# The sandhill crane in Wisconsin : a preliminary report. Report 86 [1976]

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# THE SANDHILL CRANE IN WISCONSIN

## A Preliminary Report*



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ABSTRACT

The sandhill crane was originally abundant as a migrant and common as a breeding species in Wisconsin. Highest densities occurred on the prairies and wetlands in the south and west regions where annual Indian fires maintained ideal habitat. Population decline was caused by hunting, settlement and alteration of the habitat. Major decline had occurred by 1900 and only 25 pairs were estimated surviving in 1936. Recovery has occurred gradually. Significant increases were evident in the early 1960's and attributed to acquisition and development of large waterfowl projects. An estimated 1,000 cranes were present on over 25 projects in 1973. Specific management for cranes has not occurred. However, a law was passed in 1975 to pay crop depredation losses and over $5,100 has been paid on spring damage to newly sprouted corn. Research needs include a survey of habitat characteristics for long-range planning, control methods for lessening crop depredations and an investigation of midmigration and winter range aspects.

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## INTRODUCTION

This paper reviews the status of cranes in Wisconsin, with primary emphasis on the greater sandhill crane, Grus canadensis tabida. Our intent is to highlight existing knowledge and support the workshop theme, with consideration of some aspects related to management and research.

Many of you here are familiar with Aldo Leopold's "Marshland Elegy" (1937) in which the sandhill crane's return to Wisconsin marshes was like "the ticking of a geological clock" and man's abuse of marshlands evident in "The sadness discernible in some marshes, perhaps from their once having harbored cranes," but that now "stand humbled, adrift in history." While this sad picture was true in 1937, we are here 38 years later to report that the geologic clock for sandhill cranes is ticking louder and some of the sadness has been erased through the rescue of many marshes that are now safe harbors for cranes.

## MATERIALS AND METHODS

The literature data bank on cranes in Wisconsin is old, contains very limited information, and retrieval is very time consuming (in fact we are still working on it). Two previous unpublished reports by Scott (1938) and Grange (1953), have not been obtainable for review; the authors, however, were most generous in helping with references and suggestions. Records of the Milwaukee Public Museum were generously provided by O. J. Gromme (retired) and Gayle Davis. Of major help to us have been the enforcement and wildlife management personnel of the Wisconsin Department of Natural Resources in providing their field observations in response to mail surveys of crane distribution and abundance in 1967, 1973 and 1975 (Howard pers. comm.). In 1973, Gluesing used both helicopter and fixed-wing aircraft to survey known crane marshes. Many of the data were utilized for a Master's Degree at U. W. Stevens Point by Gluesing (1974 unpubl.). The International Crane Foundation staff has been most helpful in all phases of gathering data in Wisconsin.

## RESULTS

### Status of Cranes

WHOOPING CRANE (Grus americana). This species was reported by numerous authors as a regular migrant in southern and western Wisconsin (Fig. 1), particularly along the Mississippi River, in the early to mid-1800's. It was rare, however, along Lake Michigan. Hoy (1885) reported "seeing no more than a dozen in our vicinity" (Racine Co.). A few were still seen among the enormous flocks of sandhills in the 1860-70 period and the last specimen captured was one shot in 1878 in Green County (Kumlien and Hollister 1903). Records of W. Synder (Milwaukee Public Museum unpubl.), a Dodge County naturalist, contain a sight observation at Horicon Marsh in Dodge County in April 1900.

The early status as a breeding species is still uncertain. Kumlien's correspondence (Main 1943) showed he collected G. americana eggs in 1851 but comments in Baird et al. (1884) raise confusion with the greater sandhill for he stated "this crane" (sandhill) "is the only Grus we have." Carr (1890) referred to a nest as having been found in Brown County. At this time we have not located a single whooping crane specimen or egg taken in Wisconsin. The search, however, continues.

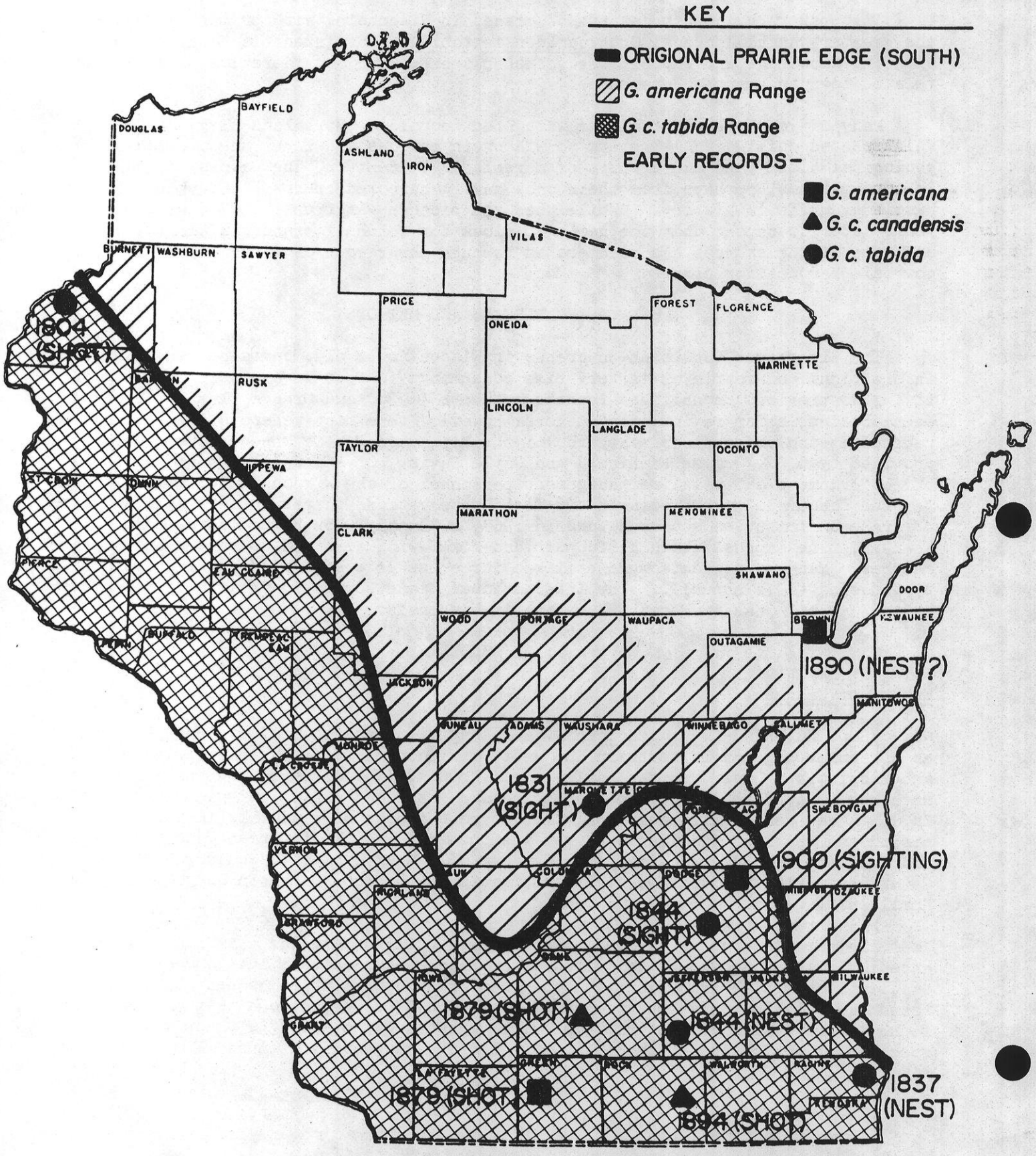


Figure 1. Historical Records of Cranes in Wisconsin.

LESSER SANDHILL CRANE (Grus canadensis canadensis). To date we have found no further records of small sandhill cranes than those cited by Kumlien and Hollister (1903). Even in the early days it was considered a rare straggler during migration. The two records (Fig. 1) were a specimen shot in late fall, in Dane County (1879), and a specimen collected on April 4, 1894 in Rock County where it had been associating with a flock of Canada geese for some days. Both birds had been preserved in museums of that period but we have not tried to locate them as of yet.

GREATER SANDHILL CRANE (Grus canadensis tabida). In addition to their citation of "enormous flocks of sandhills," Kumlien and Hollister (1903) stated, "In an earlier day a very abundant migrant and common summer resident from the southern border of the state northward." Hoy (1885) have this account: "Sandhill cranes were so common that one could not go any considerable distance on the prairies without seeing numbers of these stately birds" (about 1846). The prairies and oak openings at that time extended from Lake Winnebago in the east central region, southeast, south and west to the state line, and angled northwest to Burnett County (Curtis 1959). It was estimated that there were over 3 million acres of prairie habitat before settlement. Cranes, as we know them, are dependent on or closely associated with wetlands, especially during the nesting season. Originally there were an estimated 10 million acres of wetlands (Johnson 1975). Except for the driftless (unglaciated) region in the southwest, where only springs and drainage-ways were marshy, wetlands were abundantly interspersed throughout the prairies. Annual fires set by the Indians, to aid in hunting and travel, maintained the open character of the prairies and marshes (Curtis 1959, Schorger 1937).

The northerly extent of the original range is more difficult to define because travel was confined to a few water courses and overland Indian trails, and settlement occurred much later. Curot (1804), a fur trader, reported killing a crane and three ducks on April 14, 1804 in northwest Wisconsin. The likely location was in the extensive marshes and prairie edges along the upper St. Croix River in Burnett County. This area was along the historic travel route between the Mississippi River and Lake Superior. Robert (1932) later reported indirectly the nesting of cranes here from the time of occupancy by a local farmer in 1904, through 1930. In the central region, pairs of sandhill cranes were seen in 1831 at Buffalo Lake (Marquette County) on the Fox River route between Green Bay and Portage on the Wisconsin River (Kinzie 1901). This lake is at about the northern edge of the original prairie. Farther east, Grundtvig (1894) saw pairs of cranes at Shiocton in Outagamie County as late as May 12, 1882 and stated, "It seems to me probable that a few breed in the swamps." Surprisingly, Williard (1883) did not list the species present in Brown and Outagamie Counties. Perhaps the long period of settlement at Fort Howard in southern Green Bay had already eliminated the species from the extensive marshes on the south and west shorelines.

Obvious declines in crane numbers were evident in the south by 1885 when Hoy (1885) stated, "they are seldom seen on the praries now." Kumlien and Hollister (1903) reported 100-250 migrants as still present in spring and fall migration near Delavan (Walworth County), breeding occurring in Jefferson, Juneau, Marquette, Portage and Walworth Counties, and "unquestionably occurring in many other places unknown to us." A scarcity of ornithological literature for almost the next three decades in the early 1900's prohibited tracing the population status in that period. The decline in numbers obviously continued as settlement and development intensified.

A surge of interest in cranes occurred with the arrival of Aldo Leopold in Wisconsin in the late 1920's. While preparing his classic "Report on a Game Survey of the North Central States" (1931), he wrote but did not publish a "Report on a Game Survey of Wisconsin" (1929). He presented the first state distribution map of sandhill crane breeding records which included only five locations --one each in Wood, Juneau, Waushara, Dodge and Oconto Counties (several more pairs were located in

the next few years in the Wood, Juneau and Jackson County areas). In a brief discussion he: (1) scolded museum scientists for collecting some of the few remaining birds for they should know Wisconsin stock was not interchangeable (replaceable) with migratory stock; (2) recommended acquisition of known habitat to preserve the species; (3) suggested special enforcement efforts and (4) stressed the need for determining environmental requirements before it was too late.

A few years later (1936) Leopold wrote another paper, "Threatened species--a proposal to the Wildlife Conference for an inventory of the needs of near extinct birds and animals." Here he presented a program to identify those species which were rare everywhere including examples of both plants and animals; the bird list cited trumpeter swan, curlews, sandhill crane (U. S. breeders), and Brewster's warbler. This may have been the first endangered species list.

While cranes had been protected by federal order since 1916, the formal recognition of their threatened status was presented for the first time at the First North American Wildlife Conference by Henika (1936) in a paper concerning "Sandhill Cranes in Wisconsin and other Lake States." An estimated 25 breeding pairs had survived in Wisconsin, including about 20 pairs on the large marshes in the central region of Juneau, Wood and Jackson Counties and the remaining few in Oconto and Burnett Counties. Henika stated, "Sandhill cranes in the Lake States are so rare that no effort should be spared to insure their preservation and increase."

Following up on Leopold's suggestion to determine environmental requirements, Hamerstrom (1938) studied the cranes in the three central region counties. Only seven "ranges" occupied by pairs were located and possibly 21 adult cranes were present. Migrants were not common although 80-100 were reported in fall in nearby Adams County. Several nests found in the area were mentioned as well as local reports of a few broods. Suggested crane management included preservation of large blocks (1500 acres or more) of wild land including extensive areas of peat soil for marsh and water management, protection from disturbance and planting of corn and buckwheat to preserve grain-feeding fields.

Walkinshaw (1949) estimated the Wisconsin population in 1941 to be only 25-50 breeding pairs. He stated, however, that the species has been increasing for the past 10-15 years throughout its range. In a popular article, Grange (1955) described rearing young cranes and from long experience in the central region counties estimated a substantial increase in the statewide population to over 200; he did not specify where or the number of pairs involved. The final appraisal available on status is by Gromme (1964) who reviewed much of the above data and also had a long personal experience with cranes dating back to the early 1920's. His brief status statement in "Birds of Wisconsin" was "uncommon transient visitant" and "rare summer resident locally." Records by calendar year showed birds present in every month, but continuously from mid-March to mid-October and breeding as occurring from mid-April to mid-July.

The changing status of the greater sandhill crane is shown on the maps in Figure 2.

While the major concern here is with resident cranes in Wisconsin, it seems advisable to comment briefly on migration aspects. Walkinshaw (1960) has accurately and thoroughly documented dates of sightings and numbers observed in both spring and fall. We have detected no major changes in migrant numbers or concentration sites since that time. Williams and Phillips (1972) color-marked sandhills in northern Florida in winter and substantiated Walkinshaw's findings that the Jasper-Pulaski Wildlife Area in Indiana is the main migration stopping point and northern Florida the winter range for at least some of the Wisconsin birds. At least three of their

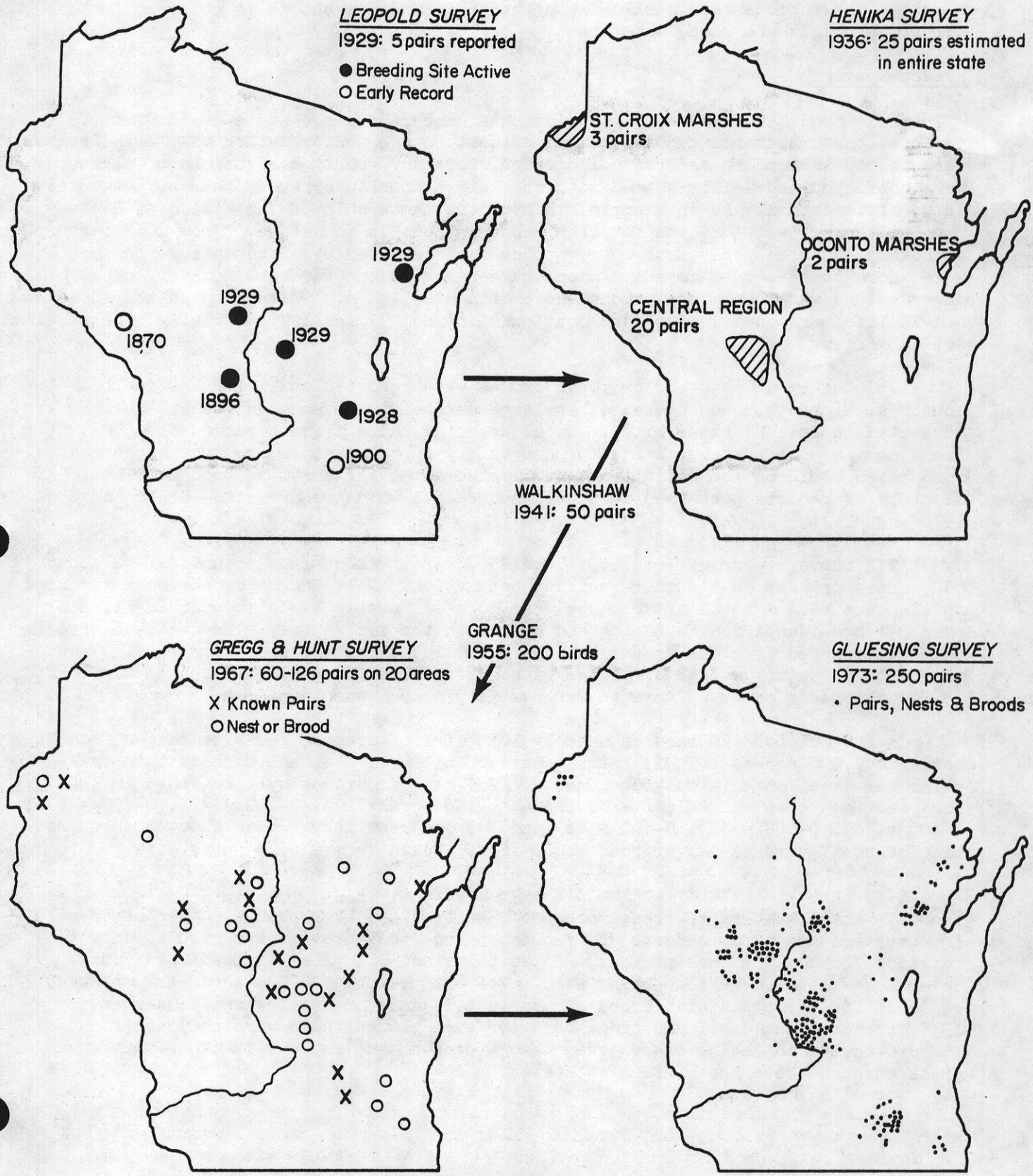


Figure 2. Changing Status of Sandhill Cranes, 1929-73.

neck bands were sighted in Wisconsin. Gluesing (1974 unpubl.) and Howard (pers. comm.) have also had observations of their color-marked cranes in both Indiana and Florida. These birds were marked in the central counties but it is not certain that all of our birds use these same areas.

Recent Surveys

While conducting waterfowl studies on a number of large state-owned wildlife projects throughout the 1950's, it was evident to the senior author that crane numbers were indeed increasing as Grange indicated. For many years observations of cranes were cherished and seldom shared with the general public or even other bird watchers in specific detail. As an example, in 1965 the membership of the Wisconsin Society for Ornithology was surveyed for crane observations in the state. From a membership of several hundred, only four observations were reported even though some members were known to have seen cranes. Among game managers and wardens, however, crane observations were becoming commonplace by the mid-1960's. This prompted the survey of wildlife personnel in 1967 and continuation in 1973 and 1975. Briefly, the results are as follows:

1967 Survey. Nests and/or young cranes were reported on 20 marshes in 16 counties. Migrants used several other large marshes in seven counties and nesting was suspected on some of these sites. Total breeding pairs present ranged from 60-126; the range in pair numbers is due to uncertainty in total pairs on large sites and some pairs could not be definitely established as having nests or broods. The majority of reports pertained to state and federal wildlife projects (Gregg and Hunt 1970 unpubl.).

1973 Survey. Survey results showed 250 pairs present in 32 counties and about 850 cranes present as a summer resident population. Nest and/or broods were reported in 11 counties. A total of 40 nests were located, mostly by helicopter in flights over marshes identified as having had cranes in the 1967 survey. Mean clutch size in 33 nests checked from the ground was 1.8 eggs, including one nest of 3 eggs. Production from 66 pairs yielded 87 young. A significant finding in this survey was that 55% of the nests observed were in marshes in private ownership.

In a sample of 139 marshes used by 161 pairs of cranes, the size ranged from 20 acres to 7,000 acres. Single pairs occurred on 121 marshes and no more than four pairs were seen on any individual marsh. The use of marshes by size range at 100-acre increments on a cumulative basis was 0-100 acres: 19%, 0-200 = 42%, 0-300 = 61%, 0-400 = 70%, 0-500 = 77%, 0-600 = 86% and 145 on areas larger than about one square mile of the 7 marshes larger than 1,000 acres, 6 had from 2 to 4 pairs each.

1975 Survey. Relatively small change apparently has occurred in the past two years in total numbers of cranes present. While there have been a number of changes in observers and a few reports are yet to be received, preliminary results show a total of 780 adult cranes present, 223 as pairs and 118 pairs sighted with young. Several new sites were also being used. For example, the 30,000-acre Horicon Marsh recorded its first positive brood record in 1974 and three pairs were observed in 1975, one of which displayed brood behavior even though there were no young found. The difficulty in seeing cranes even though present and reports of other uncensused areas suggest these are minimum estimates.

## DISCUSSION

Most authors on cranes attribute the historical decline in population levels to excessive hunting, human settlement and wetland drainage. The period of greatest decline occurred in the late 1800's. Walkinshaw (1949) in fact stated, "shooting was probably the greatest factor in the reduction of the Greater Sandhill Crane population," and cited several references on hunting. A few comments seem desirable from our review of the literature.

### Hunting

We have no doubt that hunting contributed to the decline of cranes in Wisconsin. However, from a sport-hunting viewpoint, early writers generally considered them difficult to kill. One is hard pressed to find evidence of any hunter shooting many cranes in a day afield comparable to waterfowl or upland game success. As an example, Kumlien and Hollister (1903) state, "So wary are these birds (sandhills) that of all that occur on the Delavan Marsh yearly, we have known of but two being killed at this place in many years." Diaries of early hunters and shooting clubs indicate limited success; as for example, records of the Caw-Caw Club at Horicon Marsh (Frautschi 1945) in 1866: "The bag for this season was carefully estimated at 3,000 ducks and geese, a few sandhill cranes and a large number of snipe and golden plover." While there were skilled hunters who pursued and killed cranes, Bogardus (1874) is perhaps the best example for he reported shooting 20 sandhills and 3 whooping cranes in two evenings in Ford County, Illinois in 1873. The time of year in which these activities occurred suggests that migrant cranes were often involved. The point here is that sport hunting did not seem to have a significant impact on crane population.

What about market hunting? Roberts (1932) in reporting on the early history in Minnesota said large numbers of cranes were exposed for sale in fall on the markets of large cities (specific locations were not given). Walkinshaw (1949) also mentioned cranes in the market in California in the mid-1800's and on the menu in a Jackson, Michigan hotel in 1880. It is interesting to note, however, that the price in San Francisco in 1859 was $16-20 per bird, certainly a handsome sum for any game in that day. Some years later, when egg collecting became a popular fad, Lattin (1885) was advertising for sale eggs of sandhill cranes for $1 each and whooping crane eggs for $1.10 each, an indication that these species were still relatively abundant, despite hunting. We have no evidence that cranes were shot and sold in the public places at any time in our state.

If shooting was the most important factor affecting sandhills, it probably was in the day-to-day attrition caused by "subsistence hunting" of the early settlers and which continued to some extent into the early 20th century. Roberts (1932) referred to considerable use of cranes as food in early Minnesota. Grange (pers. comm.) from long experience in our state observed continuous shooting into the early 1930's and felt it was the primary factor in causing the sandhill to almost disappear from the central counties.

### Early Settlement

Occupancy of the prairies in southern Wisconsin occurred rapidly in the 1840's and 1850's. Some of the best crane habitat was quickly altered when the annual fires of the Indians were suppressed (Curtis 1959). Trees rapidly invaded the uplands not in cultivation and brush, mostly willow, erupted in the marshes. A significant farming practice that affected many southern marshes was the cutting of hay for preserving ice and packing beer shipped from Milwaukee. This continued for several decades and was followed by development of the extensive dairy culture that required hay and large acreages of marsh pasture. Lumbering interests initially influenced

the large central region marshes and the extensive fires which followed aided in changing the landscape to a more open character suitable for cranes. Grange felt the lumbering and fires actually created new habitat by destroying the forests, opening up the tamarack swamps and burning off the peat to create deeper and more permanent pools in the marshes.

Of some interest too, as an adverse impact, was the apparent frequency with which cranes were reared as pets. There are a number of references on this practice. A. W. Schorger, who wrote historical accounts on most resident game species except waterfowl and cranes, had several brief newspaper comments in his files: three were about local hunters shooting 1, 1, and 4 birds, respectively; two were about cranes as pets; and one was about a supposedly 98-year old sandhill killed in July, 1881 in California. Suspended by a wire from the bird's neck was a silver quarter bearing the inscription: "Captured at Fort Du Quesne, May 25, 1783. Released at Fort Dearborn, November 17, 1846."

Drainage

As such, drainage of wetlands in Wisconsin was not significant until about 1900 (Johnson 1975). The first efforts occurred near Milwaukee in about 1870 to improve settlement and provide vegetable farming opportunities for the urban market. About 100,000 acres of drained farmland were created in the 30 years to 1900, mostly in the southeastern counties. Crane-breeding numbers were already sharply reduced by this time. In the next 20 years, over 800,000 acres were ditched through organization of 11 large drainage districts. Some of these projects were indeed in good crane habitat. Poor agricultural success resulted in some of these projects reverting to public ownership, outstanding examples being Horicon Marsh and the vast central region marshes. The low point in crane population had been reached and continued low even though drainage was slowed by federal and state agencies throughout the 1920's and 1930's. The largest amount of wetland losses occurred in the decades during and after World War II. Over 1,000,000 acres were drained in the 1940's and 500,000 in the 1950's. Most of these lands were put into corn production and improved pasture. Muckland or vegetable farming on drained peat soils did not start until about 1920. About 80,000 acres of marshes have been converted to this use, much of it in the last 20 years. Large wetlands are usually required but equipment is not available to do the job. Some of these sites had breeding cranes before development. Continued expansion of this industry is a major threat to both the wetland and crane resources.

A major benefit from conversion of wetlands to cranberry production was considered by Grange to have been the salvation of cranes in the central region. This industry developed early with over 15,000 acres in cultivation by 1880 and 50,000 barrels produced in 1912 (Scott 1947). These farmers preserved wetlands and managed water levels favorable to cranes. They tolerated the birds on their lands and provided protection from continuous hunting. These benefits have continued to date with great success as shown by the location of over 30 nests in the cranberry region in western Wood County in 1975 (Howard pers. comm.).

Recent Increases

We are not certain why there has been such a good recovery of sandhill cranes in Wisconsin. One important factor has been the acquisition and development of a large number of state-owned wildlife areas. The majority of these projects have included restoration of wetland habitat aimed at improving waterfowl production and providing food, water, and sanctuary to attract ducks and geese for public hunting. The goal of the Department of Natural Resources is to preserve about a half a million acres and about 300,000 acres are now in state ownership. In 1967 over 25 projects had one or more pairs of cranes. This does not include the two National Wildlife Refuges

which contain 40,000 acres at Necedah and 20,000 acres at Horicon. Both of these refuges have a few breeders and the former serves as a concentration site for nonbreeders and fall migrants. Some of the state-owned marshes were reservoirs for the surviving cranes prior to acquisition. While not by intent, security has been perpetuated and even improved.

A revealing comparison can be made on the study area used by Hamerstrom (1938). He reported finding 7 breeding ranges plus 2 more suspected sites, estimated 18-21 cranes present and found 2 nests. In 1975 Howard (pers. comm.) surveyed this same area by helicopter and found pairs with 29 nests plus 58 nonbreeders for a total of 116 birds. Over half of the nests and most of the nonbreeders were on state and federal wildlife areas. Also of interest since Hamerstrom's report is an increase in cranes in cranberry marshes only a few miles northeast of this study area. This is the area where Howard found about 30 nests and 30 nonbreeders in 1975.

The increase in use of smaller marshes in private ownership is perplexing. Several sites used for nesting contain less than 20 acres of wetlands. We suspect changes in land management as the most likely factors. Suppression of wild fires, by organized fire control districts in the Department of Natural Resources and local townships, appears to have permitted brush, largely willows and aspen, to advance extensively throughout much of the general countryside. There has also been a noticeable reduction in the many small, subsistence-type, family farms that existed into the late 1950's. While buildings often remain occupied, the marshes are no longer mowed or heavily pastured and with much poor cropland, are reverting to wild cover. The increased brushy conditions may be the security needed to make the smaller marshes acceptable as breeding habitat.

There is, of course, a more general conservation interest in all wildlife. This has developed with the gradual disappearance of any need for hunting as an essential source for food. Then, too, the law enforcement program has vastly improved since the laws of the 1930's. The possibility exists, but has not been explored, that mortality has been reduced along the migration routes and on the winter range. In any event, improved survival is suggested along with an expanded habitat as the basic reasons for recent increases. The future looks favorable for a continuing population increase but not without development of both management and research programs.

## Management

There is no specific management program for cranes in Wisconsin comparable to that for several other game species. The possibility is probably just appearing on the drawing board in long-range planning. Removal of the greater sandhill crane from the "Rare and Endangered List" (U.S.F.W. 1966) in 1973 (U.S.F.W.) and the increasing local population may have delayed action.

Initially there can be a question as to whether or not management is possible and/or needed. In retrospect, it is evident that management has occurred. We would suggest that Dr. Fred Hamerstrom should have a proud feeling about the present population status. While not by design, the very steps he suggested for management in 1938 have been implemented in the current waterfowl development programs of state and federal agencies, namely: (1) preservation of large areas over 1,500 acres in size, (2) selection of sites on peat soils, (3) control of public disturbance and (4) provision of food patches in upland feeding fields. Cranes responded magnificently, along with waterfowl. The 1,000 or more birds now present, adult plus young, have recycled the geologic clock and rewound its main spring.

The need for management is still evident even though we lack many important facts. Species security is not guaranteed, and there are no goals or direction for handling local flocks or migrants. Nevertheless, some obvious actions can be taken.

1. In May 1975, the Wisconsin legislature passed a law requiring payment of crop losses caused by cranes (we are probably the first state to do so). Depredation complaints had been gradually increasing and success of our other crop damage laws on waterfowl and big game resulted in including this species. Damages are primarily in spring in newly sprouted corn fields where the birds pull up the plants, or eat the tender new growth. In its first year there have been payments on nine complaints for over $5,100 and several more claims are pending. A firm program of handling these damages is essential to the welfare of the species or it could be the limiting factor in the near future.

2. Inventories of both breeding and migrant use could be implemented on an annual basis. Managers need good census data to follow population trends and handle depredations.

3. Acquisition of large wetland projects has progressed to the point where not many areas exist for further public ownership. High cost of land and public objection to further removal of lands from the tax roll will severely limit this type of program. A number of large sites are still in the process of having acquisition and development completed; some of these will probably attract cranes. It seems significant that there is a high use of smaller marshes in private ownership. Some program to acquire or encourage preservation of these areas should be developed.

4. An obvious effort is needed to promote a better nonconsumptive use of this resource by making more viewing areas and stressing esthetic values of the birds and their marshes. Hunters also need more exposure to crane identification. We know of several cranes being shot at waterfowl areas apparently being mistaken for geese. These "accidental" kills should not be tolerated.

Research

Studies of cranes have been lacking in Wisconsin, as elsewhere, but interest is increasing. The I.C.F. staff has initiated several projects on behavior and the U. W. Stevens Point is following up Gluesing's surveys with an intensive nesting study as well as fall banding (Howard pers. comm.) and has plans for further work if funding is obtained. Some projects needed for Wisconsin's birds are as follows:

1. An immediate need is an investigation into the characteristics of the habitat now being used. Particularly important are the plant succession aspects which may influence the direction of population change, indicate whether or not management is feasible and direct possible acquisition-preservation programs.

2. Crop depredation control techniques that generally work on ducks and geese are proving inadequate for cranes. Prompt attention to this problem, which is likely to be expensive unless solved, will help the acceptance of the species by both managers and local residents who must live with the birds.

3. Systematic banding, color-marking and use of transmitters should be intensified throughout the state for several years. We need such data to determine population trends, survival, mortality, movements, homing, pioneering and migration.

4. Some deep-digging ecological studies of several local populations appear desirable. The areas used now cover a wide range of vegetation types and habitat quality. There is also a question about current waterfowl or other specific management being in conflict with crane requirements.

5. In fall-banding operations there is no method for separating locals from migrants. A promising lead for solution here is to use the feather analysis technique involving indentification of levels of various elements in the primaries and plotting them as ionic diagrams. We have already made some preliminary investigations and expect to continue further work. If successful, identification tags can be assigned to various populations which may be helpful in long-range management.

6. From long experience with waterfowl concentrations, it seems that there should be more concern about when and where sandhill cranes concentrate in migration and on the winter range. At present, it appears that the only mid-migration stopping place on both south and north flights is the Jasper-Pulaski Wildlife Area in Indiana. With an expanding population in the Great Lakes Region, is this good management? How many birds can the Jasper-Pulaski Area support? Are there other mid-range areas used or available? Should there be other sites? We think so and suggest that the subject be investigated as a high priority item.

7. Propagation and restocking have received almost no attention despite the apparent ease with which the bird can be reared in captivity. A basic problem with hand-reared stock is their apparent inability to adapt to wild conditions. The fact that our surveys show large marshes are not an essential requirement suggests there is a good opportunity for restoration efforts. Management agencies should determine if this is desirable. Techniques for rearing suitable stock need experimentation but the prospects for success seem good.

Whooping Crane Introduction

Many ornithologists and wildlife workers in Wisconsin are aware of the general status of the whooping crane and restoration efforts of the U.S. and Canadian governments. A considerable increase in interest in this species and also sandhill cranes has been generated by the activities of the International Crane Foundation (I.C.F.) since its formation in Wisconsin in 1973. One of the major thrusts expressed by the I.C.F. staff has been promotion of an introduction of the whooping crane into the state to establish an independent eastern population of this endangered species. The objective would be met by placing whooping crane eggs into wild sandhill crane nests and hopefully the young whoopers would adopt the habits of Wisconsin sandhills, which migrate to Florida and return. Basically, this is the technique now underway in Idaho.

As pointed out above, we still have a lot to learn about Wisconsin sandhill cranes to provide for their long-term preservation. We do, however, support the exploration of the feasibility of establishing an eastern whooping crane population. When and where such a project is undertaken is still in need of considerable study. Sandhill crane studies now underway and contemplated by state and university personnel should provide an adequate base in the next few years.

The federal government has developed a procedure using "recovery teams" to formulate plans which would result in increasing the population of an endangered species to a level where it could be removed from this classification. Until a recovery plan is developed, the Bureau of Fish and Wildlife Management and the Bureau of Research of the Wisconsin Department of Natural Resources would not support a whooping crane introduction project in the state.

The "go slow" concern for introducing an endangered species is based on the restrictions inherent in such a project. While there is a stong conservation fiber in the citizenry of the state, hunting is still a prominent form of outdoor recreation, and an important part of the resource program of private and public interests.

Whooping cranes would obviously need protection for some time wherever they were introduced. Some restrictions on disturbance and hunting could be tolerated but the potential for frequent emergency closings of our many large waterfowl projects to protect large white cranes poses a problem during fall migration. A program in public education seems essential to avoid accidents. The need here is evident since whistling swans are shot annually in the state despite long-time protection. On the other hand, we would point out that it has been sportmen's dollars that purchased many large marshes now used by sandhill cranes. When the time is right, some of these areas may become whooper marshes too. Premature public pressure could jeopardize the situation and result in even more anti-hunting sentiment were a white crane to be accidentally killed.

Perhaps this workshop will contribute to a realistic timetable to help this endangered species obtain a more secure status. Wisconsin will participate wherever possible.

In conclusion, the sandhill crane has recovered from near extinction to a level of over 1,000 in the summer population. Indirectly, management was responsible for this good fortune, but now a positive program is needed to insure long-term survival. Research on both populations and habitat aspects are essential to provide the facts for sound management.

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