

Range Expansion of the Glossy Ibis in North America

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ABSTRACT

The Glossy Ibis (*Plegadis falcinellus*) has steadily expanded its range in both the United States and Mexico since the early 1800s. In the United States, the species initially colonized Florida, where breeding was first detected in the 1880s. This ibis remained a local species in the country until the 1940s, when it expanded into the Northeast and elsewhere in the Southeast, west to Louisiana. Another period of range stability was followed by a burst of westward expansion in the mid-1980s, coupled with a rapid expansion throughout the Yucatán Peninsula. The species reached the West Coast in California and Colima shortly thereafter. It now occurs annually in the western United States east of the continental divide. The vast majority of records are of adults in full breeding condition, with most in April and May. We conclude the occurrence of the species in the West reflects a true range expansion, but this pattern is confounded by the relative ease of detecting full adults in spring.

INTRODUCTION

Most range expansions are slow, with many measured over geological time (e.g., McLeod and MacDonald 1997). We might expect this slow rate of expansion if a daughter species from a speciation event slowly adapts to new environments and micro-habitats as it radiates away from its point of origin. However, many range expansions occur extremely rapidly, some possibly in association with speciation events (Gaston 1998), but most through processes that are less clear. In a few cases range expansions have occurred as a result of adaptations to local environmental change (Hilbeck and Kennedy 1998) or in response to human modification of habitat (Peris et al. 1998). Furthermore, some expansions are cyclic, apparently in response to oscillations in food and climate (Patten and Erickson 2000). Unfortunately, we generally know little about mechanisms facilitating rapid range expansion, whether by a native (e.g., Post et al. 1993, Dinsmore and Dinsmore 1993, Rothstein 1994) or non-native

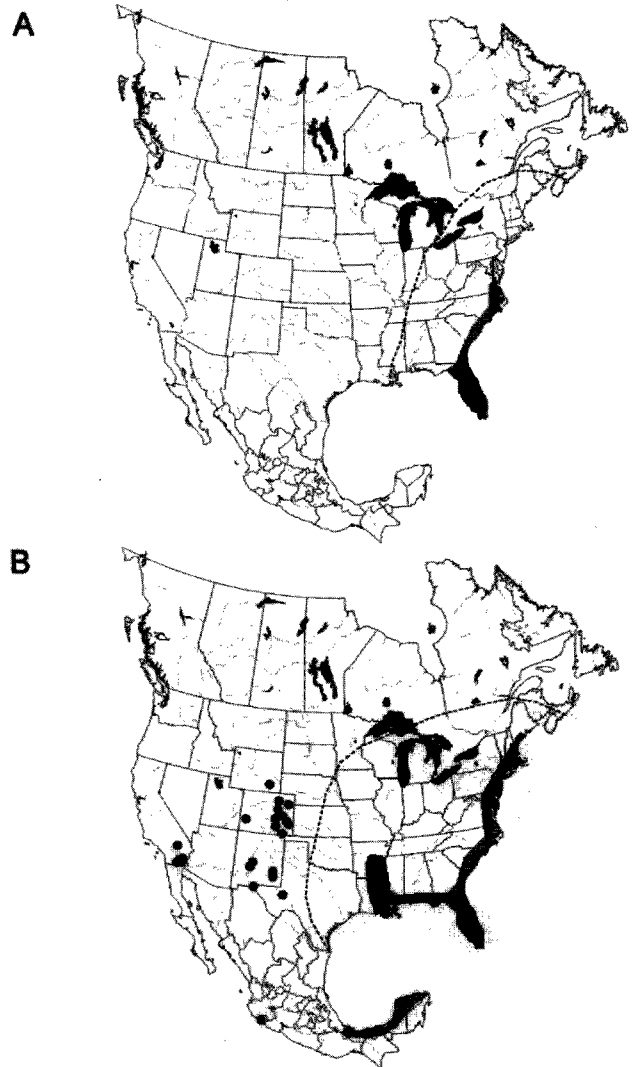


Figure 1. North American distribution of the Glossy Ibis ca. 1960 (A) and ca. 2000 (B). Dots on map B signify recent vagrant occurrences outside the current range.



Figure 2. Glossy Ibis in full breeding condition at Anahuac National Wildlife Refuge, Texas, 14 April 1996. The rich chestnut feathering throughout the head and neck is characteristic of Definitive Alternate plumage in both *Plegadis* species. Photograph by Greg W. Lasley.



Figure 3. Adult Glossy Ibis at Bosque del Apache National Wildlife Refuge, New Mexico, 19–24 April 1999, the second recorded in the state. Photograph by Jerry R. Oldenettel.

species (e.g., Veit and Lewis 1996, Gipson et al. 1998, Lewis et al. 1999), although most hypotheses invoke anthropogenic habitat alteration.

The rapid range expansions underway by both of the *Plegadis* ibis exemplify our ignorance. Over the past three decades there has been a vast increase in the number of records of the White-faced Ibis (*P. chihi*) in eastern North America and a concomitant increase in records of the Glossy Ibis (*P. falcinellus*) in western North America. The range expansion of the latter species has been particularly striking. There were no valid records in the West in the mid-1980s (DeSante and Pyle 1986), but in just 15 years it has become regular on the eastern edge of the continental divide. During this same period the Glossy Ibis expanded its range southward into Mexico (Howell and de Montes 1989), was first detected breeding in Canada (McAlpine et al. 1988), and reached the Pacific Coast in both western Mexico (Howell 1994) and California (see below).

Herein we summarize the westward expansion of the Glossy Ibis and discuss several alternative hypotheses that could explain this phenomenon, ranging from an increase in observer awareness to a natural expansion into available marshland.

FORMER RANGE AND STATUS

Apart from its distribution through various portions of the Old World, the Glossy Ibis was formerly a bird of the southeastern United States. Data are limited, but it would appear that this species is a fairly recent colonist of the New World (Palmer 1962, Dunstan 1978), presumably arriving in a trans-Atlantic manner similar to the Cattle Egret (*Bubulcus ibis*). The first United States record was during Audubon's lifetime, furnished by a specimen from Great Egg Harbor, New Jersey, 7 May 1817 (Peterson and Peterson 1981). It was so rare in the New World at that time that Audubon encountered the species but once, near St. Augustine, Florida, 16 January 1832 (Peterson and Peterson 1981). Breeding records were not obtained until the 1880s (Palmer 1962). By the turn of the twentieth century it was only "rare and local" along the Gulf of Mexico and in Florida (Chapman 1912), with the largest breeding population numbering only ± 50 pairs by the mid-1930s (Peterson and Peterson 1981).

However, the Glossy Ibis began to expand its range substantially during the 1940s, with birds pushing north to Long Island and west to Louisiana, becoming a breeding bird in New York by the early 1960s (Bull 1974) and north to Maine by the early 1970s (Oberholser 1974). This ibis first reached Honduras, Costa Rica, Panama, Columbia, and Venezuela during this time, although by the mid-1970s the species was "mainly a northern straggler to Central America and northern South America" (Blake 1977). Populations in these areas and westward along the Gulf of Mexico stabilized somewhat by the late 1970s/1980s, prior to another burst, this time to the west and south. Thus, by the early 1980s the Glossy Ibis was a bird of the southeastern United States and Atlantic Coast (Fig. 1), with local populations in the Greater Antilles, Costa Rica, and northern Venezuela and various vagrant records for eastern North America east of the Great Plains (A.O.U. 1983).



Figure 4. Breeding adult Glossy Ibis in a flooded field near the south end of the Salton Sea, ± 12 km w. of Calipatria, Imperial County, California, 1 July 2000. This bird represented the third record for California. All four records for that state are since late August 1999. Photograph by Kenneth Z. Kurland.

RECENT RANGE EXPANSION

Beginning in the mid- to late 1980s, the Glossy Ibis began to push westward into Texas and southward into the Yucatán Peninsula of Mexico (Fig. 1); its expansion into the latter area was well-documented by Howell and de Montes (1989). In Texas, the first record was of a bird at Ft. Worth 3–6 November 1983 and returning 20 October–15 December 1984 (Pulich 1988, Lasley 1989). Within a few years it was evident that the species was regular on the Upper Texas Coast (Fig. 2), with ± 25 records west to the Dallas/Fort Worth area and to Austin and San Antonio on the Edwards Plateau (see below). It has even been recorded south to the lower Rio Grande Valley (Haynie 1993) and thrice far west in the Trans-Pecos region: at El Paso 29 April–4 May 1992 and twice at Balmorhea Lake, 29 April 1997 (Peterson and Zimmer 1998) and 2 May 2000 (Lasley et al. 2000). By 1995 so many records had accumulated that the species was dropped from the Texas Bird Records Committee review list (Haynie 1996).

Both Colorado and New Mexico have experienced similar increases. In the former, there were but four valid records by 1990, of individuals at Sweitzer Lake 27 March 1986, in Weld County 25–28 May 1988, near Erie 7–9 May 1989, and at Orlando Reservoir 4 July 1990 (Andrews and Righter 1992, B. K. Percival *in litt.*). By the end of the decade the species was annual in eastern Colorado, particularly in spring, with nearly 30 reports accumulating (W. P. Lisowsky *in litt.*). For example, ± 10 were reported (but not necessarily documented) 26 April–13 July 1999 and 8 April–23 May 2000, including one in western Colorado, near Edwards, Eagle County, 24–28 April 2000 (Truan and Percival 1999, 2000).

Spring 1999 also saw Wyoming's first record, of a bird at Jackson 4 May 1999 (Truan and Percival 1999). Just a few years earlier, the species was added to the state list for New Mexico, when an adult in breeding condition was videotaped at Bosque Redondo, DeBaca County, 14–15 April 1995 (*New Mexico Ornithology Society Bulletin* 24:61, S. O. Williams *in litt.*). Since that time four–five additional records have accumulated, all of them in 1999 and 2000. Three were photographed during spring 1999, at Bosque del Apache National Wildlife Refuge 18–24 April (Fig. 3), Bitter Lake 24 April, and Santa

Rosa 9 May (Williams 1999). In 2000 one was photographed at Bosque del Apache 21–22 April and what may well have been the same bird was seen there 12–13 May (S. O. Williams *in litt.*).

Despite an unconvincing report of a flock of 60 near La Paz, Baja California Sur, 25 May 1996 (Carmona et al. 1997), this species has reached the Pacific states only in Colima in western Mexico (Howell 1994) and in California. The first record for the latter was of an adult in Definitive Basic plumage at Twentynine Palms 29–31 August 1999 (McCaskie 2000). Three more birds were photographed in spring/summer 2000 near the south end of the Salton Sea in the vicinity of Calipatria in the Imperial Valley: an adult in Definitive Alternate Plumage 27 May–8 August (M. A. Patten et al.), another 1–15 July (Fig. 4; P. A. Ginsburg et al.), and a bird in Definitive Basic or First Alternate plumage 1–8 July (M. A. Patten et al.).

Thus, the past two decades have witnessed a significant increase of records of the Glossy Ibis in western North America

($r_s = 0.80$, $P < 0.01$), with a particularly sharp increase since the mid-1990s (Fig. 5). All birds west of the Great Plains have been detected from late March to late August, with a distinct peak from mid-April to mid-May (Fig. 6). The temporal pattern of records in the West is probably a combination of the real pattern and an artifact of identification ease. Because the Glossy Ibis retracts from more northerly climes during winter and returns to those areas during summer, it is reasonable to conclude that many records at this season are of spring "overshoots." Yet at the same time adult *Plegadis* in alternate plumage and full breeding condition are by far the easiest age class to identify, so we expect that records will be skewed toward spring. However, this species regularly undergoes post-breeding dispersal northward along the Atlantic Seaboard and elsewhere in the East. Thus, fall records of vagrants should also be expected, and a number of records for Texas are from September–November, including birds west to Fort Worth (Lasley 1989).

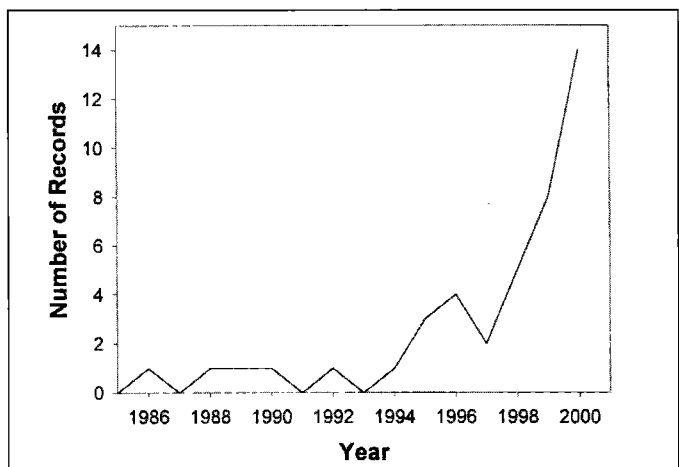


Figure 5. Records of the Glossy Ibis, 1984–2000, west of the Great Plains (west Texas, Wyoming, Colorado, New Mexico, California, and Colima).

IDENTIFICATION AND AGEING

The identification of *Plegadis* ibis requires close views, in good light, of bare-part pattern and coloration and feathering around these areas; various other plumage features are identical, as is voice. This topic has been covered well by Pratt (1976), Howell and de Montes (1989), Kaufman (1990), the National Geographic Society (1998), and Sibley (2000). However, there are important identification points that bear repeating. Furthermore, as it is with many species, properly judging age and condition is an important first step in identification, which is difficult when the bird is not in alternate plumage/breeding condition. Indeed, to our knowledge positive species-level identification of juveniles is impossible, even with a specimen, excepting relying on size extremes. The Glossy Ibis averages larger than the White-faced Ibis, sex for sex (Table 1; *contra* Sibley 2000); indeed, a Glossy amidst a large flock of White-faced is often the largest bird (Lasley per. obs.). Thus, the largest *Plegadis* should be male Glossy, whereas the smallest should be female White-faced. However, there is overlap in size (Table 1), making identification on measurements alone sometimes problematic.

Table 1. Mensural data for the Glossy and White-faced Ibis, presented as mean [range], in millimeters (data from Blake 1977). Note that, within sex, the Glossy averages larger, but there is overlap in measurements (especially the bill).

	flat wing	exposed culmen	tarsus
males			
Glossy (n = 11)	288.3 [275–294]	131.0 [127–137]	103.1 [99.2–112]
White-faced (8)	269.6 [261–280]	133.9 [118–143]	94.6 [91–98]
females			
Glossy (n = 8)	262.2 [252–275]	104.2 [95–114]	81.8 [78–88]
White-faced (10)	243.5 [238–249]	103.6 [100–111]	70.0 [63–73]

It is straightforward to distinguish between a *Plegadis* in Juvenal plumage and one in basic plumage. A uniform muddy-brown head and neck lacking white streaking and the dull brown underparts characterize Juvenal plumage (Kaufman 1990). Juveniles exhibit a variable amount of white splotching on the throat, which ranges from extensive (Fig. 7) to absent. At this age individuals tend to have a much shorter bill than do adults (Table 2), with full adult bill length being acquired within three–six months of hatching. Basic plumage, both Definite and Basic I, is characterized by a dark brown or brownish-gray head and neck covered with fine white streaking. Apparently Basic I and Definitive Basic are not distinguishable (Cramp and Simmons 1977), although there may be some tendency for adults to retain some purple iridescence in the wing coverts, whereas juveniles/first-winter birds are uniform green above (Howell and de Montes 1989). Based on an examination of specimens at the American Museum of Natural History, apparent adults in basic retain glossy purple undertail coverts, whereas immatures have dull green undertail coverts. Obviously, the color of these feathers would be difficult to assess in the field.

Table 2. Range of bill length (mm) of juvenile Glossy Ibises during the first six months of life (data from Cramp and Simmons 1977).

	Aug/Sep	Oct/Nov	Dec/Mar
male	98–113	108–132	120–134
female	86–102	95–103	101–111

As a result of the extreme difficulty or impossibility of separating a Basic I from a Definitive Basic bird, the timing of post-juvenal molt is of critical importance. Glossy Ibis generally do not undergo this molt until September/October (Cramp and Simmons 1977). Based on field experience, not on a definitive, quantitative study, it appears that post-juvenal molt takes place on the wintering grounds, as *Plegadis* that are still obvious fall migrants are in full Juvenal plumage even in late November. Conversely, around the Salton Sea in southeastern California, where thousands of White-faced Ibis regularly winter (Shuford et al. 1994), birds transitioning into Basic I can be seen by mid-August, but even there most retain full Juvenal plumage until later in the fall (Patten pers. obs.).

Adults in Definitive Alternate plumage are easily identified by the rich chestnut head and neck, glossy purple mantle and underparts, and glossy green wing coverts and tertials. The White-faced Ibis tends to show a bit less olive in the head at this season, but this feature varies substantially, such that most breeding adult *Plegadis* ibis look basically the same in general plumage color. The principal plumage difference, obviously, is the often broad but sometimes narrow border of white feathering surrounding the bare skin on the face of a White-faced Ibis, the feature that gives the species its name.

Birds in this plumage generally also exhibit breeding condition bare-part coloration, with the White-faced showing bright-red to moderate-pink facial skin and the Glossy showing dark-blue to grayish facial skin. The latter species has well-defined blue, bluish-white, or pale gray borders to the facial skin, both from the eye to the culmen (the loral stripe) and the eye to the gape (Pratt 1976, Kaufman 1990). These stripes are on the skin itself; the feathering surrounding the face is wholly dark. The loral stripe bulges toward the middle, whereas the lower stripe is even in width, such that the loral stripe is bolder and easier to see (Jonsson 1992; cf. Fig. 4). Also, the loral stripe crosses over the base of the culmen, but the lower one stops at the gape (white

feathering surrounding the facial skin of a White-faced Ibis crosses under the chin). Note that some White-faced Ibis show a pale loral stripe on the facial skin, but this stripe is narrow, ill-defined, and present only on adults, which have pink/red facial skin and thus do not pose an identification problem anyway (Howell and de Montes 1989, National Geographic Society 1998).

Leg and bill color is more variable, with the differences oversimplified in most field guides (e.g., National Geographic Society 1998). The White-faced Ibis does tend to have uniform red legs when in high breeding condition, but we note many Glossy Ibis in the same condition can show all red legs. Similarly, although the Glossy tends to have gray legs with red intertarsal joints (“knees”), we note this same pattern on many White-faced Ibis. Bill color is even more variable, with perhaps that of the White-faced averaging slightly pinker, although not enough so to be an aid to identification. Lastly, adult White-faced Ibis have bright red irides; adult Glossy Ibis and all immature *Plegadis* have brown irides (Howell and de Montes 1989, Kaufman 1990).

Diagnostic adult bare-part coloration is generally not acquired until December or January of the first year of life. Many *Plegadis* in Basic I plumage cannot be identified either, although some hatch-year *P. chihi* acquire red eyes by September (Patten pers. obs.) and some hatch-year *P. falcinellus* acquire pale facial stripes by August (Howell and de Montes 1989, S. E. Finnegan pers. comm.) or exceptionally in July (J. L. Dunn pers. comm.). However, many immatures will lack diagnostic bare-part coloration until their first spring (i.e., when they are 9–10 months old), and thus will not be identifiable.

Plegadis ibis take two years to acquire full adult plumage, but

Alternate I and Basic II are extremely similar to corresponding adult plumages. Therefore, adults in Definitive Basic plumage and all birds by their first spring should have species-specific bare-part coloration, at least in terms of eye color and facial skin color/pattern. As a result, adults in winter can be identified with good views in good light, as the facial skin will be dark gray with well-defined whitish or pale grayish borders on a Glossy Ibis (Fig. 8) but will be dull pink on a White-faced Ibis (Fig. 9), with the latter also having red eyes. However, we note that eye color can be surprisingly difficult to determine without good light and good optics (and with the bird fairly close). Even so, on California's first Glossy Ibis, a bird in Definitive Basic or Basic II/Alternate I at Twentynine Palms 29–31 August 1999, "The bare facial skin was fairly dark gray, lacking either red or blue tones. The upper edge of the facial skin was bordered by a distinct pale gray stripe that ran from the upper edge of the eye to the base of the culmen, and bulging outward in the center. The lower edge of the facial skin was also bordered by a distinct gray stripe, this one a bit thinner and less visible at a modest distance and running from the lower edge of the eye to the gape. It curved downward slightly at the gape, but did not cross under the chin" (Patten pers. obs.). It was thus identifiable as a Glossy Ibis, despite not being in alternate plumage or breeding condition.

As a final cautionary note, we note that the White-faced Ibis is undergoing an eastward expansion that mirrors that of the Glossy, with vagrant records now annual on the Atlantic Coast. Co-expansion of these sister species has brought them into sympatry in southern Louisiana (A.O.U. 1998, J. V. Rensen pers. comm.) and recently along

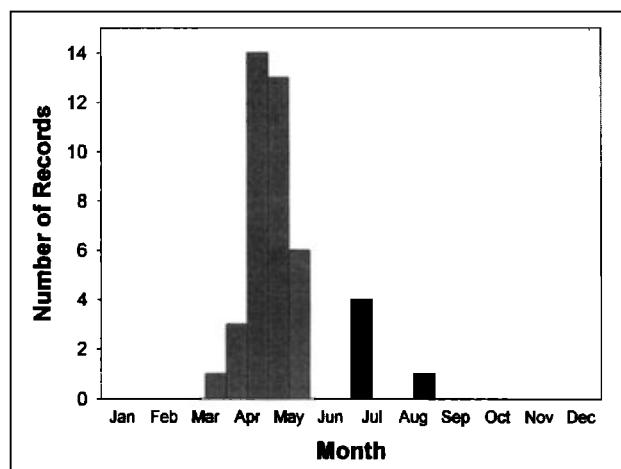


Figure 6. Seasonal pattern of Glossy Ibis records west of the Great Plains.

the central coast of Texas (Lasley et al. 1997), but hybridization has not yet been detected. However, these species "freely interbred" in captivity (Palmer 1962:517), so we anticipate that hybrids will occur in nature (see Patten 2000). Potential hybridization obviously adds a complicated and tricky wrinkle to field identification, but the possibility should be borne in mind if an ibis is encountered that exhibits mixed or intermediate characters.



Figure 7. Typical *Plegadis* in Juvenal plumage, in this case a White-faced Ibis at Furnace Creek Ranch in Death Valley, California, 16 August 1991. The extent of splotchy white feathers on the chin and throat is variable, ranging from extensive to essentially absent. Regardless, this splotching is characteristic of Juvenal plumage only. Note the lack of white streaking on the head and neck, with each instead being uniform muddy brown. Identification to species is generally impossible at this age (except by range). Photograph by Michael A. Patten.



Figure 8. Typical adult Glossy Ibis in basic plumage at the Kennedy Space Center, Florida, 6 March 1997. The white streaking throughout the head and neck is characteristic of basic plumage and is not found on birds in juvenal plumage. Pale facial stripes remain through winter, but vary in conspicuousness from distinctive to rather faint but visible with a careful study. *Photograph by Greg W. Lasley.*

CONCLUSIONS

The Glossy Ibis is rapidly expanding its range westward, with records now annual on the eastern slope of the continental divide and westward to western Colorado, inland California, and coastal Colima, Mexico. This expansion appears to be a real phenomenon, perhaps related to the creation of wetland habitats (e.g., sewage ponds, golf courses) in the previously arid portions of the southern Great Plains and the desert Southwest. The vast majority of records of the Glossy Ibis in the West are of adults in high breeding condition in April and May, suggesting a strong element of observer bias is involved. Still, both *Plegadis* are migratory, retracting from northerly climes in winter, so the possibility that spring records are the result of a preponderance of spring overshoots cannot be eliminated, as it is clearly confounded with detectability. Nevertheless, we suspect that careful scrutiny of adults in winter will yield further records in the West. Additional field data, with an accurate picture of seasonal occurrence, will be needed to determine the extent and rate of range expansion and thence to explore causal factors behind the expansion.



Figure 9. Typical White-faced Ibis (right) in basic/first-alternate plumage, with a like-plumaged Glossy Ibis (left), at Mitchell Lake near San Antonio, Texas, 12 May 1991. The red iris and dull pink facial skin remain through the winter, but sometimes require close views to be seen well. *Photograph by Greg W. Lasley.*

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LITERATURE CITED

- American Ornithologists' Union (A.O.U.). 1983. *Check-list of North American Birds*, 6th ed. American Ornithologists' Union, Washington, D.C.
- American Ornithologists' Union (A.O.U.). 1998. *Check-list of North American Birds*, 7th ed. American Ornithologists' Union, Washington, D.C.
- Andrews, R., and R. Righter. 1992. *Colorado Birds: A Reference to Their Distribution and Habitat*. Denver Museum of Natural History, Denver.
- Blake, E. R. 1977. *Manual of Neotropical Birds*, vol. 1. University of Chicago Press, Chicago.
- Bull, J. 1974. *Birds of New York State*. Comstock Publishing, Ithaca, New York.
- Carmona, R., G. Brabata, and L. Godinez. 1997. First observation of the Glossy Ibis (*Plegadis falcinellus*; Threskiornithidae) in the peninsula of Baja California. *Oceanoides* 12:127–128.
- Chapman, F. M. 1912. *Handbook of Birds of Eastern North America*. Appleton, New York.
- Cramp, S., and K. E. L. Simmons, eds. 1977. *Birds of the Western Palearctic*, vol. 1. Oxford University Press, Oxford.
- DeSante, D. F., and P. Pyle. 1986. *Distributional Checklist of North American Birds*. Artemisia Press, Lee Vining, California.
- Dinsmore, J. J., and S. J. Dinsmore. 1993. Range expansion of the great-tailed grackle in the 1900s. *Journal of the Iowa Academy of Science* 100:54–59.
- Dunstan, F. M. 1978. Glossy Ibis. Pp. 82–83, in Kale, H. W., II, ed. *Rare and Endangered Biota of Florida*, vol. 2: Birds. University Presses of Florida, Gainesville.
- Gaston, K. J. 1998. Species-range size distributions: Products of speciation, extinction and transformation. *Philosophical Transactions of the Royal Society of London B* 353:219–230.
- Gipson, P. S., B. Hlavachick, and T. Berger. 1998. Range expansion by wild hogs across the central United States. *Wildlife Society Bulletin* 26 279–286.
- Haynie, C. B. 1993. Texas Bird Records Committee report for 1993. *Bulletin of the Texas Ornithological Society* 26:2–14.
- Haynie, C. B. 1996. Texas Bird Records Committee report for 1995. *Bulletin of the Texas Ornithological Society* 29:2–10.
- Hilbeck, A., and G. G. Kennedy. 1998. Effects of temperature on survival and preimaginal development rates of Colorado potato beetle on potato and horse-nettle: Potential role in host range expansion. *Entomologia Experimentalis et Applicata* 89:261–269.
- Howell, S. N. G. 1994. Additional information on the birds of Colima and adjacent Jalisco, Mexico. *Euphonia* 3:33–54.
- Howell, S. N. G., and B. M. de Montes. 1989. Status of the Glossy Ibis in Mexico. *American Birds* 43:43–45.
- Jonsson, L. 1992. *Birds of Europe, with North Africa and the Middle East*. Princeton University Press, Princeton, New Jersey.
- Kaufman, K. 1990. *A Field Guide to Advanced Birding*. Houghton Mifflin, Boston.
- Lasley, G. W. 1989. Texas Bird Records Committee report for 1988. *Bulletin of the Texas Ornithological Society* 22:2–14.
- Lasley, G. W., C. Sexton, and M. Lockwood. 2000. Texas. *North American Birds* 53: in press.
- Lasley, G. W., C. Sexton, W. Sekula, M. Lockwood, and C. Shackelford. 1997. Texas Region. *Field Notes* 51:1020–1023.
- Lewis, J. C., K. L. Sallee, and R. T. Golightly. 1999. Introduction and range expansion of nonnative Red Foxes (*Vulpes vulpes*) in California. *American Midland Naturalist* 142:372–381.
- McAlpine, D. F., J. Finne, S. Makepeace, S. Gilliland, and M. Phinney. 1988. First nesting of the Glossy Ibis, *Plegadis falcinellus*, in Canada. *Canadian Field-Naturalist* 102:536–537.
- McCaskie, G. 2000. Southern Pacific Coast. *North American Birds* 54:103–107.
- McLeod, T. K., and G. M. MacDonald. 1997. Postglacial range expansion and population growth of *Picea mariana*, *Picea glauca* and *Pinus banksiana* in the western interior of Canada. *Journal of Biogeography* 24:865–881.
- National Geographic Society. 1998. *Field Guide to the Birds of North America*, 3rd ed. National Geographic Society, Washington, D.C.
- Oberholser, H. C. 1974. *The Bird Life of Texas*, vol. 1. University of Texas Press, Austin.
- Palmer, R. S., ed. 1962. *Handbook of North American Birds*, vol. 1. Yale University Press, New Haven, Connecticut.
- Patten, M. A. 2000. The changing seasons, winter 1999/2000: Warm weather and cross-continental wonders. *North American Birds* 54:146–149.
- Patten, M. A., and R. A. Erickson. 2000. Population fluctuations of the Harris' Hawk (*Parabuteo unicinctus*) and its reappearance in California. *Journal of Raptor Research* 34:187–195.
- Peris, S. J., B. Sanchez, and D. Rodriguez. 1998. Range expansion of the Fulvous Whistling-Duck (*Dendrocygna bicolor*) in Cuba in relation to rice cultivation. *Caribbean Journal of Science* 34:164–166.
- Peterson, J., and B. R. Zimmer. 1998. *Birds of the Trans-Pecos*. University of Texas Press, Austin.
- Peterson, R. T., and V. M. Peterson. 1981. *Audubon's Birds of America*. Artabras, New York.
- Post, W., A. Cruz, and D. B. McNair. 1993. The North American invasion pattern of the Shiny Cowbird. *Journal of Field Ornithology* 64:32–41.
- Pulich, W. M. 1988. *The Birds of North Central Texas*. Texas A&M University Press, College Station.
- Pratt, H. D. 1976. Field identification of White-faced and Glossy ibis. *Birding* 8:1–5.
- Rothstein, S. I. 1994. The Brown-headed Cowbird's invasion of the Far West: History, causes, and consequences experienced by host species. *Studies in Avian Biology* 13:301–315.
- Shuford, W. D., C. M. Hickey, R. J. Safran, and G. W. Page. 1996. A review of the status of the White-faced Ibis in winter in California. *Western Birds* 27:169–196.
- Sibley, D. A. 2000. *The Sibley Guide to Birds*. Random House, New York.
- Truan, V. A., and B. K. Percival. 1999. Mountain West Region. *North American Birds* 53:306–308.
- Truan, V. A., and B. K. Percival. 2000. Mountain West Region. *North American Birds* 54:in press.
- Veit, R. R., and M. A. Lewis. 1996. Dispersal, population growth, and the Allee effect: Dynamics of the House Finch invasion of eastern North America. *American Naturalist* 148:255–274.
- Williams, S. O., III. 1999. New Mexico Region. *North American Birds* 53:312–314.

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