

WHOOPING CRANES IN SOUTHWEST LOUISIANA

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Author's note: In October 1991 I attended the Sixth North American Crane Workshop in Regina, Saskatchewan, Canada, where I presented a paper on the history of Whooping Cranes in southwest Louisiana, along with a history of people's attitudes toward them. The topic was of interest to participants, for this corner of Louisiana was once part of the species' winter range and was until the mid-twentieth century the home of the United States' only resident Whooping Crane colony. Not surprisingly, the southwestern part of the state has been repeatedly suggested as a candidate site for Whooping Crane reintroduction. Much more than suitable habitat is necessary for a successful reintroduction, however, and my paper described some of the obstacles that surfaced when such a plan was proposed in 1977. Southwest Louisiana was considered again in the mid-1990s, but a different set of circumstances led to selection of a Florida wintering site for a new migratory flock of Whooping Cranes. This article revises and updates my original work presented in 1991. Historical sections of the article appear in *Proceedings, North American Crane Workshop* (Gomez 1992) and are included here with the permission of the North American Crane Working Group.

Introduction

Stretching westward from Vermilion Bay, the Chenier Plain region of southwest Louisiana once harbored wintering Whooping Cranes (*Grus americana*) as well as a nonmigratory population. Adjacent prairie terrace uplands also hosted wintering cranes. Whooping Cranes in these areas declined since the late 1880s as a result of hunting, increased human disturbance in formerly isolated marshes, and conversion of prairie habitat to rice cultivation (Allen 1952). Louisiana's last wild, nonmigratory Whooping Crane was captured in 1950 and transported to Aransas National Wildlife Refuge (NWR) in Texas, where it soon died (McNulty 1966).

Literary references to these birds include Olmsted's (1861) mention of an "immense white crane" on the Louisiana prairies during his journey through the South in 1854. Nelson (1929) reported on the status of wintering Whooping Cranes near Pecan Island, and McIlhenny (1938, 1943) described a sighting of

Vol. 5, No. 2, Winter 2001

4 resident birds flying west over Avery Island and speculated on reasons for the species' decline. Simmons' (1937) description of several nonmigratory cranes included a striking photograph, and both Allen (1950) and Van Pelt (1950) recounted the capture of the flock's last member. The main source of published information on the Whooping Crane's habitat, food, and nesting preferences in southwest Louisiana appears in Allen's (1952) monograph, a detailed research report on the species. Biologist John Lynch supplied much of the report's Louisiana data, which he gathered through personal observation as well as interviews with residents who remembered the cranes and their behavior. Lynch's family is currently organizing his records and has released some items for publication (Drewien et al., in press).

In the past 4 decades, Whooping Crane numbers have rebounded in response to a multifaceted effort to save the species from extinction. Reduced to a low of 16 birds in 1941/1942 (Doughty 1989), the wild Whooping Crane population that migrates annually between Wood Buffalo National Park in Canada's Northwest Territories and Aransas NWR on the Texas coast is now approaching 200, with a count of 187 recorded in winter/spring 2000 (Stehn 2000).

Increased crane numbers, along with concern about potential disasters that could decimate the Aransas/Wood Buffalo flock, have encouraged efforts to establish additional populations (Doughty 1989). In 1977, southwest Louisiana was suggested as a reintroduction site for a nonmigratory flock of Whooping Cranes (Allender and Archibald 1977), but the proposal generated strong opposition from a variety of individuals and agencies, including the Louisiana Department of Wildlife and Fisheries (LDWF). By the mid-1990s local and institutional attitudes had changed, and interest again surfaced in Louisiana's coastal wetlands, this time as a possible wintering site for migratory cranes (Whooping Crane Wintering Sites Study 1998). The Canada-United States Whooping Crane Recovery Team narrowed the choice to two sites, one in Louisiana and another in Florida, but its final decision favored the latter. Nevertheless, future reintroduction of the species in Louisiana remains a possibility.

This article illuminates the history of Whooping Cranes in southwest Louisiana, along with prospects for their return to the state's avifauna, by (1) describing the species' historic presence in southwest Louisiana and the responses of local people toward them, (2) examining reasons why the reintroduction proposals of 1977 and 1996 failed, and (3) assessing prospects for future reintroduction.

History

Former Range: Whooping Cranes historically used the marshes and ridges

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that comprise southwest Louisiana's Chenier Plain, as well as the uplands of the Pleistocene prairie terrace to its north. This portion of the crane's former range is located between latitudes 29.5° N and 30.5° N and longitudes 92° W and 94° W. Within this area, Whooping Cranes used 3 major habitats: tallgrass prairie, freshwater marsh, and brackish and salt marsh. These zones parallel the coast and extend from the prairie terrace uplands south to the Gulf of Mexico.

Tallgrass prairies, now converted to rice fields, characterized the upland areas. Prairie vegetation included big bluestem (*Andropogon gerardii*) and other bluestems, as well as a variety of bunch-grasses, wildflowers, and introduced species (Tharp 1952, Post 1990, U.S. Fish and Wildlife Service/U.S. Geological Survey 2000).

The Chenier Plain encompasses freshwater, intermediate, brackish, and salt marsh habitat. Emergent vegetation in freshwater and intermediate marshes includes maidencane or *paille fine* (*Panicum hemitomon*), bulltongue (*Sagittaria lancifolia*), giant bulrush or bullwhip (*Scirpus californicus*), and cattail (*Typha* sp.). Prominent grasses in brackish areas are marshhay cordgrass or wiregrass (*Spartina patens*), saltmarsh bulrush or leafy three-square (*Scirpus maritimus* [*S. robustus*]), and Olney bulrush or three-cornered grass (*Scirpus olneyi*). Grassy vegetation in salt marshes is predominantly smooth cordgrass or oyster grass (*Spartina alterniflora*) (Chabreck and Condrey 1979).

Bisecting the marsh are oak (*Quercus* sp.)-covered ridges, ancient beaches that rise to maximum elevations of approximately 3 meters above sea level. People have lived on these sand and shell ridges or "cheniers" since the early nineteenth century and have used the area for agriculture, cattle raising, hunting, trapping, fishing, and, more recently, oil and natural gas extraction (Gosselink et al. 1979, Gomez 1998).

Migratory and resident Whooping Cranes in southwest Louisiana favored different habitats. Migratory cranes wintered on the tallgrass prairies and in the brackish and salt marshes near the coast, while a resident flock nested in the isolated freshwater marsh north of White Lake in Vermilion Parish. Sawgrass (*Cladium jamaicense*) and deep marsh habitats were of lesser importance (Allen 1952).

Migratory Whooping Cranes: According to Allen (1952), large concentrations of Whooping Cranes wintered on the tallgrass prairies of southwest Louisiana. These prairies formerly comprised an estimated 720,000 hectares, with carrying capacity for about 2,500 cranes (Allen 1952)—a number larger than Allen's estimate of the entire population. The rapid growth of the rice industry during the late 1880s brought increasing pressure upon these birds, both from human encroachment and habitat loss. Further north, hunting along the migration route, coupled with expansion of human settlement into the crane's breeding areas in Canada and the northern United States, further reduced

the number of migratory cranes that reached Louisiana in winter (Allen 1952). The last record of Whooping Cranes on the Louisiana prairies occurred in 1918, when farmer Alcie Daigle shot 12 of the birds that were feeding on rice near his thresher north of Sweet Lake (Lynch 1947, Allen 1952).

Human encroachment also contributed to the Whooping Crane's decline south of the prairies, where smaller numbers of wintering cranes utilized the salt and brackish marshes until the early 1940s. Muskrats (*Ondatra zibethicus*) flourish in brackish marshes where three-cornered grass, their preferred food, is abundant (O'Neil 1949). Prices for muskrat pelts rose to more than \$1 each in the 1920s, luring thousands of trappers into the coastal wetlands. A network of trapping canals or "traînasses" improved access to muskrat marshes (Davis 1976), and as trapping and hunting activity increased, crane numbers steadily declined (Allen 1952).

Resident Whooping Cranes: The presence of Louisiana's resident flock was first revealed to the scientific community in May 1939 by U.S. Fish and Wildlife Service (USFWS) biologist John Lynch. Responding to a report of nesting activity among cranes in the remote marshes north of White Lake, Lynch's aerial survey discovered 13 Whooping Cranes, 2 of which were "young-of-the-year, about one-third grown" (Lynch 1984). Local people interviewed by Lynch indicated a previously "extensive" colony of the "grue blanche" centered in the freshwater marshes north of White Lake and stretching west about 19 kilometers to Grand Lake (Allen 1952).

These vast marshes of maidencane covered just over 16,000 hectares. Lynch described them as extensive low meadows with little or no tall vegetation but with nearly permanent surface water often averaging 12 to 20 centimeters deep. Maidencane and giant bulrush were apparently the preferred nesting materials for Whooping Cranes in the panicum marshes and in the adjacent and slightly higher prairie marsh and swale (Allen 1952).

Today, British Petroleum-AMOCO Production Company (BP-AMOCO) owns and manages approximately 26,000 hectares of this former crane marsh south of the Intracoastal Waterway, as well as 6,000 hectares of rice land to its north. The Florence Canal bisects the marsh, and to the canal's east the marsh is a virtually solid stand of maidencane. To the west, bulltongue has replaced sawgrass as the dominant vegetation, following a die-off of the latter species in the late 1950s. Limited waterfowl hunting occurs in these marshes, but BP-AMOCO restricts access and patrols the area for poachers (E. Abshire and W. Sweeney, AMOCO, pers. comm.). BP-AMOCO has announced its commitment to protecting the White Lake marshes through a conservation easement, and future wetland and wildlife management plans may be developed in partnership with the Nature Conservancy and other conservation organizations (BP-AMOCO press release 27 April 2000; D. McDowell, Louisiana Nature

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Conservancy, pers. comm.).

Both natural and human factors contributed to the decline of Whooping Cranes in the wetlands north of White Lake. In 1929-30, the Intracoastal Waterway sliced through the region, opening a path through previously inaccessible marshes. Hunting pressure likely increased. In 1936, for example, the *Louisiana Conservation Review* reported the accidental shooting of a White Lake crane "by a gentleman who mistook it for a goose" (Daigre 1936).

The 13 cranes present when Lynch surveyed the area in 1939 were scattered by a hurricane on 7 August 1940. The 1940 storm was 1 of 4 major hurricane-related flood events in Louisiana this century; others occurred in 1915, 1918, and 1957 (Louisiana Department of Transportation and Development 1986). Although maximum winds during the 1940 storm reached only 131 kilometers/hour, torrential rains of nearly 60 centimeters drenched the Gueydan area just north of White Lake (U.S. Department of Commerce, Weather Bureau 1940). According to Lynch, "flood water stood three and four feet deep over most of their [the cranes'] range from August until late October and never did drop down to normal until this summer [1941]" (Stevenson 1942). Lynch speculated that the dispersed cranes moved down the Texas coast or were driven onto nearby uplands where they fell victim to hunters.

Only 6 cranes returned to the White Lake marshes after the storm. Of the 7 lost birds, 6 were presumed shot, and 1 with a crippled wing was captured in a ricefield in Evangeline Parish in 1940. L. O. LaHaye of Eunice, Louisiana, presented this crane to New Orleans' Audubon Park Zoo in November 1941. Until her death in 1965, the famous "Josephine" distinguished herself as the only breeding female Whooping Crane in captivity (McNulty 1966).

The White Lake flock continued to decline by 1 bird each year until 1945, when 2 birds remained. By 1947, only a single crane survived. On 11 March 1950, a party that included Lynch and Allen chased the lone crane by helicopter and captured it. Named "Mac" in honor of the helicopter pilot, Louisiana's last wild Whooping Crane was taken to Aransas NWR, where it died 6 months later (McNulty 1966, Doughty 1989).

Local Attitudes: Several chenier residents now in their 80s and 90s remember Whooping Cranes on the ridges in fall (J. Daigle, C. Eagleson, C. Theriot, pers. comm.). These were likely migratory cranes that foraged in fields of corn and sweet potatoes and fed on live oak (*Quercus virginiana*) acorns to supplement marsh foods.

Residents from 6 Chenier Plain communities indicated that local people viewed Whooping Cranes primarily as a food source and a crop pest, yet they also felt an underlying admiration for the tall, white birds. Former Cameron Parish sheriff and rice farmer Claude Eagleson's recollections exemplify these perceptions and help explain why cranes were often shot by the local people: "It

was beautiful to see them up there in the sky, always 7 or 8 in a bunch, circling and crossing each other like people square dancing. You could hear them for a long way. They'd go down in the sweet potato patch and make a pest of themselves eating the sweet potatoes, so people would kill them. They were good to eat—better than a goose—and most people would eat them, like any other bird. There was a lot of meat to 'em: the neck gave you a pot full, and the gizzard was good too. We ate them mostly in gumbo. Remember, in those days, that's all people had to eat in this country was wildlife and what they raised. If you didn't eat from the land, you didn't eat." (Gomez 1992, 1998)

Proposed Reintroductions

In 1977, John Allender and George Archibald submitted a draft proposal for reestablishing resident Whooping Cranes in southwest Louisiana (Allender and Archibald 1977). After review the following year by the USFWS, Whooping Crane Recovery Team, Canadian Wildlife Service, and the Louisiana Wildlife and Fisheries Commission (LWLFC), the proposal was rated as very low priority and deferred indefinitely. USFWS Director Lynn Greenwalt (letter to G. Archibald, 10 April 1978) cited potential dangers from hurricanes, predators, and human activity in the coastal marshes, and USFWS Special Agent David Hall (letter to Audubon Park Zoological Garden, 13 April 1978) warned of a possible enforcement problem due to the Cajun people's traditional reliance on the marsh for consumptive activities, including the use of non-game birds for food.

Perhaps most influential was the strong opposition LWLFC expressed to the proposal. The commission's opposition was based on concerns that waterfowl hunting, muskrat and nutria trapping, cattle grazing, and marsh management programs would be impaired by designation of areas as critical habitat under the Endangered Species Act (J. B. Angelle, LWLFC, letter to G. Archibald, 14 March 1978; T. Joanen and A. Ensminger, LDWF [now retired], pers. comm.). Assurances to the contrary could not allay fears that Louisiana's snow goose hunting seasons would be affected as had those on Bosque del Apache NWR, New Mexico (Middle Rio Grande Valley Management Review Team 1984).

For more than a decade following the 1977 reintroduction proposal's failure, the perceived threats to traditional land use posed by the Endangered Species Act continued to stand between Whooping Cranes and the southwest Louisiana marshes. Ted Joanen, then Research Leader at LDWF's Rockefeller State Wildlife Refuge, expressed these concerns in 1991: "We *could* have cranes back in this [area], which would be beautiful. The habitat could support them, and the people would welcome them with open arms, provided they didn't have to *give up* anything. And you ask yourself, why *should* we give up? We have

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land use practices going on today which are good, and healthy, and I don't think we should give them up to bring in another species." (Gomez 1992)

Wetland landowners echoed Joanen's concerns. Many had experienced federal intervention in the form of permitting requirements imposed under Section 404 of the Clean Water Act, which regulates earth-moving activities in wetland areas (including activities designed to reduce saltwater intrusion and improve the health of the wetland). Resentful and frustrated by the time involved in the permitting process, they were understandably suspicious of crane reintroduction unless the effort came with a guarantee that current land use practices would not be affected (Gomez 1992, 1998).

And what of hunters, who in Louisiana accounted for 11% of reported Whooping Crane kills between 1885 and 1948 (Allen 1952)? Although residents no longer depend on a wide range of wildlife for subsistence, recreational hunting remains a popular and economically important activity (Gomez 1998). A combination of factors, however, has effected a noticeable change in hunter attitudes since the 1970s.

Declines in wildlife numbers, particularly ducks, brought about increasing awareness of the need to eliminate excessive kills in order to conserve the remaining resource. This heightened sense of responsibility, combined with hunter education programs, more effective enforcement, and stiff penalties for violators, has led to stricter adherence to wildlife laws in south Louisiana, to the benefit of both game and non-game species. Education has played an important role as well. As Ted Joanen remarked in 1991, "you're dealing with a different person now. He's educated, he's taught in school to conserve, he's taught about the environment. The old slob hunter, the old market hunter—he's gone, he's in the graveyard." (Gomez 1992)

Violations still occur, of course, though game law enforcement officers report that the offenses tend to be fewer and of lesser magnitude than those of previous decades. Several chenier residents, however, add a note of caution. Although hunter attitudes have changed significantly, there are "still a few" who are "liable to shoot anything." (Gomez 1992)

While the threat of illegal hunting will remain wherever Whooping Cranes and hunters coexist, agency and landowner concerns about land use restrictions have softened somewhat since the early 1990s. This has occurred in response to the USFWS's occasional practice of designating introduced populations of endangered species as "experimental/non-essential" if they are wholly separate from existing non-experimental populations of the same species. The experimental designation has proved a useful tool for enabling releases in areas where human land use issues are prominent and conflict likely. This designation relaxes some of the restrictions on land use, making them equivalent to the requirements for a threatened rather than an endangered species.

In the mid-1990s, the Whooping Crane Recovery Team again "tested the waters" in south Louisiana, this time in search of a Gulf Coast wintering site for migratory cranes. Using a technique pioneered by William Lishman for the Snow Goose (*Chen caerulescens*), the captive-reared birds would be led by ultralight aircraft, learning the migration route south from a chosen site in central or eastern Canada or the northern U.S. The new migratory flock must remain separate from the Aransas/Wood Buffalo population, however, in order to eliminate the possibility of disease transmission and learning of inappropriate behaviors between wild and captive-reared cranes.

The search for a wintering site for the new migratory flock began in 1996 under the direction of conservation biologist Dr. John Cannon. During the ensuing 2 years, the Whooping Crane Wintering Sites Study examined 20 sites in 6 southeastern states, including 5 sites in Louisiana. The Louisiana sites were, from east to west, Marsh Island State Wildlife Refuge in Iberia Parish; the National Audubon Society's Paul J. Rainey Wildlife Sanctuary (considered by the study as an adjunct to Marsh Island) in Vermilion Parish; BP-AMOCO's White Lake marshes, also in Vermilion Parish; Rockefeller State Wildlife Refuge in Cameron and Vermilion Parishes; and Sabine National Wildlife Refuge in Cameron Parish.

After gathering ecological data as well as some sociological and administrative information through rapid-assessment screening visits, Cannon's survey team selected 3 sites for further study. These sites were considered excellent potential wintering sites for Whooping Cranes because of their large size (greater than 9,500 hectares), shallow water, flat topography, open visibility, and limited number of potential hazards. The sites were St. Marks NWR and Chassahowitzka NWR, both in Florida, and Marsh Island State Wildlife Refuge (including nearby State Refuge and Rainey Sanctuary) in Louisiana. Further study narrowed the list to 2: Chassahowitzka and Marsh Island.

An in-depth assessment of ecological and sociological/political characteristics of each site followed, along with consideration of these characteristics along the migratory pathway that would bring cranes to each area. By summer 1998, both sites looked very promising, with Marsh Island the stronger of the sites in terms of ecological characteristics and hazard control, while Chassahowitzka ranked higher in terms of sociological/political characteristics and administrative potential. It is interesting to note that despite the Florida site's higher ranking for these criteria, Louisiana government officials were reported to be positively disposed toward a Whooping Crane reintroduction project (Whooping Crane Wintering Sites Study 1998, J. Cannon, pers. comm.).

The Wintering Sites Study concluded in August 1998 with a final report to the Whooping Crane Recovery Team. Based on the above selection criteria, the report described the relative strengths of the Louisiana and Florida sites and

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declared that each appeared to be acceptable. The report, however, strongly urged the Recovery Team to consider 2 additional factors: separation from the Aransas/Wood Buffalo population of Whooping Cranes and introduction in the core versus the periphery of the cranes' historic winter range. Accordingly, the Recovery Team would choose the new wintering site based not only on ecological and sociological/political criteria, but on the relative importance of these 2 major factors as well.

In terms of core vs. periphery, Louisiana was the undisputed choice. Whooping Cranes had both wintered and nested in the state's southwestern marshes, while documented sightings east of the Mississippi River between 1722 and 1948 numbered less than a dozen (Allen 1952). Since research on the success or failure of reintroduction projects has indicated that chances for success are greater if animals are reintroduced into the core of their historic range, the Recovery Team would need to consider this factor in its decision. It also had the benefit of 5 years of experience as the result of an experiment to establish a nonmigratory population of Whooping Cranes in the Kissimmee Prairie region of central Florida. Releases began there in 1993, but bobcat predation and drought had by 1998 taken a large toll on the introduced birds. Despite annual bolstering of the population with captive-reared birds, several recent nesting attempts, and a hatching in spring 2000 (Folk and Nesbitt 2000), the cranes have yet to successfully fledge young on the Kissimmee Prairie. The experiment continues, however, and hopes remain high.

Marsh Island, then, seemed the logical choice as a wintering site in terms of ecological characteristics, hazard control, and historic range, but one major factor remained to be considered: separation of the new migratory flock from the Aransas/Wood Buffalo cranes. A migration route from Manitoba, Canada, to Marsh Island would leave a buffer of only 80 kilometers at the closest point between the two populations as they migrated across the continent, while the route from a more eastern nesting site (in Ontario, Wisconsin, or northern Michigan, for example) would extend the buffer to 230 kilometers, the approximate distance between Marsh Island and Aransas NWR. A safer bet was the route that took cranes from an eastern nesting area to Chassahowitzka NWR in Florida, which would provide a minimum buffer of 400 kilometers between the wild and captive-reared birds (Whooping Crane Wintering Sites Study 1998).

Accordingly, the Whooping Crane Recovery Team in August 1998 chose a Wisconsin to Florida route for the new migratory flock, but they did not completely rule out Louisiana as a site for future Whooping Crane reintroduction. At their September 1999 meeting, the Recovery Team passed a resolution that included the following statement: "When the migratory pathway and amount of dispersal of the new population assure that no significant mixing will occur with the Wood Buffalo/Aransas population, then additional releases will

be considered to include other sites in Wisconsin, Seney NWR in Michigan, the InterLake region of Manitoba, and a wintering population at Marsh Island Wildlife Refuge in Louisiana." (Stehn 1999)

Discussion

Future prospects for Whooping Crane reintroduction in southwest Louisiana are dependent on the following factors: (1) the dispersal behavior of captive-reared cranes in the Florida nonmigratory and eastern migratory experimental flocks (i.e. how frequently and how far these cranes will wander); (2) the receptivity of Louisiana officials, agencies, landowners, and the general public to crane reintroduction; (3) continued health and stewardship of southwest Louisiana wetlands; and (4) the cooperation of waterfowl hunters and community leaders in both practicing and educating their peers about Whooping Crane protection.

Concerns about possible mixing of wild and introduced Whooping Cranes, with the ensuing potential for disease transmission and learning of inappropriate behaviors, are magnified by the dispersal of cranes in central Florida's nonmigratory flock. In the three years following the initial releases of 1993, cranes spread in all directions from the release area on Kissimmee Prairie; by 1996, the farthest of the dispersals was approximately 105 kilometers from the release site (Nesbitt et al. 1997). Florida's Whooping Cranes have continued to wander, but until summer 2000 all had remained within the state's borders. That season, perhaps influenced by the severe drought, a pair flew north to Michigan. In late November the pair began moving south, and although the male perished, the female returned to Kissimmee Prairie in early December 2000 (Folk 2000). Whether this event was simply an unusually long dispersal or an example of a "nonmigratory" crane in the process of becoming migratory remains to be seen. Either way, such wandering of introduced birds is cause for concern among all who wish to safeguard the Aransas/Wood Buffalo flock.

While Louisiana residents have no control over this first factor, the remaining 3 factors that will determine whether Whooping Cranes are to once again become part of the state's avifauna are largely within its citizens' sphere of influence. When the next reintroduction proposal is made, the Recovery Team will assess the candidate states' willingness to cooperate on all levels—government, land management, citizen/hunter attitudes—as well as the quality and suitability of its wetlands. How will sea level rise affect Marsh Island? Will the LDWF still be supportive of a crane reintroduction effort? Will the Governor and legislators endorse, promote, or otherwise assist the enterprise? Will the White Lake marshes be protected and their water levels and vegetation characteristics managed to make them suitable for Whooping Cranes? Will

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local Ducks Unlimited chapters support the return of an endangered species, educating their members on the fine points of crane identification and hunter restraint?

These questions, and more, are ripe for investigation, and the process is now beginning with the formation of a Louisiana Crane Study Group. Organized in February 2001 with the encouragement of Dr. George Archibald, Director of the International Crane Foundation in Baraboo, Wisconsin, the group's purpose is to encourage the study of and sharing of information about Louisiana's 2 native crane species, the Sandhill Crane and Whooping Crane. Planned research includes initial studies to discover where the state's wintering Sandhill Cranes breed (information that may be useful for a new Whooping Crane reintroduction technique), as well as a broad-spectrum citizen attitude survey to determine whether Louisiana's people and leaders are ready for the return of an endangered species. We hope that these and later studies will provide information useful to the Whooping Crane Recovery Team and perhaps help pave the way for the return of *la grue blanche* to Louisiana skies.

Acknowledgments

I am grateful for assistance during the initial phase of my research from Dr. Robin Doughty and the Department of Geography at the University of Texas at Austin, the Louisiana Department of Wildlife and Fisheries, Ted Joanen and his staff at Rockefeller State Wildlife Refuge, and Wayne Sweeney and Earl Abshire of BP-AMOCO. I also thank Dr. George Archibald, Scott Hereford, and the North American Crane Working Group for their recent assistance, along with Mary Lynch Courville, who granted permission to use John J. Lynch's 1947-1948 notes on historical observations of whooping cranes in southwest Louisiana. I also appreciate the efforts of U. S. Whooping Crane Coordinator Tom Stehn, Dr. John Cannon, and Dr. James Ingold, each of whom offered perceptive comments that improved the manuscript.

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