and Caballo Reservoir for 66. Elephant Butte was filled completely for the first time in 1942, was very low during the drought of the 1950s, was again full in the 1980s and 1990s, and finally fell again in the last decade. Within these major level changes were many annual and seasonal fluctuations. Changes in Caballo’s levels have been more uniform and annual in nature. Throughout the lives of both reservoirs, the availability of inundated trees and shrubs for nest sites has likely varied, dependent upon opportunities for growth in intervening low water levels and the hardiness of snags to remain standing despite rot, wind and wave action. Although presence and size of nesting colonies of waterbirds is dependent on the availability of suitable nest sites, data on the availability of nest sites were not previously collected. How this important factor varied over time cannot now be indirectly measured. Still, one thing is certain: no matter what the condition of nest sites in Upper Elephant Butte 1914-2001, once that portion of the lake was dry, there were no suitable colony sites between the Narrows and Quates Marsh (30 km).

All locally nesting species except Cattle Egret forage predominately in water. While the other egrets and herons take a variety of prey, Great Egrets, Neotropical Cormorants, and Double-crested Cormorants eat mostly fish (Table 1). All three species are likely to forage within 0-10 km of the rookery, with a maximum foraging range of 40 km (Table 1). In 1999, when there were 100 cormorant nests at Quates Marsh (Table 2; S.O. Williams III, unpubl. data), there was still water in upper Elephant Butte Reservoir,

about 15 km downstream of Quates Marsh. In 2007, when only 11 Double-crested and 4 Neotropic Cormorant nests were identified at Quates Marsh, the open water of Elephant Butte Reservoir was 30 km away. For cormorants to nest at Quates in 2007 and forage on the lake would have required all flights to be at their maximum foraging range. Meanwhile, no inundated nest sites remained in the reservoir above the Narrows. Therefore it is likely that the 85-90% decline in nesting Double-crested Cormorants by 2007 from the estimated peak of 600 nests in 1996 was mostly attributable to decreased availability of suitable nesting sites within an acceptable distance of the lakes. The amount of water in Elephant Butte and Caballo Reservoirs and any effect that might have had on the availability of prey does not appear to have limited cormorant nesting.

Documented nests of Neotropic Cormorants were comparable in 1975 and 2007. Unfortunately the dearth of data for the intervening years does not allow an assessment of their trend, only the conclusion that they are no worse off in 2007 than they were as recent pioneers in 1975

While cormorant nests, mostly Double-crested, declined ~10-fold through the last decade, Great Egret nests increased ~10 fold since the late 1970s. This suggests that Great Egrets were still able to forage more successfully in Quates Marsh and along the Rio Grande than were Double-crested Cormorants. Great Blue Herons, while not recorded in the 1970s, appeared to remain stable since 1999, with more than 22 nests recorded in 2007 in the same river and reservoir stretch that 19 were recorded in 1999.

Finally, two species with more varied diets, Snowy Egrets and Black-crowned Night-Herons, nested in much lower numbers in 2007 than in all previous decades. While cormorant nests are almost always quite visible, these two species can nest low within live vegetation and can be missed during aerial surveys. Thus, declines observed in these two species are not as certain as those detected in the Double-crested Cormorant.

Middle Rio Grande Valley

Only the one large egret/night-heron colony (on Sevilleta NWR) was encountered between Albuquerque and Bosque del Apache NWR in 2007. In 1982 60 Snowy Egret and 40 Black-crowned Night-Heron nests were counted at a rookery near Belen. Cattle Egrets were reported with 3-4 nests at the same rookery in 1973 and 1984, and a Little Blue Heron nest was there in 1984 (NMOS 2007). No rookery was found in that area during the 2007 aerial survey; it was apparently abandoned by the mid-1980s due to disturbance (W. H. Howe, unpubl. data). Intermittently Black-crowned Heron and Snowy Egret colonies have been reported in residential areas of Bernalillo and Valencia Counties. USDA Wildlife Services takes those calls, and likely discourages further nesting (W. H. Howe, personal commun.).

Additional Statewide Observations: Double-crested Cormorants and Great Blue Herons

In addition to the Double-crested Cormorant colonies monitored along the Rio Grande in 2007, two other known colonies in New Mexico were visited during 2007. On a 1 June ground visit, there were 16 active nests at Abiquiu Reservoir, while on a 2 June aerial visit there were about 15 active nests at Santa Rosa Reservoir. The loss of the ~80 nest colony at Jemez Canyon Reservoir, due to that lake remaining empty since 2003, has further decreased the breeding population in New Mexico. Ironically, New Mexico might be in danger of losing cormorants as breeding species, while elsewhere in the U. S. efforts to control burgeoning populations are ongoing (e.g., Duerr et al. 2007).

Great Blue Herons, however, appear to be expanding their breeding range in New Mexico. They were mostly confined to southwestern New Mexico in the 1960s and 1970s (Hubbard 1978), with a notable exception in Mora County (NMOS 2007). While the southwestern colonies persist, breeding has apparently increased in the Lower Rio Grande Valley (Table 2). Two new breeding locales have been reported in San Juan County since 2004 (NMOS 2007). In 2006-07, two small (2-3 pairs) pioneering colonies were found in northern Rio Arriba County (D. W. Stahlecker, Eagle Environmental, Inc., unpubl. data) and at least 8 active nests were found on the Lower Canadian River in Quay County during 1 June 2007 aerial surveys (D. W. Stahlecker, unpubl. data). Expanding breeding in northwestern New Mexico, in particular, could be immigrants from nearby Colorado colonies rather than from more distant New Mexico ones.

RECOMMENDATION

The documented ninety percent decline in nest numbers of Double-crested Cormorant, Snowy Egrets, and Black-crowned Night-Herons in the Lower Rio Grande Valley should be of management concern. More regular and systematic population monitoring of colonial waterbirds along the Rio Grande and throughout New Mexico should be undertaken. More systematic, season-long, ground monitoring would also provide further insight into reproductive success than that provided by the single annual observations (1985, 1998, 1999) or even the 3-visit (2007) scenarios of the past two decades.

Elephant Butte Reservoir will take years to refill and then only with above average precipitation. The pool of Caballo Reservoir, however, is smaller and intensively managed. Yet, when conditions were right (1979, 1998), large numbers of cormorants nested there. If it decides that maintaining or increasing colonial waterbird breeding populations is a priority, NMDGF could determine from historic records and current conditions a level for Caballo Lake that provides ample nesting sites in standing water. Then, with support from U. S. Fish and Wildlife Service, it could explore means of maintaining those nest sites in standing water from 1 April to 1 August each year with the Bureau of Reclamation, and the New Mexico Interstate Stream Commission, and the Elephant Butte Irrigation District.

ACKNOWLEDGMENTS

S. O. Williams III identified the need for an extensive survey of the Middle and Lower Rio Grande for colonial waterbirds and placed it among priorities for Share with Wildlife funding. The NMDGF Share with Wildlife review committee selected this study for funding. C. L. Hayes and M. Medina, NMDGF, processed the contract. W. H. Howe and R. L. Robichaud, U. S. Fish and Wildlife Service, and R. H. Doster, U. S. Bureau of Reclamation, provided waypoints of known rookeries prior to the aerial surveys. D. G. Mikesic assisted on the aerial survey, piloted safely by L. Rhodes, Gallup Flying Service. C. L. Hayes and R. H. Doster aided on ground surveys. Finally, C. A. Hundertmark, W. H. Howe, C. G. Schmitt, and S. O. Williams III conducted previous nest counts within the survey area between 1970 and 2000. Without this important data, population trends would not be discernible. C. L. Hayes and H. A. Walker reviewed the draft of this report, resulting in a much improved document.

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