



Once considered a rare visitor to Wisconsin, American White Pelicans have become a more common sighting in recent years. Photograph by Jack Bartholmai at Horicon Marsh.

# Changes in the Status, Distribution, and Abundance of American White Pelicans (*Pelecanus erythrorhynchos*) in Wisconsin, 1850–2013

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## INTRODUCTION

A. W. Schorger (1954) concluded his *Passenger Pigeon* paper on the his-

toric occurrences of American White Pelicans in Wisconsin with this pronouncement: “Until better information is available, the white pelican

cannot be considered as a formerly breeding bird.” Forty years later, pelicans began nesting in lower Green Bay, a fact that would have delighted and intrigued Schorger.

The American White Pelican ranges from southern Canada to Costa Rica (Keith 2005) and numbers well over 130,000 breeding birds in North America (King and Anderson 2005). (The Brown Pelican *Pelecanus occidentalis*, a bird of the East, West, and Gulf coasts, is the only other pelican species that occurs in North America.) White pelicans breed primarily in the western and central Canadian provinces, and in north-central and western U.S. states (Pacific Flyway Council 2012). A comparison of surveys conducted during 1979–81 and 1998–2001 at 20 colonies east and west of the North American Continental Divide indicated that the number of pelican nests in those colonies more than doubled (King and Anderson 2005).

In the eastern U.S., white pelicans have long been known to breed predominantly in the northern Great Plains, with wintering birds occurring in the Lower Mississippi Valley and along the Gulf of Mexico (Evans and Knopf 1993, Johnsgard 1993, King 1997, King and Michot 2002), but increases in the number of breeding pelicans over the past decade (2004–2013) in the Upper Midwest, largely in Minnesota and Wisconsin, have brought to light changes in interstate and intrastate breeding distribution and occurrences (Wires et al. 2006, Wires pers. comm., Matteson 2013).

Pelicans are nesting now (2013) in Wisconsin in unprecedented numbers, with the number of colonies and nesting pairs increasing markedly

within a relatively short time frame, similar to the resurgence of the Wisconsin Double-crested Cormorant (*Phalacrocorax auritus*) population in the 1980s and 1990s (Matteson et al. 1999). Recruitment alone from Wisconsin colonies is not responsible for the large population increases observed. This paper summarizes all known occurrences for the American White Pelican—a species of Special Concern in Wisconsin, describes changes in status, distribution, and abundance, presents what is known about pelicans nesting in the state (and to some extent regionally) during 1994–2013, and concludes with a brief overview of limiting factors affecting breeding populations.

## METHODS

We examined all known historic records for occurrences of the American White Pelican in Wisconsin, examining the accounts of early explorers, Jesuit missionaries, and early Wisconsin naturalists. We also scrutinized all *Passenger Pigeon* volumes during 1939–1994 for pelican observations, and perused Wisconsin eBird reports from 1994 (when pelicans started nesting in Lower Green Bay) through 2012 for observations reported electronically. We consulted Robbins (1991) and the Wisconsin Breeding Bird Atlas (Cutright et al. 2006) for additional pertinent information. We identified potential breeding sites based on the input of state and federal wildlife managers and researchers, and by reviewing records of pelican occurrences. We also studied papers in the journal *Waterbirds* for relevant material related to the increase

in pelican numbers in the Upper Midwest during the past decade.

We present data from our own annual population surveys, conducted between 7 May and early June in lower Green Bay and east-central and southeastern Wisconsin during 1994–2013. We counted nesting pairs of American White Pelicans at all known colonies, counting on foot the number of nests and recording clutch sizes, and describing breeding habitat. For each colony, similar to estimating Double-crested Cormorant colony size (Matte-son et al. 1999), the estimate of the number of nesting pairs was based on the highest number of active nests counted during a single visit. Accordingly, one active nest represented one pair of nesting/breeding pelicans, and a nest was considered active if it contained eggs and/or chicks, or if it was an apparently occupied nest, with fresh nesting material (Cuthbert and Wires 2011) or egg-shell fragments present.

In some years, complete counts were not carried out even though pelicans were known to be present, notably at the Horicon National Wildlife Refuge (NWR) in 2000–2002 and 2004. We made no attempt to estimate detection rates because no field procedures were used that would allow such estimation; pelicans are highly visible ground nesters, however, so detection rates were probably high in all years when pairs at all colonies were counted.

We did not estimate trends at individual colonies because of the large annual variability at the colonies, probably due to local changes in water levels or presence of potential predators. Pelicans are known to move among nearby colonies from year to

year in response to such factors (Anderson and King 2005, Moreno-Matiella and Anderson 2005). Some of the large annual changes at eastern Wisconsin colonies suggest such inter-colony movement. For instance, a large drop in counts at Horicon NWR between 2007 and 2008 due to high water occurred simultaneously with a large increase at Lakes Butte des Morts and Puckaway colonies (Table 1). For this reason, we summed counts of nesting pairs within two regions: Green Bay (includes Cat Island, Lone Tree Island, and Hat Island) and Eastern WI (includes Horicon NWR, Beaver Dam Lake, Lake Butte des Morts, Lake Puckaway, and Lake Winnebago). We also computed statewide totals for each year. Because of the missing counts at Horicon in 2000–2002 and 2004, there were missing counts for the Eastern WI region and for the statewide totals in those years.

We estimated statewide and regional trends in counts of nesting pairs using a generalized linear model with a gamma error distribution and log link, with year as the predictor variable. This is very similar to linear regression of log-transformed counts on year and usually leads to the same conclusions (McCullagh and Nelder 1989). An advantage of the generalized linear model is that it provides predictions on the original scale without requiring adjustments in back-transformation (Venables and Ripley 2004). The trend estimates from these analyses are most naturally expressed as a constant percent change per year in counts of nesting pairs. Equivalently, this can be considered multiplication by a constant factor each year (e.g., a 15% increase corresponds to multiplication of the

Table 1. Counts of nesting pairs of American White Pelicans in Wisconsin, 1994–2013. CI = Cat Island, LTI = Lone Tree Island, HI = Hat Island, GBay = Green Bay region; Hor = Horicon National Wildlife Refuge, BDL = Beaver Dam Lake; BdM = Lake Butte des Morts, Pkw = Lake Puckaway, Wbg = Lake Winnebago, EWis = Eastern Wisconsin Region.

Year	Green Bay Region				Eastern WI region						Total State
	CI	LTI	HI	GBay	Hor	BDL	BdM	Pkw	Wbg	EWis	
1994	2	0	0	2	0	0	0	0	0	0	2
1995	9	0	0	9	0	0	0	0	0	0	9
1996	56	0	0	56	0	0	0	0	0	0	56
1997	107	0	0	107	0	0	0	0	0	0	107
1998	168	0	0	168	0	0	0	0	0	0	168
1999	180	0	0	180	13	0	0	0	0	13	193
2000	207	0	0	207	?	0	0	0	0	?	?
2001	238	0	3	241	?	0	0	0	0	?	?
2002	220	0	0	220	?	0	0	0	0	?	?
2003	185	200	0	385	522	0	0	0	0	522	907
2004	334	314	0	648	?	0	0	0*	0	?	?
2005	345	249	0	594	494	0	13	0	0	507	1101
2006	191	333	0	524	777	0	48	0	0	825	1349
2007	397	421	40	858	501	0	386	17	25	929	1787
2008	376	544	3	965 <sup>^</sup>	8	0	695	0**	27	730	1695
2009	254	463	76	793	3	0	1009	0	57	1159	1952
2010	255	381	69	705	0	?	1472	1	81	1554	2259
2011	760	704	139	1603	0	?	1263	0	189	1422	3026 <sup>†</sup>
2012	1184	582	739	2505	611	30	802	0	0	1443	3948
2013	1065	1088	253	2406	433	382	754	0	148	1717	4123

\*50 adults and 24 young counted in August on nearby Hope Marsh and may have nested there.

\*\* 250 adults observed on 2 June 2008, but high water precluded nesting (D. Christensen pers. comm.).

<sup>^</sup> Included in total for GBay: T. Erdman (pers. obs.) documented 42 nests on Willow Island.

<sup>†</sup> Total includes 1 nest reported on the Mississippi River.

counts by a factor of 1.15 each year). The significance of trend estimates was determined using Wald statistics (ratio of estimate to its standard error), which follow a standard normal distribution under the null hypothesis of no trend (Fox 2008). We examined residuals from models to determine if assumptions of the models were satisfied. We also visually compared results of the generalized linear model with a more flexible generalized additive model to determine if the form of the model (i.e., multiplicative change) was adequate. Computations were carried out in R.

We estimated multiplicative rates of

increase for both regions (Green Bay and Eastern WI) and for the state as a whole. Because of the sudden increase in nesting pelicans in Eastern WI and the missing counts in 2000–2002, we analyzed trends for Eastern WI and for statewide totals beginning in 2003. The multiplicative model was intended to provide a reasonable summary of population change after establishment of pelicans in each region; we acknowledge that some patterns of annual variability may not be explained by the multiplicative model. Residual plots suggested assumptions of the model were satisfied. Generalized additive models produced very

similar predictions over the same time period, indicating that the form of the model was appropriate.

Finally, we examined the results of two Great Lakes-wide population surveys of colonial waterbirds conducted by the University of Minnesota (UMN) for the U.S. Fish and Wildlife Service during 1989–1991 and 1997–2001. The results of these surveys were discussed in a waterbird conservation plan for the Upper Mississippi Valley and Great Lakes (Wires et al. 2010). Additionally, we perused a summary of statewide Minnesota pelican census data for 2004/05 and 2010–2012 generously provided by L. Wires (pers. comm.).

## RESULTS AND DISCUSSION

### *Historic Wisconsin/Regional Occurrences—*

American White Pelicans have been present in Wisconsin as migrants, for centuries perhaps, and Native Americans were the first to identify them (Schoolcraft 1855, Dablon 1899). Perrot, a French official, was among the first to live with Native Americans in the Upper Great Lakes during the latter half of the seventeenth century, and he described pelicans as “very common, but they have an oily flavor, whether alive or dead, which is so disagreeable that it is impossible to eat them” (in Blair 1911). Perrot did not provide any specific information on where he encountered pelicans.

The French explorer Pierre Radisson (in Kellogg 1917) was the first European to record pelican presence in Wisconsin. He observed them (with a bill 22 “thumbs” in length) in north-

western Wisconsin around 1655. In 1670, the Jesuit priests—notably Allouez and Dablon—also observed them foraging below the Kaukauna rapids, and on “small lakes” associated with the Fox River, en route to Lake Winnebago (Schorger 1954).

White pelicans were apparently “moderately common” along the Mississippi River prior to 1850, “numerous” as spring migrants on Lake Koshkonong, and frequently reported from Dane and Jefferson county lakes before 1870 (Kumlien and Hollister 1903, Robbins 1991).

The first change in pelican status in Wisconsin apparently occurred after 1870. Schorger (1954) pointed to that year as a likely turning point in the number of migrants, suggesting a downward trend in occurrence:

“Schoolcraft on August 8, 1820, observed a flock on an island in the Mississippi below the mouth of the Wisconsin. In the same year Kearney mentions seeing pelicans on August 1 at La Crosse, and on August 4 below the mouth of the Wisconsin. While at Wabasha, Minnesota, September 7, 1835, Featherstonhaugh saw a flock crossing the Mississippi. Lapham wrote in 1844 that pelicans occasionally ascend the Mississippi and its tributaries far into Wisconsin. Ten years later Barry mentioned it as a common migrant along the Mississippi. King wrote about 1875 that, though formerly a common migrant, its movements were now confined to the Mississippi.... So large a mark was irresistible to gunners, and it is apparent that

the number of migrants declined sharply by about 1870.”

Reviewing historical changes in distribution across North America, Evans and Knopf (1993) listed pelicans as occurring formerly in central Wisconsin. Elsewhere in the state, pelicans were uncommon in the nineteenth century (Robbins 1991). No conclusive evidence exists that white pelicans nested in the state historically, although some circumstantial evidence suggests they may have occurred as breeding birds. Kumlien and Hollister (1903) mentioned the possibility of an abandoned breeding site in western Wisconsin in 1883 and another location northeast of Merrill in 1884, but the information was inconclusive (Robbins 1991). Schorger (1954) thoroughly investigated the probability of a Wisconsin nesting and pointed to Pelican Lake in Oneida County as the only likely locale, but older residents at the time could only remember seeing pelicans as migrants. Therefore, there is no conclusive evidence historically of pelicans breeding in Wisconsin.

#### ***Recent Wisconsin Occurrences—***

The American White Pelican was not among the 212 breeding bird species listed or discussed in the most recent analysis of the Wisconsin Breeding Bird Survey conducted during 1966–1991 (Robbins et al. 1996). Robbins (1991) noted that between 1939 and 1989, there were only 1–4 reports per year, with sightings occurring in about 8 of every 10 years.

Based on our analyses of observations published in the *Passenger Pigeon* during 1939–1994 (Appendix A) and

reported online at Wisconsin eBird during 1994–2012, the number of pelican occurrences started to increase notably in the 1980s and dramatically in the mid-1990s.

In 1991, when Robbins' *Wisconsin Birdlife* was published, there were only two Wisconsin eBird observations represented. By 2012 (the most recent year for which we are relatively confident of complete eBird submissions), the number of eBird observations had mushroomed to 640 at 238 sites in 36 counties (Figure 1).

American White Pelican breeding occurrences during 1994–2013 can be partitioned into two main regions: Green Bay and Eastern Wisconsin. Breeding pelicans have almost exclusively (exception: 1 nest on a dredge spoil island, Mississippi River) occupied inland lakes in east-central Wisconsin, and sites at Horicon Marsh and in the Green Bay/Lake Michigan area. They have nested on isolated, permanent islands, dredge spoil islands, dikes, and edges of peninsular cattail (*Typha* spp.) stands. All colonies have occurred on the ground, either on bare ground, exposed dredge spoil or mud flat, on flattened cattail mats, or in the case of some Horicon nests, at the base of shrubs.

American White Pelicans are highly adaptable to changing habitat conditions and readily colonize new locations (e.g. islands, peninsulas) if they are isolated from human disturbance and provide (or appear to provide) protection from mammalian predators, particularly coyotes (*Canis latrans*) (Murphy 2005). Available and abundant food resources adjacent or near the colony site may also be important but are not deemed critical



Table 2. Estimates of % change in counts of nesting pairs of American White Pelicans based on a generalized linear model with gamma distribution and log link. The P-value is for a test of the null hypothesis that the trend equals zero.

Region	Time period	N (years)	% change	95% CI	P-value
Green Bay	1996–2013	18	21.1	18.3–23.9	<0.001
Eastern WI	2003–2013	10	13.8	10.0–17.8	<0.001
State	2003–2013	10	17.0	14.7–19.3	<0.001

ent here for 5 years in association with a Double-crested Cormorant colony prior to initial nesting attempts.) Both nests failed, but 9 pairs nested here in 1995, with 35 birds present throughout the summer (Soulen 1996), representing the known peak number of pelicans in Wisconsin during the breeding season.

Although counts at nesting colonies in Wisconsin began in 1994,

we did not use the initial years of data collection in analyses because of large initial increases apparently due to immigration of pelicans from outside Wisconsin. These large increases were then followed by long periods of a relatively steady population increase (Table 2; Figure 2). In the Green Bay region, there were small numbers of nesting pelicans in 1994 and 1995, then a sudden jump in 1996 followed

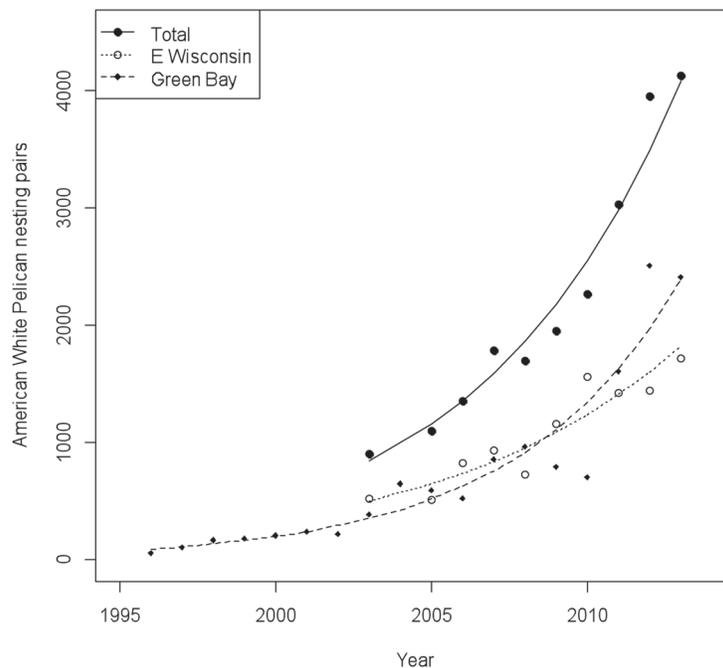


Figure 2. Counts of American White Pelicans for two regions in WI (Green Bay and Eastern WI) and statewide totals, 1996–2013. Lines show predicted values from generalized linear models described in the text.

by a steadier increase. In the Eastern WI region, no nesting pelicans were observed at any site until 1999, when 13 pairs nested at Horicon NWR for the first time.

For the period 2000–2004, we only have complete breeding information for both regions for one year: 2003. During this 5-year period, survey information was lacking for the Eastern Region, though we know that pelicans were nesting in growing numbers at Horicon NWR. By 2003, a major increase in the state's breeding population had occurred, with 907 nests recorded—a 370% increase since 1999. This substantial increase was largely a result of what we observed at Horicon NWR, where we documented 522 nests—at that time the largest colony in the state.

In 2005, the number of nesting pairs statewide continued to climb steadily to 1,101, with about 54% nesting in lower Green Bay on Cat and Lone Tree islands. And by 2005 and 2006, counts of nesting pelicans at Horicon NWR had grown markedly, reaching 777 nesting pairs in 2006. Large numbers of breeding pelicans at Horicon may have resulted from an influx of pelicans from outside Wisconsin, perhaps from Minnesota but likely from central North Dakota, where up to 30,000 birds mysteriously abandoned nesting sites at the Chase Lake National Wildlife Refuge in 2004 (S. Friess, *Where did all the pelicans go?/Birds abandon chicks, eggs at refuge where they usually breed*, San Francisco Chronicle, 13 July 2004). King and Andersen (2005) had described Chase Lake as the largest breeding colony in North America, with 14,900 nests recorded during the 1998–2001 conti-

mental American White Pelican Survey.

From 2005 through 2013, the state's pelican breeding population increased nearly 275%, reaching 4,123 nesting pairs at 8 Wisconsin colony sites in 2013 (Table 1, Figure 3), representing 6 distinct locales: Lower Green Bay (Brown County), Upper Green Bay (west of the upper northern Door County peninsula), Horicon National Wildlife Refuge (Dodge County), Lake Butte des Morts (Winnebago County), Lake Winnebago (Winnebago County), and a new site at Beaver Dam Lake (Dodge County). Pelicans have also nested intermittently at Lake Puckaway in southwestern Marquette County.

After the establishment of pelicans in each region, counts of nesting pairs increased throughout the study period (Figure 2). Estimates of breeding population change were large for both the Green Bay and Eastern WI regions (21.1% and 13.8%, respectively; Table 2), and statewide (17.0%). The estimate of breeding population change for the Green Bay region was somewhat larger than that for Eastern WI, but the data for Green Bay also covered a longer time period.

Differences in breeding population trends between the Eastern WI region and the Green Bay region were not significant during the later time period (2003–2013), when data were available for both ( $P = 0.24$ ; the estimate of breeding population trend for Green Bay was 18.2% during this time, while for Eastern WI it was 13.8%). For the period 2003–2013 (Table 1), the number of pelican nests increased 524.9% in the Green Bay region and 228.9% in Eastern Wisconsin.



Figure 3. Distribution of Wisconsin American White Pelican Colonies, 2013

A summary by region is presented below, with annual counts of nests presented in Table 1.

**Green Bay Region—Lower Green Bay—**

Breeding pelicans occupied 2 sites (Cat Island and Lone Tree Island) during 1994–2013.

**Cat Island** (Brown County)—With the exception of Horicon Marsh NWR, where pelicans began nesting

in 1999, Cat Island in lower Green Bay was the sole Wisconsin breeding site for pelicans from 1994 through 2002. The year 2013 marked the twentieth consecutive year American White Pelicans nested on the ground at Cat Island, an island formerly covered with eastern cottonwoods (*Populus deltoides*) but which today is largely barren in part due to the long-term presence of large numbers of nesting

Black-crowned Night-Herons (*Nycticorax nycticorax*), cormorants, and Ring-billed Gulls (*Larus delawarensis*), as well as the blowdown of trees from storm activity. Here, M. Jones (pers. obs.) and B. Maedke documented 1,065 nests on 24 May 2013—an increase of 319% over a 5-year period, but a slight decline from the peak of 1,184 nests reported in 2012.

**Lone Tree Island** (Brown County)—Beginning in 2003, breeding pelicans from Cat Island spilled over onto nearby Lone Tree Island, where breeding numbers increased from around 200 nesting pairs in 2003 to 314 in 2004, and these were presumed to be from Horicon NWR, where high water levels caused early colony abandonment. T. Erdman (pers. obs.) estimated that 360–380 young fledged from Lone Tree in 2004. By 2013, the number of pelican breeding pairs had exceeded the number on Cat Island, with 1,088 nesting pairs documented in 2013—an 87% increase between 2012 and 2013.

T. Erdman (pers. obs.) has monitored pelican production annually at Cat Island since 1994, and for both Cat and Lone Tree islands since 2003. For the period 2003–2010, he estimated that 4,941 young fledged from 5,241 nests (0.94 yng/nest; annual range = 0.82–1.18 yng/nest).

**Green Bay Region—Upper Green Bay—**

Pelicans have occupied 1 site infrequently (Hat Island) since 2001.

**Hat Island** (Door County)—The number of breeding pelicans here has changed erratically since 2001, when the colony was first documented. That year, K. Stromborg (pers. comm.) observed 3 nests on 21 June 2001. Two of

these nests contained 3 live chicks each, and one had 2 live chicks. Pelicans were absent as breeders during 2002–2008. During 2009–2010, M. Jones (pers. obs.) reported about 70 nests. In 2011, M. Jones (pers. obs.) documented 139 nests, and in 2012 he recorded a record high of 739 nests on 22 May. In stark contrast to 2012, there were 253 nests here on 29 May 2013, a 192% decline from 2012. There is no known reason for the marked fluctuation in breeding pairs observed, particularly in recent years, but it is possible that availability of prey (fish) and/or degree of human disturbance may have affected colony stability.

**Eastern WI Region—**

Pelicans have occupied 3–5 main colony sites in any given year since 1999. There were, however, several subcolonies that occupied proximate sites within a locale (Horicon Marsh NWR, for example).

**Horicon Marsh NWR** (Dodge County)—For the fifteenth consecutive year, pelicans were present at the Horicon NWR. Pelicans began nesting at the refuge in 1999, when 13 nests were recorded. Due to disturbance concerns, no nesting surveys occurred in 2000 and 2001, but 16 fledglings and 152 fledglings, respectively, were documented. In 2002, pelicans nested in subcolonies on 7 islands within the refuge, along the Main Ditch, “just shy of W88°, 42.00/, and ranged from north to south, from N43°, 33.30/ to N43°, 32.45/ (D. Penttila pers. comm.). Penttila estimated the pelican population to be 1,000–1,400 adults (including breeders and non-

breeders), with at least 340 young produced.

In 2003, W. Woyczik, J. Krapfl, A. Techlow, and S. Matteson documented 522 nests at 8 subcolonies on 2 June. Each of these subcolonies occurred on dredge spoil islands, with all but two (characterized by broad-leaved cattail *T. latifolia*) stands dominated by sandbar willow (*Salix exigua*). At the cattail-dominated sites, the pelicans had flattened *T. latifolia* along edges of the islands and laid eggs on top of the cattail mats. J. Krapfl (pers. obs.) reported that 727 young fledged in 2003.

In 2004, severe spring floods almost eliminated all nesting attempts, and several hundred breeding pairs abandoned the refuge. Refuge biologists estimated that 400-500 pairs attempted to nest here during April-May 2004 (J. Krapfl pers. obs.). A 1 June 2004 survey revealed that 6 of 8 former subcolony sites were under water, with only 21 adults and 17 young remaining at two sites. Apparently hundreds of breeding adults may have relocated to lower Green Bay because T. Erdman (pers. comm.) reported an influx of pelicans in early to mid-June 2004 at Lone Tree and Cat islands. He reported that a total of 700-750 young fledged from these colonies in lower Green Bay.

The refuge story was different in 2005. On 20 May 2005, J. Krapfl and S. Matteson documented 494 ground nests at 7 dredge spoil island sites ( $n = 30, 13, 4, 54, 77, 124, 192$ ). These islands varied in the degree of vegetative cover from sparse and barren rock rubble to cattail and willow-dominated sites, with open areas for nests. J. Krapfl (pers. obs) reported that 940 young fledged in 2005.

The most number of nests and fledged young documented for any given year between 1999 and 2013 occurred in 2006 when J. Krapfl, W. Woyczik, and S. Matteson documented 777 pelican nests on 19 May at 6 dredge spoil sites and 1 peninsular (Fig. 4) *Typha*-dominated site ( $n = 57, 14, 73, 64, 333, 86, 150$ ). J. Krapfl (pers. obs.) reported that 1450 young fledged. High water returned to become an issue for nesting birds in 2007, limiting the number of available sites, but on 17 May 2007, J. Krapfl, B. Hill, and S. Matteson documented 501 pelican nests at 5 dredge spoil sites and at a cattail-dominated peninsula ( $n = 1, 39, 83, 31, 324, 23$ ). J. Krapfl (pers. comm.) reported that 946 young fledged in 2007.

High water levels and flooding were the central themes at the refuge during 2008-2011, significantly reducing or eliminating available breeding habitat, with only 8 pelican nests documented on a floating cattail mat in 2008. Water levels stabilized somewhat in 2012, allowing J. Krapfl, W. Woyczik, and S. Matteson to record 611 nests at three sites on 30 May: a flattened cattail island; the Main Ditch Spoil near Townline Ditch; and the Townline Ditch east of Main Ditch.

For the year 2013, J. Krapfl, S. ODell, and S. Matteson observed 427 abandoned nests on 31 May at a cattail-dominated subcolony site known as the West Townline Ditch. These nests had been heavily predated, likely by a mammalian predator. At a second subcolony site, Mid-Townline Ditch, in willow brush adjacent to cattail mats, they observed 280 active nests; these nests may have been re-nests that resulted from birds shifting from the West Townline Ditch. Another 8 nests



Figure 4. Breeding pelicans on matted, peninsular cattail stand, Horicon NWR. Photo by Jon Krapfl, 19 May 2006.

were documented on 31 May 2013 at a third subcolony site—a lone cattail island. Subsequent surveys on 13 June 2013 revealed a marked increase at the Mid-Townline Ditch site: 399 nests (J. Krapfl pers. obs.); and a new site called Mid-Townline Ditch – West, with 26 nests. We estimated conservatively that 433 nesting pairs occupied Horicon NWR in 2013 based on the peak number of known active nests.

**High Island, Beaver Dam Lake** (Dodge County)—C. Lovell (pers. comm.) reported that Wildlife Services personnel documented 382 nests on 3 June 2013. H. Bartholmai (pers. comm.) reported the following: “Patrick Clark owns the Island (about 1 acre in size) and has been aware of nesting there for the last 3 years. He found eggs in the grasses in July of

2010. At that time it was mostly covered with grasses (Timothy). The Island looked solid white from the road in 2011, and 30–40 nests were counted last year [2012]. Pat planted natives in 2009, and those still there include: brome grass, little blue stem, milkweed, marsh milkweed, wild bergamot, and Joe-Pye-weed. The island also has staghorn sumac, willow, and poplar growing on it. Back in the 1920s, when the dam in the city was lower, the bay between the island and west shore was pasture as the water was much lower than it currently is. The island was a pile of rocks with a few inches of soil at that time.”

**Pancake Island, Lake Puckaway** (Green Lake County)—This site can be characterized as ephemeral or unstable for breeding pelicans. The year

2007 marked the first time pelicans were known to breed on the island, having been observed on or near the island for a few preceding years by D. Christensen (pers. comm.). On 1 June 2007, WDNR biologists R. Jurewicz and S. Matteson (pers. obs.) counted 17 nests on bare, eroded ground. They also counted 69 adults at the west end of the lake, with 6–7 inactive nests on a beaten-down cattail mat.

For the period 2008–2013, only 2 nests were documented. On 21 May 2010, M. Jones (pers. comm.) and P. Gettelman observed 2 nests containing 1 egg and 2 eggs, respectively. High water and flooding all but precluded nesting on the island during this 6-year period, though 250 adults were observed on 2 June 2008 by D. Christensen (pers. comm.).

**Dredge Spoil Sand Islands # 1, 2, 3, 4, 5 (inside) Terrell's Island Break-wall, Lake Butte des Morts** (Winnebago County)—Pelicans first started nesting in the area in 2005. A. Techlow (pers. obs.) found 13 nests in bare sand at one island on 17 May 2005, with 12 of these still active on 25 May. Techlow (pers. obs.) observed 48 nests on 26 May 2006. On 6 June 2007, A. Techlow and S. Matteson documented a total of 386 pelican nests at 3 of these dredge soil islands; many of these nests contained chicks in various stages of development reflecting asynchrony in hatching dates. A. Techlow (pers. obs.) counted 695 pelican nests in May 2008 at 4 dredge spoil islands, and on 12 May 2009, R. Jurewicz and S. Matteson (pers. obs.) documented 1,099 pelican nests on 4 islands. On 4 May 2010, A. Techlow and S. Matteson counted 1,071 nests on the islands. In 2011, there were 676 nests on the is-

lands and 277 on the adjacent break-wall and dike.

In fall 2011, as part of a Department of Transportation (DOT) wetland mitigation project, A. Techlow and DOT personnel conducted island habitat management here to re-establish the original management objectives for the islands, which were aimed at benefitting nesting terns and waterfowl production. He graded (shaved) the four islands down to normal summer water levels and began to plant the newly formed 'shoals' with hard-stem bulrush (*Schoenoplectus acutus*) and other emergent aquatic plants. As a result of island habitat management, no pelicans nested on 4 of the 5 islands in 2012; there were 24 nests counted by A. Techlow (pers. obs.) on 8 May 2012 at Dredge Spoil Island #1. There were, however, another 65 nests on the adjacent breakwall and dike.

In 2013, A. Techlow, A. Sabai, and S. Matteson surveyed Terrell's Island #1 and counted 77 nests with eggs on 8 May 2013. Along the adjacent dike, they documented 496 nests that included 196 active nests and another 300 abandoned nests with smashed egg shells and predated eggs, the work of unidentified mammalian predators.

**Benedict's Island, Lake Butte des Morts** (Winnebago County)—On 4 May 2010, S. Matteson (pers. obs.) discovered an incipient pelican colony of 50 nests (48 clutches with 1 egg) and counted 160 adults with breeding knobs. On 1 June 2010, S. Matteson counted 401 ground nests amidst flattened cattails and on bare soil. These nests apparently were some combination of re-nests and late nests of young breeding adults, perhaps spill-over from the sand islands described above. In 2011, with most pelicans

breeding at the nearby Terrell's Island breakwall and sand islands, S. Matteson (pers. obs.) recorded 197 nests here. The following year on 8 May 2012, A. Sabai, A. Techlow, P. Guckenberg, and S. Matteson documented 713 ground nests, reflecting an influx of birds that likely came from the modified and no longer suitable islands inside Terrell's Island breakwall.

On 23 May 2013, with most pelican nesting pairs attempting to colonize the Terrell's Island breakwall, M. Jones and C. Lovell recorded 181 ground nests scattered across the north, central, and southern portions of the island.

**White's Island, Lake Butte des Morts** (Winnebago County)—This site has only been occupied once: in 2011, when A. Techlow and S. Matteson recorded 113 active nests on gravel and bare soil.

**Lake Winnebago, Fraction Island,** (Winnebago County)—On 6 June 2007, A. Techlow and S. Matteson (pers. obs.) discovered a new colony of nesting pelicans. They found 25 nests on bare ground, with nests comprised of sticks, grasses, dried willow (*Salix spp.*) leaves and stems, and water smartweed (*Polygonum amphibium*) stems. This site was not used in 2008, except by loafing pelicans.

On 12 May 2009, A. Techlow and S. Matteson (pers. obs.) documented 17 nests with eggs on the island. On 1 June 2010, 19 pairs had apparently re-nested or nested late when A. Techlow, L. Patt, S. Matteson (pers. obs.) visited the island. There were 27 nests here in 2011 (S. Matteson pers. obs.). No breeding pelicans occurred here in 2012.

M. Jones (pers. obs.) documented 148 nests here on 21 May 2013.

**Lake Winnebago, Long Point Island** (Winnebago County)—On 14 May 2008, A. Techlow and S. Matteson noted 27 pelican nests (23 with eggs) in two subcolonies. On 15 May 2009, C. Lovell (pers. comm.) documented about 57 abandoned pelican nests on the island and noted 2 red fox pups in a den in the middle of the colony.

At least 80 of 81 pelican nests had been deserted by the time of a visit here by A. Techlow and S. Matteson (pers. obs.) on 4 May 2010. C. Lovell (pers. comm.) indicated at the time that USDA Wildlife Services' cormorant control activities here had likely resulted in colony abandonment.

There were 132 nests here in 2011 (S. Matteson pers. obs.). M. Jones (pers. comm.) did not observe breeding pelicans here in 2012 and 2013.

#### ***Breeding on the Mississippi River and Lake Superior?—***

Although pelicans are routinely and regularly observed along the Mississippi River corridor and as far north as Lake Superior, only 1 pelican nest has been reported along the Wisconsin shores of the Mississippi River: in 2011 on an island in Pool 5 on the east side of the Main Channel, directly across from Minneiska, Minnesota (M. Stefanski pers. comm., D. Dieterman pers. comm.). No other breeding has been reported in Wisconsin Mississippi River waters, though pelicans have nested elsewhere on the Upper Mississippi on Iowa and Illinois river islands (see below).

Pelicans have yet to breed in Wisconsin and other U.S. waters of Lake Superior, but the first known nesting of American White Pelicans in the

Canadian Great Lakes occurred in 2007 on Granite Island, Lake Superior, as all indications point toward an eastward expansion of the bird's breeding range in Canada, where approximately 50% of the continental population breeds in Saskatchewan and Manitoba (Pekarik et al. 2009).

#### REGIONAL AND CONTINENTAL POPULATION DYNAMICS IN RELATION TO WISCONSIN'S BURGEONING POPULATION

Why the marked increase in breeding pelicans in Wisconsin? For an answer that is only partially satisfactory, we have to examine what has happened to the American White Pelican continentally and regionally.

Continentally, pelican populations were once threatened by some combination of habitat loss and degradation, changing water levels, human disturbance, and chemical contaminants (Knopf and Evans 2004). The species has recovered, is increasing at least at a rate of >3% annually, and is expanding its continental range eastward into the Great Lakes (Knopf and Evans 2004, Cuthbert 2011, Pacific Flyway Council 2012). Largely a bird of the West and South, habitat loss resulting from agricultural reclamation of marshes and water diversion projects resulted in western breeding populations shifting eastward to the central U.S. (Lies and Behle 1966, Murphy and Tracy 2005).

Additionally, pelicans continued their abandonment of colony sites in 2005 at the Chase Lake National Wildlife Refuge in central North Dakota for reasons unknown (J. MacPherson, AP News, 13 July 2005,

*Officials Investigating Pelican Deaths*). These factors together with colonization of suitable/available habitat and apparently abundant prey (fish) populations, and an apparent high rate of recruitment from some growing colonies in the state, likely contributed to large-scale increases in numbers of breeding birds in east-central and northeastern Wisconsin.

The following synopsis presents an overview on pelicans breeding in other midwestern states, beginning with Minnesota, which has the largest number in the Upper Midwest. Also addressed is the influx of migrants in some midwestern states where breeding has yet to occur.

#### *Minnesota—*

Unlike Wisconsin, which had no documented history of breeding pelicans prior to the 1990s, pelicans were once common in large colonies throughout Minnesota, with the last known historic colony occurring in 1878 (Roberts 1932, Thompson 1933). One pair may have nested in 1904 (Roberts 1932), but breeding birds were absent until 1968. Human disturbance and the effects of pesticides and other persistent chemicals were factors identified by Wires et al. (2006) for the absence of breeding pelicans in Minnesota during much of the twentieth century and until 1968, when they were discovered nesting at Marsh Lake in western Minnesota, and since then they have been regular breeders.

In Minnesota's first statewide pelican breeding census in 2004, Wires et al. (2006) estimated 16,652 breeding pelican pairs occurred at 16 sites in northern, west-central, and southern

Minnesota, with over 80% of the state's breeding population nesting at Marsh Lake. Pelicans were observed loafing in virtually every county in western Minnesota, and Wires et al. (2006) speculated that these birds may have originated from the recently abandoned Chase Lake colony in North Dakota. In Minnesota, similar increases (but in far higher numbers) to Wisconsin's have occurred across a similar time period (2004/05, 2010-2012), but the rate of increase has slowed, and in 2011-2012 the Minnesota breeding population was essentially stable, with about 22,000 breeding pairs documented in 2012 (Wires et al. 2013).

#### *Michigan—*

In Michigan, the occurrence of breeding birds is a recent phenomenon that reflects the regional population expansion. Until the 1990s, the American White Pelican was a "rare straggler and summer visitant" in Michigan, a fact borne out by the first Michigan Breeding Bird Atlas, 1983-1988 (Wood 1951, Cuthbert 2011). But recent population increases in Wisconsin may have been responsible for Michigan's first breeding pelicans observed in 1999 (10 nests) and during the second Michigan Breeding Bird Atlas, 2002-2008, when at least 17 nests were recorded in 2007, with non-breeding birds observed at a handful of other sites in northern Lake Michigan (Cuthbert 2011).

#### *Iowa and Illinois—*

In Iowa and Illinois, an influx of large numbers of pelicans occurred after 2005 that led to established breeding colonies on Mississippi River

dredge spoil islands. In Illinois, about two dozen pelicans began frequenting sand bars along the Mississippi River in 1991. By 2006, there were about 1,000 birds. The first known Mississippi River colony of American White Pelicans in the Upper Midwest, however, occurred in 2007 in Iowa on 2 dredge spoil islands called the "Cormorant Islands," located north of Clinton in Pool 13, with about 50 young produced. These islands are also known as "Island 303" and "Island 304," and are located at River Mile 528. Birds returned to nest on these sand islands in 2008, despite spring floods, and produced 200 young (Britton 2010).

By 2009, there were 2,500 pelicans in Pool 13, and about 20 breeding pairs moved across the river into Illinois and established Illinois's first known pelican colony at Woodruffs Island, River Mile 526.7, in the Upper Mississippi River National Wildlife & Fish Refuge in northwestern Illinois (Britton 2010). Refuge biologist E. Tomasovic (2013) found that the first nests were built in "willow saplings and button bushes on the periphery of the island." He noted that nesting on the Iowa islands followed a similar pattern, with birds "nesting first in low cover, which also included sedges with the shrubbery, followed by nesting near fallen trees in the interior."

In 2010, 167 pelican nests were documented by S. Dinsmore and M. Griffin on Woodruffs Island (S. Dinsmore pers. comm.). At Iowa's Islands 303 and 304, there were 653 and 452 nests, respectively (R. Egelke pers. comm., S. Dinsmore pers. comm.).

For 2011, breeding pelicans returned to Woodruffs Island in Illinois and colonized a new site (Gomers Is-

land or Island 306—E. Tomasovic (pers. comm.) at River Mile 529.0 that contained “400 chicks and 500 flighted birds [including young]” in late June (R. Engelke pers. comm.). In Iowa, S. Dinsmore (pers. comm.) returned to Islands 303 and 304 and counted 200 active nests, 800 adults, and 650 chicks at Island 303, and 65 active nests, 400 adults, and 300 chicks at Island 304.

In 2012, S. Dinsmore (pers. comm.) recorded 28 nests on Illinois’s Woodruffs Island, with 400 adults and 300 young observed. Pelicans also nested on three Iowa islands: 286 nests on Island 303, with 600 adults and 400 chicks observed; 68 nests, 500 adults, and 360 young observed on Island 304; and on Island 306 there were 63 nests, 180 adults, and 100 young noted (S. Dinsmore pers. comm.).

In 2013, Woodruffs Island contained no birds (because it was under water for much of the breeding season due to spring floods), but on nearby Pelican Island—an Illinois dredge spoil island created in 2006 (E. Tomasovic pers. comm.)—there were as many as 91 pelican nests, with 325 adults and 270 young observed (S. Dinsmore pers. comm.). Also, in 2013, breeding pelicans expanded to Illinois’s Smith Bay Island, an island with fresh dredge spoil in 2012. Here, E. Tomasovic (pers. comm.) observed initial nesting “under a lower canopy in stinging nettle and on the edges in button bush.” An aerial survey on 13 May 2013 revealed about 250 nests; high water likely affected the site and on 19 June E. Tomasovic (pers. comm.) counted 160 nests. The site, however, was abandoned at the time of Tomasovic’s visit, likely due to

human disturbance from camping on the dredge spoil. In Iowa, birds returned to the same three islands observed the previous year: 52 nests, 400 adults, and 225 young recorded at Island 303; 57 nests, 900 adults, and 520 young observed at Island 304; and nests and adults not counted at Island 306, but 55 young observed here on 1 July 2013.

#### *Indiana—*

In Indiana, no breeding has occurred to date (2013) but the number of migrants (first reported in 1994) increased dramatically during 2008–2013 (K. Brock pers. comm., J. Castrale pers. comm.) from 275 in 2008 to 5,216 in 2013, with far more birds reported in spring than in fall (e.g. in 2013: 3,970 vs 748).

#### *Ohio—*

In Ohio, spring and fall migrants have been increasing in number in recent years, but no nesting has been reported to date (M. Shieldcastle pers. comm.).

### **BAND RECOVERIES: LIMITED SUPPORTING EVIDENCE OF RANGE EXPANSION**

T. Erdman (pers. comm.) has unpublished data for 35 or more band recoveries, including birds banded elsewhere (western states) and subsequently nesting on Cat and Lone Tree islands. A sample of 7 available records since 2006 is provided in Table 3.

These band recoveries, together with Erdman’s unpublished records, give some credence to the prevailing

Table 3. American White Pelican band recoveries provided by Tom Erdman.

Band Number Metal	Banding Location Date	Encounter Data Recovery Location	Date
0559-95943	7/7/2001—Appleton, MN	LTI, Green Bay WI	5/11/2011
0669-61447	6/26/2010—Marsh Lake WC, MN	Near Bailey's Harbor WI	7/24/2013
0649-03139	6/27/1998—Medina, ND	Cat Is., Green Bay WI	6/9/2010
0649-19292	7/8/1999—Medina, ND	LTI, Green Bay WI	5/18/2010
0609-13803	7/13/2007—Cat Is., Green Bay, WI	Cat Is., Green Bay WI	5/13/2008
0609-13061	6/27/2002—Cat Is., Green Bay, WI	LTI, Green Bay WI	5/21/2009
0609-13703	6/8/2006—Cat Is., Green Bay, WI	Cat Is., Green Bay WI	9/13/2006

LTI = Lone Tree Island; WC = West Central

view that the influx of breeding pelicans in Wisconsin was likely due to birds originating from the Dakotas and Minnesota, further supporting the notion of an eastward expansion of the bird's breeding range. We also know that some of our banded lower Green Bay pelicans have been recovered in the Dakotas, indicating that population interchange has occurred. (Interestingly, many of Erdman's unpublished band recoveries come from Florida—Sanibel Island NWR—during winter, with several recoveries of Wisconsin-banded birds shot at fish farms in Mississippi, Arkansas, and Louisiana. Wisconsin pelicans likely winter from Louisiana to Florida.)

In Illinois, E. Britton (pers. comm.) reported that during the summer of 2013 a banded pelican observed at Illinois's Pelican Island was originally banded as a chick in 2001 at the Chase Lake colony near Medina, North Dakota. The mean average life span for an American White Pelican is 12-14 years old, with the oldest banded pelican surviving to age 26.4 years (Clapp et al. 1982).

#### LIMITING FACTORS AFFECTING PELICAN POPULATIONS

Habitat loss/degradation nationally, competing demands for water use in the West, and to some extent contaminants continue to be a threat to breeding populations (Pacific Flyway Council 2012). There has been considerable interest in the impacts of the 2010 Deepwater Horizon Oil Spill on nesting colonial waterbirds (L. Wires pers. comm.). In 2012, Upper Mississippi NWR staff collected addled eggs from Iowa and Illinois pelican colonies and submitted them for contaminant analyses. Preliminary results indicated egg contamination from DOSS (soap agent used for oil dispersal); PAHs (polyaromatic hydrocarbons); and from mercury, DDT, dieldrin, chlordane, mirex, and PCBs (E. Britton pers. comm.). Also, deformed pelican chicks have been recorded from time to time at both Cat and Lone Tree islands, though the source of contamination is unknown.

Disease transmission in recent decades is another limiting factor, with the bird especially susceptible to avian botulism (the primary cause of

death in the U.S. during 1978-2003, especially in the West; Murphy 2005, Rocke et al. 2005), and with West Nile Virus, avian cholera, aspergillosis, and Newcastle Disease also causing mortality (Pacific Flyway Council 2012). Botulism Type E was found in a lower Green Bay pelican one year, with a possible link to consumption of round gobbies (*Neogobius melanostomus*), which now comprise part of the pelican diet (T. Erdman pers. obs.).

Of all limiting factors, however, predation and persistent human disturbance (by foot, boat, plane) at breeding colonies constitute the major threats to pelican breeding success (Pacific Flyway Council 2012), with chicks <3 weeks of age especially vulnerable to predators such as red fox (*Vulpes vulpes*), coyote, badger (*Taxidea taxus*), raccoon (*Procyon lotor*), gulls (*Larus spp.*, especially Herring Gulls *L. argentatus*), Common Raven (*Corvus corax*), Great Horned Owl (*Bubo virginianus*), and in some areas Bald Eagle (*Haliaeetus leucocephalus*; Thompson et al. 1979, Koonz 1987, Idaho Fish and Game 2009, Pacific Flyway Council 2012). We have observed periodically entire sub-colonies lost in Wisconsin due to predation events, usually where birds have selected nests on dikes or accessible peninsular sites. Typically during a breeding season when predation is not a factor, a female begins egg-laying in her third year, 2 eggs are the mean clutch size, and 1 young survives (Sloan 1982, Knopf and Evans 2004).

Finally, shooting historically—and to some extent today—has been a significant mortality factor as humans have taken pelicans for their feathers, for sport, or “to alleviate suspected impacts to fisheries” (Pacific Flyway

Council 2012). Parenthetically, pelican diets are composed predominantly of *Cyprinidae* and *Catostomidae* spp. of low economic value (Derby and Loworn 1997, Findholt and Anderson 1995, Knopf and Evans 2004), with sport fishes comprising a small percentage of fish consumed (Knopf and Evans 2004, Pacific Flyway Council 2012). Breeding American White Pelicans, however, are opportunistic feeders, shifting to what is most easily accessible, and in so doing can impact to some degree localized fish populations, creating conflicts (Knopf and Kennedy 1981, Knopf and Evans 2004, Teuscher 2004, Teuscher et al. 2005, Pacific Flyway Council 2012).

#### SUMMARY

Wisconsin is the apparent beneficiary of an eastward continental American White Pelican range expansion that has occurred during the past two decades, with regional increases notably evident since 2005. From 2005 through 2013, Wisconsin’s pelican breeding population increased markedly to 4,123 nesting pairs at 8 Wisconsin colony sites in east-central and northeastern Wisconsin. Will numbers of pelicans colonize island sites in the Mississippi River, as has occurred recently in Illinois and Iowa? As the state’s breeding population continues to grow—a likely trend in the foreseeable future—pelican colonies in Wisconsin waters of the Mississippi (and elsewhere) seem probable.

Editor Bettie Harriman (2006) concluded her pelican account in the Wisconsin Breeding Bird Atlas by ruminating on the bird’s future:

“Whether the American White Pelican will continue to nest in Wisconsin or disappear again as it apparently did in the past depends on human behavior.” With a greater understanding of its past and current status and distribution, as well as a more comprehensive grasp of its breeding biology here in the years ahead, we hope that this ancient piscivorous bird, with its extraordinary 9-foot wingspan (rivalling the California Condor in North America), will continue to be a regular feature of Wisconsin’s avifauna.

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## APPENDIX A.

American White Pelican Observations, *Passenger Pigeon*, 1939–1994; dates are given month, day, year; source is given as volume # (issue number): page number(s). Compiled by William Volkert.

Date	Number Reported	Location	Observer(s)	Source
6-20 to 7-23-1940	3	Lake Pepin	Aliesch	2(10): 118
4-20-1941	1	Babcock	Grange/Cole	3(5): 43
4-28-1941	28	near Hudson	Hope	III(8): 76
4-10-1942	1	Madison	Chase	V(2): 47
11-7-1942	17	Horicon Marsh	Burrows	V(4): 91
11-8-1942	37	Milwaukee Co.	Duesing	V(4): 91
Summer, 1945	4	Koshkonong	Maxson	VII(1): 21
6-5 to 7-10-1946	2	Horicon Marsh	Mathiak/Hopkins	VIII(4): 125
4-24 -1948	27	St. Croix/Polk	Jonas	X(2): 71
4-25-1948	48	St. Croix/Polk	Hope	IX(3): 112
6-12-1948	3	St. Croix & Polk	unknown	X(2): 71
5-4-1948	a few	Koshkonong	Traxler	X(2): 71
9-16-1948	4	Koshkonong	Dallman	X(1): 33
10-27-1949	1	Black River	Marcon/Regenfuss	XI(2): 81
4-20-1950	9	Menominee	Mattison	XII(3): 137
5-7 to 12-1950	8	Maiden Rock	Campbell	XII(4): 172
No date 1951	1	Bayfield Co.	Keener	XIV(3): 103
6-22-1953	1	Koshkonong	M. Donald	XV(4): 175
Early Nov 1954	3	Allouez Bay	Hofslund	XVII(2): 88
6-14 to 9-18-1955	1	Horicon Marsh	multiple	XVII(4): 164
5-16 & 30-1956	4	Petenwell Flo.	S. Robbins et al.	XVIII(3): 128
June to Nov 1-1957	2	Petenwell Flo.	multiple	XIX(1): 35
9-9-1957	1	Cornucopia	Willis	XIX(1): 35
11-7 to 23-1957	1	Two Rivers	multiple	XX(1): 32
4-24-1958	4	Ashland	Thompson	XX(3): 124
11-23 & 24-1958	7	Dane Co.	multiple	XXI(2): 82
10-5-1959	1	Marquette Co.	Soulen	XXII(2): 19
10-22 to 11-1-1959	1	Dane Co.	Ashman	XXII(2): 19
5-28 to 30-1960	1	Bayfield Co.	Bratley/Dryer.	XXII(4): 195
11-8 to 22-1961	1	Bayfield Co.	Klugow	XXIV(2): 49
5-18-1963	1	Douglas Co.	Bernard	XXV(4): 162
10-23-1963	1	Racine Co.	Prins	26(2): 97
5-29-1964	1	Douglas Co.	Bernard	27(1): 28
6-3-1964	1	Superior	Bernard	27(2): 82
7-22-1964	1	Burnett	Stone/Caldwll	27(2): 82
9-26-1964	1	Crawford Co.	Bierbrauer	27(3): 122
10-20-1964	2	Columbia Co.	Field	27(3): 122
10-25 to 28-1964	1	Superior	Bernard	27(3): 122
11-1-1964	1	near Freedom	Vander Logt	27(3): 122
6-24-1966	18	La Crosse	unknown	29(2): 39
8-28 to 11-22-1966	1	Milwaukee Co.	Donald	29(3): 86
10-4-1966	3	Buffalo Co.	Everson	29(3): 86
10-26-1966	1	Grant Co.	Krumm	29(3): 86
5-9-1968	16	La Crosse Co.	Leshner	30(1): 37
6-28 to 7-4-1967	35	Vernon Co.	Leshner	30(2): 93
11-4-1967	1	Milwaukee Co.	Gustofson	30(3): 131
11-6-1967	1	Brown Co.	Delsart	30(3): 131
11-13-1967	1	Clark Co.	Hansen	30(3): 131
11-15-1967	1	Washburn Co.	unknown	30(3): 131
10-16-1969	2	Collins Marsh	Olson	32(4): 164
11-15-1969	2	Winnebago Co.	Roehr	32(4): 164
4-25 to 5-31-1970	1	Jefferson Co.	multiple	33(1): 19

Date	Number Reported	Location	Observer(s)	Source
8-12 to 9-11-1971	7	Grand Rr. Marsh	Tessen	34(2): 75
9-27-1971	11	Ashland	Roy	34(3): 108
10-1-1972	4	Madison	Scott	35(3): 136
10-14-1972	3	Oconto Co.	Erdman	35(3): 136
Oct 17-1972	2	Cedar Grove	Berger et al.	35(3): 136
10-7 to 25-1973	1	Price Co.	Vincent	36(3): 121
10-16-1973	16	Cedar Grove	Berger	36(3): 121
11-16-1973	3	Ozaukee Co.	Donald/Erickson	36(3): 121
5-11-1974	22	Barron Co.	Faanes	37(2): 70
11-11-1974	6	Ashland Co.	Miller	37(3): 121
6-12-1975	1	Door Co.	Trick et al.	38(2): 73
10-20-1975	2	Wood Co.	Follen	37(4): 188
11-2 to 6-1975	2	St. Croix Co.	Faanes	38(3): 114,127
11-20-1975	1	Green Bay	Erdman	38(3): 114
Fall 1976	unk	Lake Onalaska	Lint	39(2): cover
8-23-1976	23	La Crosse Co.	Leshner	39(3): 286
7-24-1977	7	La Crosse Co.	Leshner	40(2): 407
7-18 to 30-1977	11	Tomah area	Epstein	40(2): 407
7-3-1977	1	Milwaukee	Cutright	40(2): 407
7-31 to 8-23-1977	11	Tomah area	multiple	40(3): 455
Sept 10 to 14-1977	14	La Crosse Co.	unk	40(3): 455
10-20 & 21-1977	1	Racine Co.	Erickson	40(3): 455
6-18 to 7-4-1978	19	Grand Rr Marsh	multiple	41(2): 82
7-4-1978	1	Green Bay	Trick	41(2): 82
8-12-1978	3	Adams Co.	Kjos	41(4): 162
10-24-1978	1	Door Co.	Lukes	41(4): 162
10-27-1978	—	Sheboygan Co.	Berger	41(4): 162
No date 1978	1 inj/capture	La Crosse Co.	Leshner	41(4): 162
4-16 to 21-1979	32	Pepin Co.	Kemper et al.	42(1): 32
4-22-1979	6	Burnett Co.	Evrard	42(1): 32
4-26 to 5-24-1979	—	La Crosse Co.	Rosso	42(1): 32
4-29 to 5-31-1979	—	Ashland Co.	Verch	42(1): 32
4-30 to 5-27-1979	23	Douglas Co.	Johnson et al.	42(1): 32
6-11-1979	2	Douglas Co.	Johnson	42(2): 77
9-19-1979	1	Wood Co.	Follen	42(3): 105
6-10 to 7-1-1980	2	Brown Co.	Erdman/Trick	43(2): 52
Late October, 1980	1	Douglas Co.	Johnson	43(4): 120
6-17-1981	1	Burnett Co.	Hoefler	44(2): 75
3-18 to 5-31-1982	—	Chippewa Co.	Polk	45(1): 27
3-31 & 4-16	—	Trempeleau Co.	Polk	45(1): 27
4-14 to 4-27-1982	4	Bayfield Co.	Verch	45(1): 27
4-17-1982	—	Green Lake Co.	DeBoer	45(1): 27
4-18 to 22-1982	40	Burnette Co.	Hoefler	45(1): 27
5-12-1982	—	Price Co.	Hardy	45(1): 27
9-4 to 10-2-1982	—	Dunn Co.	Polk	45(3): 88
10-1-1982	1	Sheboygan Co.	Berger et al.	45(3): 88&110
10-16-1982	1	Columbia Co.	Lange	45(3): 88
11-14 to 20-1982	1	Columbia Co.	Hoffman/Tessen	45(3): 88
4-23-1983	—	Dane Co.	Tessen	46(1): 25
5-12-1983	—	Dunn Co.	Polk	46(1): 25
5-29-1983	—	Marathon Co.	Heig	46(1): 25
6-1 to 7-13-1983	3	Marathon Co.	multiple	46(2): 83
6-4-1983	4	Ashland Co.	multiple	46(2): 83
6-30-1983	—	Winnebago Co.	Carpenter	46(2): 83
7-19-1983	3	Dunn Co.	Polk	46(2): 83
5-10 to 31-1984	—	Brown Co.	multiple	47(1): 18
5-11-1984	—	Green Lake Co.	Mossman	47(1): 18
5-19-1984	—	Winnebago Co.	multiple	47(1): 18

Date	Number Reported	Location	Observer(s)	Source
5-27 to 29-1984	—	Door Co.	Lukes	47(1): 18
7-13 to 24-1984	1	Winnebago Co.	Carpenter/Ziebell	47(2): 75
7-28 to 31-1984	4	Ashland/Bayfield	Verch	47(2): 75
Early September, 1984	—	Trempeleau Co.	Polk	47(3): 104
10-25-1984	17	Ashland/Bayfield	Verch	47(3): 104
10-27-1984	—	Price Co.	Hardy	47(3): 104
No date	—	Burnett Co.	unknown	47(3): 104
No date	—	Manitowoc Co.	unknown	47(3): 104
4-19 & 28-1985	—	Dunn Co.	Polk	48(1): 27
4-28-1985	—	Burnett Co.	Hoefler	48(1): 27
5-7-1985	—	Ashland Co.	Verch	48(1): 27
9-20 to 27-1985	2	Winnebago Co.	Ziebell	48(3): 133
10-22 to 31-1985	1	Dunn Co.	Polk/Tessen	48(3): 133
4-20-1986	7	Burnett Co.	Hoefler	49(1): 25
4-28-1986	5	La Crosse Co.	Leshner	49(3): 144
5-30-1986	14	Iron Co.	Rilin	49(1): 25
7-8-1986	1	Vilas Co.	Spahn	49(2): 107
9-6-1986	3	Dodge Co.	Baughman/Tessen	49(3): 144
9-27-1986	2	Grant Co.	Thiessen	49(3): 144
10-8 to 10-1986	1	Milwaukee Co.	multiple	49(3): 144
10-11-1986	11	Douglas Co.	Johnson	49(3): 144
5-19 to 25-1987	18	Bayfield Co.	Multiple	50(1): 61
5-24-1987	4	Douglas Co.	DeBoer	50(1): 61
6-11-1987	1	Douglas Co.	Johnson	50(2): 161
4-30-1988	—	Douglas Co.	Johnson	50(4): 344
5-7 to 22-1988	—	Green Lake Co.	multiple	50(4): 344
No date	—	Manitowoc Co.	Sontag	50(4): 344
6-18-1988	1	Winnebago Co.	Ziebell	51(1): 113
4-8-1989	—	Monroe Co.	Epstein	51(4): 382
4-20-1989	—	Ashland Co.	Verch	51(4): 382
5-5-1989	—	Douglas Co.	Johnson	51(4): 382
5-9 & 25-1989	—	Dane Co.	Thiessen	51(4): 382
11-4-1989	2	La Crosse Co.	Soulen	52(2): 181
4-22 to 5-23-1990	25	Burnett Co.	Hoefler	52(4): 361
5-26-1990	—	Douglas Co.	Johnson/Semo	52(4): 361
No date	—	Ashland Co.	unknown	52(4): 361
No date	—	Dane Co.	unknown	52(4): 361
No date	—	Green Lake Co.	unknown	52(4): 361
No date	—	Taylor	unknown	52(4): 361
No date	—	Trempeleau	unknown	52(4): 361
7-21-1990	1	Barron Co.	Goff	53(1): 86
7-19-1990	2	Winnebago	multiple	53(1): 86
7-21 to 27-1990	—	Douglas Co.	Johnson/Semo	53(1): 86
8-24 to 9-16-1990	7	Brown Co.	multiple	53(2): 171
10-17-1990	3	Douglas Co.	Semo	53(2): 171
11-19-1990	5	Polk Co.	Hudick	53(2): 171
4-5-1991	33	Trempeleau Co.	Hunter	53(4): 358
4-27-1991	—	Douglas Co.	Johnson	53(4): 358
4-28-1991	12	Buffalo Co.	Leshner	53(4): 358
4-29-1991	—	Ashland Co.	Verch	53(4): 358
5-11-1991	—	La Crosse Co.	Leshner	53(4): 358
6-1 to 7-7-1991	2	Brown Co.	multiple	54(1): 87
7-22-1991	—	Milwaukee Co.	Domagalski	54(1): 87
9-9 to 16-1991	12	Vernon Co.	Dankert	54(2): 155
10-1-1991	—	Trempeleau Co.	Hunter	54(2): 155
4-11-1992	2	Dane Co.	Holzheuter	54(4): 311
4-16 to 27-1992	3	Green Lake Co.	Schultz	54(4): 311
4-19-1992	35+	S Lake Michigan	Idzikowski	54(4): 311

Date	Number Reported	Location	Observer(s)	Source
5-1 to 31-1992	3	Douglas Co.	multiple	54(4): 311
5-3-1992	11	Grant Co.	Burcar/Shea	54(4): 311
5-6 to 8-1992	33	Dunn Co.	Polk	54(4): 311
5-17-1992	10	Chippewa Co.	Polk	54(4): 311
5-19& 20-1992	4	Ashland Co.	Verch	54(4): 311
5-29-1992	1	Burnett Co.	Korducki/Tessen	54(4): 311
6-28 to 7-4-1992	103	Vernon Co.	Dankert	55(1): 83
No date	—	Adams Co.	Tessen	55(1): 83
No date	—	Juneau Co.	Tessen	55(1): 83
No date	—	Burnett Co.	Hoefer	55(1): 83
No date	—	Dodge Co.	multiple	55(1): 83
No date	—	Door Co.	Lukes	55(1): 83
No date	—	Douglas Co.	Johnson/Semo	55(1): 83
No date	—	Green Lake Co.	Schultz	55(1): 83
8-1-1992	—	Burnett Co.	unknown	55(2): 180
8-1-1992	—	Dodge Co.	unknown	55(2): 180
8-1 to 18-1992	250	La Crosse Co.	Dankert/Lesher	55(2): 180
8-1-1992	—	Brown Co.	unknown	55(2): 180
8-1-1992	—	Chiewa Co.	unknown	55(2): 180
8-1-1992	—	Green Lake Co.	unknown	55(2): 180
8-1-1992	—	Trempealeau Co.	unknown	55(2): 180
8-1-1992	—	Vernon Co.	unknown	55(2): 180
10-14-1992	—	Dodge Co.	Domagalski	55(2): 180
4-18-1993	—	Trempealeau Co.	Hunter	55(4): 316
No date	—	Recorded in 8 western counties		55(4): 316
No date	—	Door Co.	unknown	55(4): 316
Through 5-31-1993	—	Brown Co.	unknown	55(4): 316
Through 5-31-1993	—	Douglas Co.	unknown	55(4): 316
Through 5-31-1993	—	Trempealeau Co.	unknown	55(4): 316
6-11-1993	6	Marquette Co.	Foster/Robbins	56(1): 75
6-18 to 24-1993	215	Vernon Co.	Dankert	56(1): 75
6-20-1993	4	Dane Co.	Burcar	56(1): 75
6-21 to 7-31-1993	—	La Crosse Co.	Dankert	56(1): 75
7-7-1993	16	Door Co.	Lukes	56(1): 75
7-30-1993	—	Brown Co.	Nussbaum	56(1): 75
8-1-1993	—	La Crosse Co.	unknown	56(2): 159
8-1 to 11-23-1993	240	Vernon Co.	Dankert	56(2): 159
No Date	—	Brown Co.	unknown	56(2): 159
No Date	—	Door Co.	unknown	56(2): 159
No Date	—	St. Croix Co.	unknown	56(2): 159
4-17-1994	—	Trempealeau Co.	Hunter	56(4): 266
No date	—	Reported in 13 scattered counties		56(4): 266
5-3-1994	183	Buffalo Co.	Hunter	56(4): 266

**SOME CONCLUSIONS REGARDING  
WISCONSIN PELICAN SIGHT  
RECORDS IN THE  
PASSENGER PIGEON, 1939–1994**

Prior to the advent of Wisconsin eBird records, the *Passenger Pigeon* was the only comprehensive source of Wis-

consin bird records. Data for the Table were taken from seasonal reports and other articles. Since observations were recorded quarterly, pelicans that remained from one quarter to the next may have been recorded in more than one issue, and therefore the above records were in some instances listed

twice for the same bird in two consecutive seasons. The dates of sightings in these instances ended with 31 May and began on 1 June for late spring records that remained into summer, or began on 1 August for summer sightings of pelicans that remained into fall.

The following are some conclusions from the sight records of American White Pelican as tabulated above.

1. In the 1943 issue of the *Passenger Pigeon*, sightings on 7 November at Horicon Marsh, and a wounded bird picked up there on 11 November, were reported as the first November records for this species in the state. (5(4): 91).

2. In the 1953 "Field Notes" of the *Passenger Pigeon*, it was reported for Lake Koshkonong that "this rare visitor was formerly common in this area; now only one or two are reported here annually." (XV (4): 175).

3. Reports of white pelicans in Wisconsin from 1940 through the 1960s were primarily of single birds, with the exception of larger flocks observed in the spring of 1948, 1950, 1966, and 1967. There were only a few records of pelicans observed in summer (23 July 1940; summer 1945—no details given; and 10 July 1946) during this period.

4. In 1955 and 1957, pelicans—apparently non-breeders—remained throughout the summer at Horicon Marsh and Petenwell Flowage.

5. From 1939 through 1969, there were 49 reported observations of white pelicans in Wisconsin; 13 in April and May, 9 in June and July, and 26 in September through November. There were summer records of pelicans, but most all of the earliest records involved sightings of 1–3

birds. Many observations covered a single day, but in some instances pelicans remained for as many as 4 weeks, without any evidence of nesting attempts. These latter records all appear to have been non-breeding birds that remained on Wisconsin waters for varying lengths of time during the breeding season.

6. By 1966, we see the first substantial flocks sighted in summer, with 18 pelicans on 24 June 1966, and 35 reported for the period 28 June to 4 July 1967. During the 1970s, white pelicans were reported every year, but not always in both spring and fall migration. Records of larger flocks, however, became more frequent. Of the 36 records for the decade, 10 involved single birds, 12 were of 2–10 birds, and 10 records constituted flocks of 11–35 birds, with a maximum of 32 pelicans reported for the spring of 1979. There were another 4 records of an unknown number of pelicans, but these likely involved single birds.

7. In the 1980s, sight records of white pelicans increased dramatically, with 56 records for the decade. Many of the seasonal reports in the *Passenger Pigeon* no longer listed the number of birds observed, and infrequently the date sighted, except in the case of particularly large flocks. Records instead typically focused on the statewide distribution of observations. This trend was also noted for the 1990s as a result of an ever-increasing number of sight records. For the period 1990 through 1994, there were 69 records, with numerous occurrences reported in consecutive issues resulting from individual birds or flocks remaining from one season to the next. More pelicans remained into the summer months, and stayed for longer periods

of time, which appeared to be a precursor to eventual nesting efforts.

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Portrait of an American White Pelican by Jack Bartholmai