

Hybridization between Glossy and White-faced Ibises

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ABSTRACT

Up to five apparent hybrids between Glossy and White-faced Ibises were discovered in Alfalfa County, Oklahoma during 2002. They frequented an area in which White-faced Ibis had recently established breeding colonies, and where a few breeding-condition Glossy Ibis appeared during previous breeding periods. Only one intermediate *Plegadis* individual had been previously recognized, that depicted by Sibley (2000). Our Oklahoma observations depict a spectrum of variation in characteristics among probable hybrids.

INTRODUCTION

The Glossy Ibis (*Plegadis falcinellus*) is a cosmopolitan species, with North American populations breeding primarily in the Atlantic and Gulf coastal areas of the United States and in the Greater Antilles (Davis and Kricher 2000). The White-faced Ibis (*Plegadis chihi*) breeds locally in the western United States, highlands of Mexico, and in Gulf coastal areas of Texas and Louisiana (Ryder and Manry 1994). There is remarkably little variation worldwide among the populations of Glossy Ibis (Davis and Kricher 2000).

Although these two forms were considered conspecific for much of their taxonomic history (Palmer 1962), recent treatments have elevated White-faced to species status (American Ornithologists' Union 1983, 1998; Sibley

and Monroe 1990). Glossy and White-faced Ibises are known to have produced hybrids in captivity (Gray 1958, *vide* Terres 1980). However, at breeding colonies in Alabama, Louisiana, and Texas where the two occur together, interbreeding has not been observed (Ryder 1967, Duncan and Johnson 1977; Hockey, pers. comm.). Pairs perform various courtship rituals of allopreening and mutual wagging of nest material but appear to arrive at nesting colonies "already mated" (Belknap 1957). Surprisingly little is known of the mechanisms of pair bonding (Davis and Kricher 2000) or of isolating mechanisms between species. Such mechanisms would presumably be linked to species-specific plumage characteristics, to soft-part and eye coloration, and possibly also to species-specific displays.

On 30 May 2002, Arterburn was studying dark ibises at the Byron Fish Hatchery and Salt Plains National Wildlife Refuge, Alfalfa County, Oklahoma. Among the White-faced Ibis at the Hatchery, he noticed two birds that he suspected were hybrids. The first bird had some white feathering around the face but also other characters suggestive of Glossy Ibis. The second bird had pale pink to purplish lines forming upper and lower borders to the bare facial skin; the facial skin was mainly a plum-gray color. Along the auto-tour route at the Refuge, he found and photographed a third bird that he initially thought was an adult Glossy Ibis.

David Sibley and Grzybowski examined the photos of the two birds from the Hatchery and agreed that both were likely hybrids. However, in reviewing the photos of the third bird, both Sibley and Grzybowski noted intermediate characters that suggested hybrid status for this bird as well.

Arterburn returned to the Hatchery and Wildlife Refuge on 6-7 June and 5-6 July 2002. He found another hybrid at the Hatchery on 7 June and yet another different bird on the Refuge 5 July. He also found one certain adult Glossy Ibis on the Refuge on the June trip and three to four on the July trip, as well as relocating the adult hybrid on both trips. Grzybowski visited the Hatchery and Wildlife Refuge on 5 July and found two certain adult Glossy Ibis and one of the hybrids on the Refuge. He crossed paths with Arterburn at the Hatchery, where they relocated one of the hybrids first found on 30 May.

IBIS CHARACTERISTICS

Adult and immature *Plegadis* plumages are adequately described in a number of accounts (Palmer 1962, Oberholser 1974, Pratt 1976, Cramp and Simmons 1982, Kaufman 1990, Ryder and Manry 1994, Davis and Kricher 2000, Sibley 2000, Patten and Lasley 2000). First-basic and first-alternate plumages are presumed similar to definitive-basic and definitive-alternate plumages, respectively, with minor variation occurring in coloration of undertail coverts between first- and definitive-basic plumages (Howell and de Montes 1989, Patten and Lasley 2000). The limited amounts of white feathering that surrounds the facial skin in some White-faced is not considered (known?) to be a feature of first-alternate plumage.

We focus here on coloration of the eye and facial soft parts, and on the level of white feathering immediately surrounding the facial skin, as these form the bases for distinguishing between these species. Bill and leg color are variable, with overlap between species, and are therefore less reliable characteristics. Most obviously, adult White-faced Ibis in breeding condition (in definitive-alternate plumage) shows a modest to broad band of white feathers edging the bare facial skin that is not present on Glossy Ibis. White-faced past their first-winter season have a red iris, while that of Glossies is brown.

The facial skin of Glossy Ibis is variously described as purplish black, blue-black, and dark cobalt blue in breeding condition, and is described as dark blue, dull green, or dull gray during winter. There are pale blue or blue-white lines edging the upper and lower borders of facial skin from the bill to eye, but not extending behind the eye. In intense breeding condition, the loreal line (upper) thickens (Fig. 1). Most Glossies show these lines duller and reduced in non-breeding condition.

The facial skin of breeding adult White-faced is described as red, pinkish-red (Fig. 2) to rich maroon (Fig. 3), fading to pale pink or gray during winter. Some White-faceds show a thin pale loreal line that is usually white or pale pink. It is most noticeable during winter when the white feathering around the facial skin is absent. In some summer individuals, pale pink lines form borders, above and below, to the pinkish-red facial skin; the pale pink eyelid can make these



Figure 1. Typical adult Glossy Ibis in breeding condition at Salt Plains N.W.R., Oklahoma 6 July 2002. The dark brown eye and blue-black facial skin with borders, above and below, of bluish-white lines are characteristic of breeding birds. Photograph by James W. Arterburn.



Figure 2. Adult White-faced Ibis in breeding condition at Salt Plains N.W.R. 5 July 2002. White feathers surround the facial skin and red eye. The facial skin appears pinkish-red. Note the pale eyelid. Photograph by James W. Arterburn.

lines appear to circle behind the eye and connect (Grzybowski, pers. obs.). In both cases, the pinkish, red or maroon facial skin readily distinguishes these birds as White-faced.

HYBRID DESCRIPTIONS

The five birds with intermediate characters described below show a spectrum of variation from a bird very closely resembling an adult Glossy Ibis to one appearing as an off-tone White-faced. The latter may indeed be a variant White-faced.

Three birds depicting clearly intermediate characters are those in Figures 4-7. These birds may be subadults in their first-alternate plumage. Bird A (Figs. 4-5) has a brown to brownish-red eye. The bare facial skin has patches of both dark gray and a plum-purple coloration, the latter intermediate between that found in Glossy and White-faced Ibises. The line forming the upper border to the facial skin is mostly pale blue (as in Glossy), while that forming the lower border contains a pale plum cast (an intermediate coloration). The eyelid is pale, of similar tones to the facial lines. There is some white feathering just above the loreal stripe and on the side of the face near the gape (as in White-faced).

Bird B (Fig. 6) also has characteristics of

both species. The eye has several clearly red areas. The facial skin has pink, plum-purple, and gray tones. The lines forming the borders of the facial skin, above and below, are white (suggestive of Glossy). The upper line is thickened (as in Glossy). The lower line extends to just behind the eye. The pale eyelid makes these lines appear as if they extend and meet behind the eye (as in Bird A above). There are also some white feathers on the head just above the loreal stripe and on the side of the face near the gape.

The eye of Bird C (Fig. 7) is brown with areas of red. The bare facial skin is a plum-purple coloration with patches of gray. The lines bordering the facial skin are mostly the pale (intermediate) plum coloration, with some whiter and blue-white areas. The upper line thickens somewhat (suggestive of Glossy). Because the eyelid is dark (as in Glossy), the upper and lower lines do not appear to extend and connect behind the eye.

The adult hybrid in Figures 8-9 (Bird D) looks most like a Glossy Ibis. However, it has several clearly red areas in the eye. The facial skin is largely a plum-purple tone approaching, but essentially duller than, the maroon tones on the bare-skin areas of the White-faced Ibis in Figure 3. The lines forming the borders of the facial skin are pale blue and appear very much like those of a Glossy Ibis, the upper thickening somewhat. The eyelid is dark. There is white in some of the feathers on top of the head just above the loreal stripe and on the side of the face near the gape.

Bird E (Fig. 10) may be a hybrid or possibly a variant White-faced in retarded first-alternate plumage. The feathering on the anterior portions of the head shows a few white streaks that may be remnants of first-basic plumage. The facial skin is largely plum-gray, with a few brighter areas of plum coloration characteristic of the intermediates above. The lines forming the borders of the facial skin are a pale plum or pale maroon (the intermediate tone). The upper line thickens (as in Glossy) and is paler than the lower. The eyelid is plum posteriorly, matching the lower border-line, but gray anteriorly. The eye is brown but, upon close inspection, vermiculated slightly with

reddish-brown, possibly a condition of retarded juvenile color.

Three of the five intermediates show combinations of red in eyes (of White-faced) and pale blue in the lines edging the facial skin (of Glossies); in a fourth, the facial lines are whitish. The most diagnostic feature shared by these hybrids is the presence of the plum-purple coloration (uncharacteristic of either White-faced or Glossy) in the facial skin, and/or toning to its pale borderlines. We believe all four of these are hybrids. The plum tone in the eye-lines of bird E is consistent with tones in the other birds. This would suggest hybrid status for this bird as well.

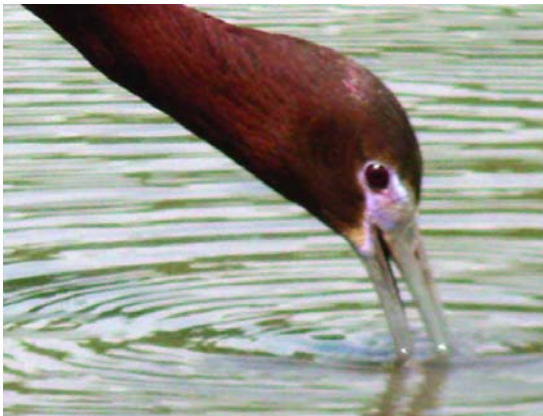
DISCUSSION

Palmer (1962) suggested, from the occurrences of breeding records, that the Glossy Ibis spread to America from the Old World in the 1800s. Patten and Lasley (2000) discussed this historical spread into Atlantic and Gulf coastal areas of the United States. From these data, it would appear that Glossy and White-faced Ibises were geographically isolated for some time, allowing reproductive isolating mechanisms between these forms to become established.

Patten and Lasley (2000) also depicted the recent increase in extralimital records of Glossy Ibis into the western reaches of the United States beginning in the 1980s and showing an especially pronounced increase beginning in 1998. This is consistent with the recent increase in Glossy Ibis sightings for the southern Great Plains. A bird found by Jo Loyd and Pat Seibert and photographed by Steve Metz in Tulsa County, Oklahoma in October 1991 was only the second Glossy Ibis documented for Oklahoma (Grzybowski 1992). The next to appear were in the spring of 1999, when at least three were noted in the Southern Great Plains Region of Nebraska, Kansas, and Oklahoma (Grzybowski 1999). In 2000, Arterburn discovered several adult Glossy Ibis in counties near the Salt Plains (Kingfisher and Major Counties, Oklahoma)



Figure 3. Another adult White-faced Ibis in breeding condition at Salt Plains N.W.R. 7 June 2002. Note the bright red eye and rich maroon facial skin of this bird. Photograph by James W. Arterburn.



Figures 4 & 5. Hybrid *Plegadis* (possibly subadult) near Salt Plains N.W.R Oklahoma 30 May 2002. Notice the brown to brownish-red eye; facial skin that has pink, plum-purple, and gray patches and pale blue-line borders; and white feathers above the loreal stripe and near the gape. Photographs by James W. Arterburn.

during the breeding season.

White-faced Ibis breeds very locally at scattered localities in the Great Plains and Mountain West (Ryder and Manry 1994). The species has long been noted nesting at Cheyenne Bottoms Wildlife Management Area and Quivira National Wildlife Refuge in central Kansas (Thompson and Ely 1989), with one recently documented nesting colony in Meade County, Kansas during 1998 (Flowers 1998).

Concomitant with the increasing extralimital appearances of Glossy Ibis has been the southward expansion in breeding of the White-faced Ibis into Oklahoma. The species was first noted breeding on Ralston Island, Salt Plains National Wildlife Refuge, north-central Oklahoma in 1995, although several were observed annually during summer on this island since 1992 (Shepperd 1996). During 2000 and 2001, several temporary colonies were observed in Kingfisher and Beaver Counties of northwestern Oklahoma (Arterburn, pers. obs.) and as far south as Tillman County in southwestern Oklahoma (Fazio, Grzybowski, pers. obs.).

Hybridization in the wild between these *Plegadis* ibises has not been observed in several Gulf Coast colonies where both occur

(Belknap 1957, Duncan and Johnson 1977). In Texas, Glossy Ibis was first found nesting at Sundown Island in Matagorda Bay during 1998 by Petra Hockey (pers. comm.) and Brush Freeman. In surveying ibis colonies during 2002 on Matagorda Bay islands, Hockey found approximately 23 Glossy Ibises on nests in among those of White-faced Ibis and other herons and egrets. She scrutinized each dark ibis for signs of possible hybridization but did not find a single odd ibis.

David Sibley (pers. comm.) also studied ibises in the Texas coastal areas and found only one suspected intermediate, a bird depicted in his recent identification guide (Sibley 2000). It shows the same plum cast to the facial skin and lines as the Alfalfa County birds. No other potential hybrids have been reported to date in the wild.

Why would hybridization occur at the Salt Plains but not apparently on the Texas coast? With isolating mechanisms in place, hybridization should rarely occur. However,

with little knowledge on courtship and possible behavioral cues, little but speculation can be offered. Many waterfowl are genetically compatible, yet comparatively few individuals hybridize because of detailed and stereotyped displays and very discrete male plumages (Mayr 1965). Hybridization at the Salt Plains may be a local phenomenon induced by the relative rarity of Glossy Ibis: an adult Glossy Ibis in Oklahoma would have had few choices other than a White-faced for a mate. Such is the typical condition deduced by Mayr (1965): hybridization between bird species with species-specific courtship displays and extended pair bonds would be likely in a situation of same-species mate scarcity. In Gulf coastal colonies where both species nest, hybrids have not been found (or recognized) to date. This may be due to higher numbers of each species there, making it easier to find a mate of the same type. Alternatively, hybrids may be present but

rare relative to the total populations, making them less likely to be detected. Several authors have suggested that the situation in Gulf coastal colonies needs more study (Ryder and Manry 1994, Patton and Lasley 2000).

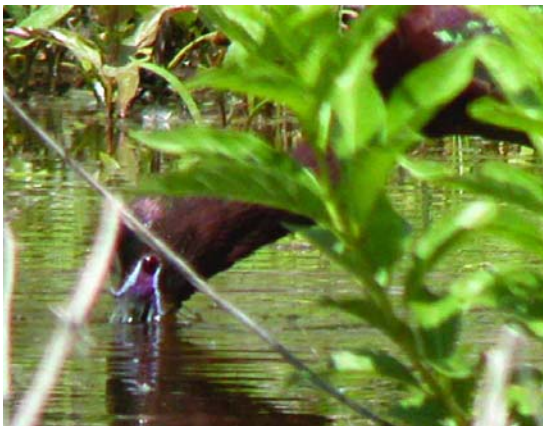
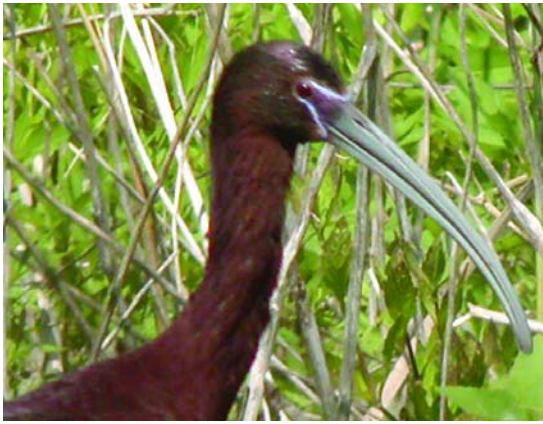
Patten and Lasley (2000) anticipated that with the expansion of both White-faced and Glossy Ibises, hybrids would be found. Whether this will be a pattern occurring broadly or one of occasional local occurrence depends presumably in large measure on the effectiveness of current isolating mechanisms. Given that hybrids have been rare to date even when looked for, isolating mechanisms between these species may be effective. We would, thus, predict frequencies of hybridization similar to those for waterfowl, occurring only occasionally where vagrants in breeding condition encounter localized breeding populations of the regionally expected species.



Figure 6. Hybrid *Plegadis* (possibly subadult) near Salt Plains N.W.R 6 June 2002. The eye is mostly red, and the facial skin has pink, plum-purple, and gray coloration. The lines forming the borders of the facial skin are white, the upper line thickening; the pale eyelid makes them appear to connect behind the eye. Also note white feathers above the loreal stripe and near the gape. Photograph by James W. Arterburn.



Figure 7. Hybrid *Plegadis* (possibly subadult) at Salt Plains N.W.R 6 July 2002. The eye is brown with patches of red, and the facial skin has plum-purple and gray coloration. The lines forming the borders of the facial skin are mostly plum-purple, with some areas of blue-white (upper) and white (lower), the upper line thickening. Note the eyelids of this bird are dark. Photograph by James W. Arterburn.



Figures 8 & 9. Adult breeding-condition *Plegadis* hybrid at Salt Plains N.W.R 30 May 2002. This bird looks like a Glossy at a distance, but notice the red in the eye, some white feathers above the lore stripe and near the gape, the clearly blue lines forming the borders of the bare facial skin (upper thickening), and the largely plum-purple tone to the remaining facial skin. Photographs by James W. Arterburn.

Nonetheless, the occurrence of these intermediates adds a new consideration to identification issues for extralimital *Plegadis* ibises. Although hybrids would not be expected in the first wave of extralimitals, the vagrancies in these species now include much of the contiguous United States where one of the cohort species is very rare relative to the other. Hybrids should be considered carefully in each instance of potential vagrancy. Documentation is still critical in assessing biologically meaningful distributional patterns of these species.

CONCLUSIONS

Plegadis ibises with characters intermediate between Glossy and White-faced suggest hybridization events between these species in a circumstance in which Glossy Ibis is very rare relative to White-faced Ibis. The extent of hybridization expected in other areas is uncertain, as so little is known about courtship and the influence of isolating mechanisms in this group, or the extent to which it may be occurring where both species are more common. Nonetheless, with the current expansion of vagrants of both species into the breeding ranges of the other, the

existence of apparent hybrids raises cautions for identification of extralimital *Plegadis* ibises.

Acknowledgments

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Figure 10. Apparent subadult *Plegadis* hybrid or variant White-faced Ibis near Salt Plains N.W.R 30 May 2002. This bird may be a White-faced in retarded juvenile color (see text). The brown eye has slight flecks of red. But notice the largely plum-gray facial skin with brighter patch anteriorly, as well as the pale plum or maroon lines forming the borders of the facial skin, tones characteristic of the other intermediates. Photograph by James W. Arterburn.