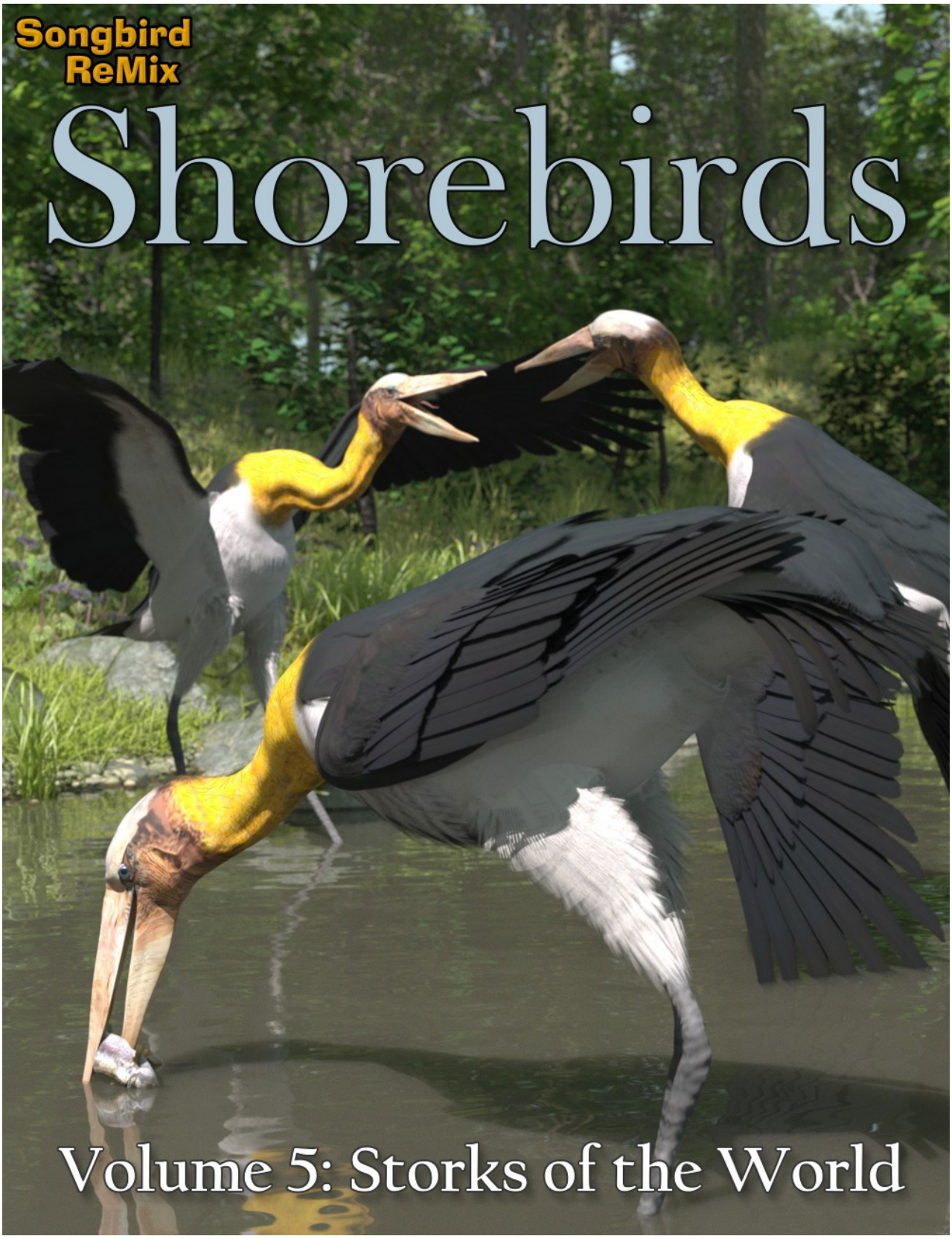

Avian Models for 3D Applications

Characters and Procedural Maps by Ken Gilliland

Songbird ReMix Shorebirds

Volume Five: Storks

Contents

Songbird ReMix Shorebirds
Volume Five: Storks

Introduction

Storks are large, long-legged, long-necked wading birds with long, stout bills. They belong to the family *Ciconiidae*, and make up the order *Ciconiiformes*.

They dwell in many regions and tend to live in drier habitats than the closely related shorebirds. Bill-clattering is an important mode of communication at the nest. Many species are migratory. Most storks eat carrion, frogs, fish, insects, earthworms, small birds and small mammals.

There are 20 living species of storks in six genera. Shorebirds v5 includes 15 stork species (the other 5 are already in past Shorebirds volumes). It includes the iconic Marabou Stork of Africa, as well as the Openbills with their unusual bill shapes and the prehistoric looking Adjutant Storks. All birds use the Songbird Remix model technology which has a fully articulated model with the ability to open/fold wings, open/close bill and over 100 other morphs to control behavior of shape of the bird.

The set two versions; DAZ Studio and Poser, and supports 3Delight, Iray, Firefly and Superfly render engines.

Overview and Use

The set is located within the **Animals : Songbird ReMix** folder. Here is where you will find a number of folders, such as **Bird Library**, **Manuals** and **Resources** . Let's look at what is contained in these folders:

- **Bird Library:** This folder holds the actual species and poses for the "premade" birds. Birds are placed into a "type" folder (such as "Birds of Prey (Order Falconiformes)" which for example would hold falcons, hawks and eagles). The birds for this set can be found in the following folder(s):
  - **Storks (Order Ciconiiformes)**
- **Manuals:** Contains a link to the online manual for the set.
- **Props:** Contains any props that might be included in the set
- **Resources:** Items in this folder are for creating and customizing your birds

- **Bird Base Models:** This folder has the blank, untextured model(s) used in this set. These models are primarily for users who wish to experiment with poses or customize their own species of bird. With using physical renderers such as Iray and Superfly, SubD should be turned to at least “3”. For DAZ Studios 3Delight renders, the SubD must be turned from the “High Resolution” setting to the “Base” setting (otherwise some areas will render incorrectly transparent).

Poser Use

Select **Figures** in the **Runtime** Folder and go to the **Animals : Songbird ReMix** folder. Select the bird from the renderer *Firefly or Superfly*) folder you want and simply click it to load. Some birds in the Songbird ReMix series may load with attached parts (*Conformers*) such as tail or crest extensions. Some of these parts have specific morphs. You will need to click on the attached part to access those controls. Associated poses can be found in the same folder- **Bird Library : (Type) : Poses**.

DAZ Studio Use

Go to the **Animals : Songbird ReMix** folder. Select the bird from the renderer (*3Delight or Iray*) folder you want and simply click it to load. Some birds in the Songbird ReMix series may load with attached parts (*Conformers*) such as tail or crest extensions. Some of these parts have specific morphs. You will need to click on the attached part to access those controls. Associated poses can be found in the same folder- **Bird Library : (Type) : Poses**. **Note:** Using the "Apply this Character to the currently selected Figure(s)" option **will not** properly apply the correct scaling to the bird selected. It is better to delete the existing character first and load the one you want to use.

Physical-based Rendering

Iray and **Superfly** requires more CPU and memory horsepower than the legacy renderers because of ray-trace bounces and higher resolution meshes needed for displacement. Poser’s **Superfly** renderer will require that the “Min Transparent Bounces” be set to **at least 16** and that the “Max Transparent Bounces” be set to **at least 32** in render settings. Superfly renders may show artifacts in the head area. This is a known Poser issue and may be addressed in the future. Increasing the SubD may minimize this issue.

Posing Tips

Gular Sac on Certain Storks

Two birds in this set have Gular Sacs (Greater Adjutant and Marabou Storks). The Gular Sac controls can be found in Action Morphs/Specific Behaviors. In the case of these two birds, the Inflate Neck3 morphs controls the size and length of the sac. The Fix Inflate3 morphs help to shape/fix the sac when bend in the neck occurs. The Fix morph corrects the most glaring issues but will not be perfect in some poses.

Where to find your birds

Type Folder	Bird Species
Storks (Order Ciconiiformes)	Milky Stork Yellow-billed Stork Asian Openbill African Openbill Abdim's Stork African Wooly-necked Stork Asian Wooly-necked Stork Storm's Stork Maguari Stork Black Stork Black-necked Stork Saddle-billed Stork Lesser Adjutant Greater Adjutant Marabou Stork

Where to find your poses

Type Folder	For what species?
Storks (Order Ciconiiformes)	All Storks

Songbird ReMix Shorebirds

Volume Five: Storks

Field Guide

Milky Stork
Yellow-billed Stork
Asian Openbill
African Openbill
Abdim's Stork
African Wooly-necked Stork
Asian Wooly-necked Stork
Storm's Stork
Maguari Stork
Black Stork
Black-necked Stork
Saddle-billed Stork
Lesser Adjutant
Greater Adjutant
Marabou Stork

Common Name: Milky Stork
Scientific Name: *Mycteria cinerea*

Size: 36–38 inches (95-100 cm); **Wingspan:** 83 inches (210 cm)

Habitat: Asia; it is found in Cambodia, western Peninsular Malaysia, Sumatra, Java and Sulawesi.

It is predominantly a coastal species, in contrast to its near relative the Painted Stork (*M. leucocephala),* foraging on tidal mudflats, in saline pools, freshwater marshes, fishponds and rice paddies, and nesting in bordering mangroves or swamp forest. It is only now encountered inland in flooded forest around Lake Tonle Sap in Cambodia, from where the birds disperse in the wet season, possibly to the coast.

Status: Endangered. Global Population: 2,200 adult individuals with a declining population trend. It was formerly classed as Vulnerable but ongoing and severe population declines has led to its reclassification. The global population since 2008 has at least halved. Habitat loss due to the conversion of tidal forests, including mangroves, for fish farming and rice cultivation is a major threat, but hunting of adults and the taking of eggs and chicks for food are also severe problems, in Indonesia and elsewhere. In Indonesia, colonies are located in at least five protected areas on Sumatra with one on Java. The single colonies in Malaysia and Cambodia are also protected. In Malaysia, there is a captive breeding

and reintroduction program that releases individuals into Kuala Selangor Nature Park.

Diet: It prefers large mudskippers (*Periophthalmus*) of the 10–23 cm size,. It will also take small fish, snakes, and frogs.

It regularly probes in sediments with its bill. Occasionally, it will locate prey by sight. Its daily food intake estimated at about 630 g (which the bird usually catches in about two hours). It frequents shallow pools in mangroves, where there is a high density of fish. Communal fishing has been seen where fish are concentrate.

Nesting: It is a large, predominantly white ibis-like stork. Sexes are alike except for size, males are larger. There is a black patch by the base of the bill. The breeding adult has creamy tone to its plumage, a bright yellow bill, and bright red face and legs. Non-breeding adults lacks milky tone to plumage. It has dark red facial skin, a pinkish-yellow bill, dull red legs and feet. Immatures are generally a good deal more drab, with more feathering on the head and the bare parts are dull yellow.

Peak breeding appears to be dry season in July and August. It is a colonial tree nester. The nests are usually 6–12 m up in a large tree. The egg clutch is 1-4 eggs. The chicks have white down.

Cool Facts: This species was formerly placed in genus *Ibis*. Phylogenetic studies based on DNA hybridization and cytochrome oxidase b have demonstrated that the milky stork shares a clade with other *Mycteria*, and forms a sister pair of species with the painted stork. Hybrids between this species and Painted Storks (*M. leucocephala)* have been recorded in Thailand.

Common Name: Yellow-billed Stork
Scientific Name: *Mycteria ibis*

Size: 36–38 inches (95–105 cm); **Wingspan:** 78.7 inches (200 cm)

Habitat: Africa; it is found south of the Sahara, in Madagascar and straggles into Palearctic Africa in Morocco, Tunisia and Egypt.

It frequents a broad variety of wetland types including swamps, reservoirs, margins of rivers and lakes, waterholes, sandbanks, rice paddies, lagoons, alkaline lakes and marine mudflats. It does avoid areas of large-scale flooding, such as in the Sudan. Sometimes, it will nest in towns in west Africa and build colonies near rice-fields in Uganda have been found to be associated with human habitation. It is much rarer in areas of forest, though not uncommon in savanna woodlands. It often roosts on sandbanks and alternatively in trees.

Status: Least Concern.
Global Population: 5,000-6,000 adult individuals. The global population is thought to be declining overall but locally stable. However, in East Africa, it is known to be at risk from poaching and habitat reduction despite abundance and population stability.

Diet: Frogs (often taken when they emerge after rain), small fish, and other small aquatic prey.

It feeds mainly in relatively shallow water. Tactile feeding is typical. It sometimes walks along, repeatedly probing into water with bill, or with head under water for some time. Has been known to scavenge fish regurgitated by cormorants. It is gregarious, but seldom found in large flocks.

Nesting: Its body is white with a short black tail that is glossed green and purple when freshly molted.The bill is deep yellow, slightly decurved at the end and with a rounder cross-section than in other stork species outside the *Mycteria* family. Feathers extend onto the head and neck just behind the eyes, with the face and forehead being covered by deep red skin. Both sexes are similar in appearance, but the male is larger and has a slightly longer heavier bill. Non-breeding adults plumage and the bare parts are duller. The immature is duller, especially on the bare parts. It is dingy brown with dull green bare parts.

It is a seasonal breeder. The season starts towards the end of the rains or, in drier areas, in the dry season (whenever conditions lead to food becoming more concentrated). It is a colonial tree nester, often nesting in mixed colonies with herons and other aquatic bird species. Colonies are generally small, usually small groups of 10–20 pairs (exceptionally up to 50). It creates a small stick nest which is usually high up in a small tree over water or high up in a large tree (such as Acacia, Bombax or baobab). The clutch is usually 2–3 eggs, with the incubation time about 30 days. Chicks have pure white down and fledge after about 55 days. Sexual maturity occurs after about three years.

Cool Facts: The yellow-billed stork has appeared on postage stamps in several African countries.

Common Name: Asian Openbill
Scientific Name: *Anastomus oscitans*

Size: 16.8-31.9 inches (68–81 cm); **Wingspan:** 59 inches (150 cm)

Habitat: Asia; India (northern plains from Gujarat eastward to Assam Valley, and in eastern and southern Peninsula), south Nepal and Sri Lanka to Thailand and Indochina. It has recently colonized southwestern China. Non-breeding populations are found in most of peninsular India, Bangladesh and eastern Pakistan (northeastern Punjab, southern Sind).

It occurs in a variety of wetlands, including lakes, canals, rivers, marshes and occasionally mudflats. Paddyfields are also frequently used, even in the dry season in Thailand when the mud is caked hard. It also has been seen in newly ploughed fields. It may nest near humans.

Status: Least Concern. **Global Population:** Unknown amount of adult individuals with an increasing population trend. In recent years, this species has

rapidly and greatly expanded its distribution in response to forest clearance and the spread of the invasive Golden Apple Snail (*Pomacea canaliculata)*.

Diet: Almost entirely apple snails. It will occasionally take other small aquatic animals, such as frogs, crabs and large insects. In southwestern China, it has been observed taking large snails and freshwater mussels, including Chinese mystery snail (*Cipangopaludina chinensis*), river snail (*Bellamya aeruginosa*) and Chinese pond mussel (*Anodonta woodiana*)

Its specialized bill and technique enables species to exploit abundant source of food, which is inaccessible to most other potential predators. Snails extracted by inserting bill, virtually without damage to shells. Will feed in close association with other large wading birds (such as Cattle Egret, Little Egret, Great White Egret and Gray Heron.

Nesting: It is fairly large, mostly white stork with diagnostic bill showing space between mandibles when closed. The adult has grayish-white plumage with black flight feathers and a black forked tail (but usually hidden by long under-tail-coverts). It has a broad, horn-colored bill. Immatures are smoky brownish gray with a darker mantle. Its bill lacks the curve.

Breeding mostly occurs from July–September in northern India, from November–March in southern India and Sri Lanka (starting at onset of rains) and in the dry season in Thailand, with most egg laying in January. It is a colonial tree nester, sometimes in mixed colonies with herons, cormorants and Painted Stork (*Mycteria leucocephala)*. It creates an unelaborated stick nest with central depression lined with leaves. The nests often very close together, with 100s spread over a few large trees, but may also nest in smaller trees. Normally four eggs are laid (2–5 range). The incubation period is 27–30 days. The chicks have pale fawn-colored down and normal-shaped bill. The fledging period takes 35–36 days.

Cool Facts: Its eggs and young may be taken by monitor lizards, as well as crows and raptors.

Common Name: African Openbill
Scientific Name: *Anastomus lamelligerus*

Size: 31.5-37 inches (80–94 cm); **Wingspan:** 59 inches (150 cm)

Habitat: Africa; south of the Sahara desert and Madagascar. It is an intra-African trans-equatorial migrant, making movements that are triggered by the rains.

The species inhabits freshwater wetlands with shallow waters and a large abundance of aquatic mollusks, including marshes, swamps, rice-fields, flood-plains, the backwaters and margins of lakes or rivers, ponds and streams. It may also frequent moist savanna or burnt grassland, as well as occasionally forest clearings, coastal mudflats and mangrove swamps.

Status: Least Concern.
Global Population: 300,000-500,000 adult individuals with a suspected stable population trend. The species is threatened by habitat loss, entanglement in fishing lines and environmental pollution (e.g. pesticides applied to water for mosquito control). It also suffers from hunting, poaching and the destruction of breeding colonies by villagers on Madagascar.

Diet: Aquatic snails of the genus *Pila*. In different parts of their range, some individuals have been observed to eat freshwater mussels,

terrestrial snails, frogs, crabs, fish, worms and large insects. It is important to note, that none of these are the preferred food choice of the African Openbill, only aquatic snails are.

Most of the snail capture procedure is done underwater or hidden in vegetation, therefore there are still a lot of unknowns surrounding how exactly the African openbill removes the meat from the snail shells. Scientists know that the storks often submerge their head in the water while working on the shells and that they vigorously shake their heads up and down while doing so. This vigorous motion of the head led many scientists to incorrectly conclude the storks were crushing shells. Freshly discarded shells have been collected in multiple studies and have always been found whole, therefore discrediting the hypothesis of the storks breaking the shells to obtain the mollusc meat.

They are believed to remove the snails from their shells by using their bills to pin the snails down long enough for the bird to sever the operculum. This is achieved by using the tip of the upper mandible to hold the snail on the ground and forcing the tip of the lower mandible under the operculum. Once the attachment point has been broken, the stork uses the tip of its bill to grasp onto the snail's body and shakes its head sideways to release the meat from the shell. Finally, the stork swallows the body whole by tossing its head backwards.

Openbills are well known for removing the meat of the mollusks without breaking their fragile shells.

Nesting: The adult plumage is overall black with iridescent green feathers on their backs, coverts and abdomens. The juvenile plumage is usually less vibrant and browner in color with the feathers of the underparts having pale tips. The legs and feet are black. The eyes are gray with gray lores and no distinct coloration of the eye-ring.

It breeds during in the rains when snails (its main prey items) are most readily available. It nests in colonies of various sizes, often with other species. Nesting may only occur in years when local food supplies are plentiful; however, it may not occur regularly at the same site. The species feeds in loose groups that may contain up to 50 well-dispersed individuals; flocks of over 7,000 may also occur in some seasons. It migrates in flocks and roosts communally in trees.

Cool Facts: The gap in the bill of the African openbill was first hypothesized to serve as a nutcracker, crushing the shells of the snails this stork feeds on. Scientists later demonstrated that the bill does not serve this function. Rather the opening between the two mandibles facilitates grasping the shells of the snails. The convergent tips of the mandibles prevent the slipping forward of a spherical object being carried by the storks. The curve in the lower mandible allows the stork to have the perfect angle of attack to force its way under the operculum and release the molluscs from their shells. The bill of the African openbill storks

closely evolved with the bird's specialized diet, allowing for the perfect handling of snails and other mollusks.

There are two subspecies:

- *A. l. lamelligerus lamelligerus.* The nominate subspecies occurs in Africa, south of the Sahara desert (except extreme south).
- *A. l. madagascariensis.* This subspecies is endemic to Madagascar.

Common Name: Abdim's Stork
Scientific Name: *Ciconia abdimii*

Size: 29.5-31.9 inches (75-81 cm); **Wingspan:** 48 inches (122 cm)

Habitat: Africa and Asia; found widely in open habitats in Sub-Saharan Africa and in Yemen. It breeds colonially in trees, on cliffs or rooftops in the northern half of its range (north of the Equator) during the wet season from May to August, migrating to eastern and southern Africa for the remainder of the year.

Normally found in open grassland and also in areas of cultivation. Typically frequents very dry zones, including semi-desert. Migrant flocks descend into

open grassy areas, including airfields and playing-fields. Also, occurs often near water . Roosts on trees or cliffs and often rests beside marshes and pools. Many nest in villages, where their reputation as harbingers of rain protects them from disturbance, so that they are often confiding.It is mostly absent from forests, dense woodlands and deserts.

Status: Least Concern**. Global Population:** 200,000-400,000 individual adults with a decreasing population trend. The species is potentially threatened by habitat degradation through urban development and agricultural activities (such as maize farming) which have reduced the available area of natural grassland. In Namibia it is threatened by habitat degradation through overgrazing and bush encroachment. The species may also be threatened by the control of its principle food source, locusts, either through direct poisoning (a mass mortality event in Sudan may have been the result of extensive use of pesticides), or through a reduction in the availability of food. The species is hunted and traded at traditional medicine markets in Nigeria.

Diet: Mostly insectivorous, feeding on locusts, caterpillars and other large insects, although these birds will also eat small reptiles, amphibians, mice, crabs and eggs.

Nesting: It is a black stork with gray legs, red knees and feet, gray bill and white under parts. It has red facial skin in front of the eye and blue skin near the bill in breeding season. Sexes are alike, although the male is slighter larger than the female.

It usually begins nesting early in the rains, in April through June. It nests in scattered colonies, typically of up to 20 nests. Sometimes, it will nest solitary at edge of its range. Nests are typically built in cliffs or trees, often with other species. Some storks will nest on roofs of village huts. It lays two to three eggs with incubation lasting 28-29 days. Chicks have light gray down and fledging lasts 50–60 days.

Cool Facts: It is the smallest species of stork. The common name commemorates the Turkish Governor of Wadi Halfa in Sudan, Bey El-Arnaut Abdim (1780–1827).

Common Name: African Wooly-necked Stork
Scientific Name: *Ciconia microscelis*

Size: 29.5-36.2 inches (75-92 cm); **Wingspan:** 78.7 inches (200 cm)

Habitat: Africa; it is found in Sub-Saharan Africa from Senegambia east to Eritrea, and south to northern Botswana and eastern South Africa.

It is usually in or by wetlands such as rivers, lakes, flood plains, marshes, flooded pastures, and waterholes. In eastern Africa, it is most common along the coast, feeding at low tide on estuary mudflats, in mangrove swamps, or on coral reefs. Perhaps especially in the southern part of its range, it also occurs in savanna, grassland, and cultivation, attending grass fires. Normally avoids forest, but it does occur in light woodland and forest clearings, usually by streams or rivers, and also in forest marshes. It is found up to 3,000 m elevations in eastern Africa.

Status: Least Concern.
Global Population: 20,000 - 53,000 adult individual with an slightly increasing population trend. It is considered widespread but uncommon across most of its large range. The African Wooly-necked stork is one of the species to which the Agreement on the Conservation of African-Eurasian Migratory Waterbirds (AEWA) applies.

Diet: Fish, frogs, toads, snakes, lizards, large insects and their larvae: including termite alates and army

worms, crabs, reptiles, mollusks, and marine invertebrates.

Nesting: It is an unmistakable stork with glossy black-and-purple plumage and a ‘Wooly’ neck and head. Both sexes are identical with a glistening black plumage, has a black crown that diffuses to white towards the neck, white forehead, and downy white neck; white underparts and under-tail coverts. It has a black fork tail. The tail is usually obscured by long under-tail coverts. In flight shows an obvious white lower belly and under-tail coverts. Immatures are duller and browner and lacks the white forehead.

The nest is a large stick platform with central depression lined with finer twigs and dry grass. The clutch size is 2-4 eggs with the incubation time lasting 30-31 days. Fledging takes 55–65 days.

Cool Facts: This stork gets its name from its ‘Wooly’ appearance of the soft feathers on its neck. It was formerly considered a subspecies of the Asian Wooly-necked stork (*C. episcopus*), and called the Wooly-necked stork, but was split as a distinct species by the International Ornithological Congress in 2023 on the basis of its allopatric range and significant plumage and morphological differences.
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Common Name: Asian Wooly-necked Stork
Scientific Name: *Ciconia episcopus*

Size: 29.5-36.2 inches (75-92 cm); **Wingspan:** 78.7 inches (200 cm)

Habitat: Asia; India, Nepal, Sri Lanka, Bangladesh, Myanmar, Cambodia, Laos, Vietnam, and Indonesia.

The species occurs in natural wetland habitats such as in savanna and grassland, including rivers, streams, lakes, ponds, water-holes, lagoons, dams, flood plains, marshes, and freshwater and peat swamp forests, whilst also using artificial habitats such as rice paddy-fields, flooded pastures, and cultivated fields. The species is also known to use man-made, urban structures such as mobile-towers for nesting, potentially due to their height and increased visibility. It is regular in light woodland or forest clearings in Indochina, however may avoid mature forests. It also frequents coastal mudflats or coral reefs, and can be found up to 1,400 m in Sulawesi and 1,250 m in Nepal.

Status: Near Threatened. **Global Population:** 50,000 - 249,999 mature adults with a declining population trend. The population is suspected to be undergoing a decline at a rate of 20-29% over three generations.The species is threatened by certain levels of urbanization, habitat loss (such as conversion of wetlands to private ponds), fragmentation, cutting of trees nest destruction, and environmental pollution, particularly that of lowland forests with tall trees used for nesting, although much suitable habitat remains that is not inhabited. In Nepal, the species is threatened by habitat loss and degradation, hunting, disturbance and possibly the use of agro-chemicals.

Diet: Fish, frogs, toads, snakes, lizards, large insects and larvae, crabs, mollusks and marine invertebrates.

Nesting: The adult is a largely glossy black bird with a contrasting bright white neck, lower belly, under-tail coverts and tail. The bald face and chin are lead-gray, while the feathered crown and nape are glossy black, and the forehead is variably bare gray skin or feathered in dingy white or gray. The iris is usually bright red. The black bill is straight and tapered with a variable amount of red distally, while the legs and feet are orange-red, sometimes with gray at the tibio-tarsal joint (or "knee").

Juveniles of the nominate subspecies are patterned much like adults, but their plumage is brownish-black where that of adults is glossy black. Juveniles also differ in having a tuft of white feathers on the forehead, dull-colored legs, and a duller bill.

The nest is a large stick platform with central depression lined with finer twigs and dry grass. The clutch size is 2-4 eggs with the incubation time lasting 30-31 days. Fledging takes 55–65 days.

Cool Facts: There are two subspecies:

- *C. e. episcopus.* The nominate subspecies is found in Northern Pakistan (Punjab), and India east through mainland Southeast Asia, and south through the northern Malay Peninsula; Philippines. It differs from race *neglecta* primarily in having bare skin on the forehead (or limited dingy white to gray feathering) and a bright red iris (most birds).
- *C. e. neglecta*. This race is endemic to Southern Sumatra, Java, and Wallacea.It differs primarily in having prominent white to gray feathering on the forehead and a brown iris. The leg color may also be duller.

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Common Name: Storm's Stork
Scientific Name: *Ciconia stormi*

Size: 29.5-35.3 inches (75–91 cm); **Wingspan:** 71 inches (180 cm)

Habitat: Asia; the bulk of the world population of this stork occurs on Borneo; occurring in Kalimantan (Indonesia), Swarak, Sabah (Malaysia) and Brunei. It is also found throughout Sumatra, although its range there was previously considered to be restricted to the south east.

It occurs at low densities in large, undisturbed blocks of level lowland forest, particularly freshwater and peat-swamp forests, on the floodplains of large rivers.

It also frequents disturbed, recently burned and logged areas, and occasionally areas subject to tidal movements, although these may constitute suboptimal habitats and breeding records are confined to primary forest.

Status: Endangered. Global Population: 300 - 1,750 adult individuals with a declining population trend. Although there are no direct population data for this species from which to accurately derive trends, comparing the spread of historic records, with more recent data, indicates that there is no doubt *Ciconia stormi* has greatly contracted its range over the past three generations, with it no longer being found at many sites it once occupied. The landscape-scale removal of swamp and plains-level forests for plantations (principally oil palm, but also rubber) has been the principal driver of this, and while rates of forest loss have recently slowed (especially in Kalimantan), the practice still continues and there is no reason to suspect that this species has ceased declining. Moreover, some populations (especially those in Peninsular Malaysia and, perhaps, on Sumatra) are now so small and isolated, with very little breeding habitat, that they may not be viable population units in the future. Accordingly, the species is inferred to be undergoing a continuing decline.

Diet: Small fish, frogs, aquatic insect larvae, and sometimes earthworms.

This stork typically forages stealthily with slow, deliberate movements and a retracted neck along muddy banks of rivers and creeks within dense primary forest; keeping primarily to the shaded areas. It is generally solitary, but is occasionally found in small groups.

Nesting: It is a medium-sized stork with most of the plumage being black. The under-tail coverts and the back of neck are white with a black cap. It has orange facial skin with a yellow ring surrounding the eye, a red iris, and a pinkish-red bill. On some, but not all male individuals, the culmen of the bill is slightly concave with a basal knob. The legs and feet of adults are dull red, but usually appear paler because they are often covered with the birds' excreta. The bill and other soft body parts darken in the breeding season. The sexes are similar in appearance, but as in all storks, the male appears slightly larger. It is also speculated from field observations that the male's black cap, chest and throat are slightly glossier.

The plumage of the chicks at 1–3 days old is completely white, accompanied by a black crown and a black bill with a yellow-orange tip. The legs, facial skin and gular pouch are initially light yellow; as the chicks age, the legs become pink, and the facial skin becomes dark gray. The iris is initially brown.

This species are typically monogamous. Both parents attend to the young at the nest, but only one parent at a time is usually present; with the female estimated to spend three times as long alone at the nest as the male. Contrary to previous assertions, this species actually appears to breed solitarily and does not nest in

colonies. However, it is sometimes found to roost communally, and several individuals have been observed roosting in tops of tall swamp trees a few kilometers from the nests. Two eggs are usually laid and the chicks are able to fly after c. 90 days.

Cool Facts: It is considered to be the rarest of all storks, and is estimated to number less than 500 wild individuals throughout its geographic range. This species is very similar and closely related to the Asian Wooly-necked stork whose range partially overlaps with that of Storm's stork. Although Storm's stork has long been considered a separate species, it has also been previously treated as a subspecies of the Wooly-necked stork in the more recent past.

Common Name: Maguari Stork
Scientific Name: *Ciconia maguari*

Size: 38–47 inches (97–120 cm); **Wingspan:** 61-71 inches (155-180 cm)

Habitat: South America; it has a relatively wide distribution over much of South America, and occurs primarily to the east of the Andes. It lives in the Llanos of Venezuela and eastern Colombia; Guyana; eastern Bolivia; Paraguay; Brazil, but rarely in the Amazon and the north-east; Uruguay and Argentina. The most southerly part of the range lies in the Chubut province. It more rarely occurs to the west of the Andes (Chile) and probably does not breed there. It is a rare visitor to the Suriname coast from March until May and also been reported as a vagrant on Trinidad and Tobago.

Its habitat largely comprises open lowland and shallow-water wetland such as tropical wet savannah grasslands, marshes, mudflats, and flooded fields. It more occasionally frequents dry fields, but invariably avoids forested regions. Numerous Maguari stork assemblages have been observed in their habitat during the dry season, where they forage in low-level bodies of water where prey is concentrated. The Maguari stork lives in

sympatry with Jabiru and wood stork where the ranges of these three species overlap, especially in the Venezuelan llanos.

Status: Least Concern. **Global Population:** 50,000–100,000 adult individuals with a stable population trend. The primary threats to this species are habitat disturbance and hunting for food. A common human disturbance occurs through habitat destruction via land reclamation from marshes for agriculture, which has occurred especially in southeast Brazil and may therefore evoke conservation concern for the species in this area. Claiming land for agriculture by digging canals, together with land filling and sewage discharges may also threaten dry-season foraging environments for maguari storks especially on the northern Rio de Janeiro coast. The maguari stork is vulnerable to nesting habitat destruction because it shows nest-site fidelity, and will continue to nest in the same place even after onset of recent anthropogenic disturbance.Use of pesticides may also adversely affect the health and breeding success of this species. The capture of individuals for food presents another survival threat and occurs particularly in the Southern Amazon and Venezuela.

Natural enemies of this stork include boa constrictors and crested caracaras, both of which eat this species' eggs.

Diet: Fish, frogs, eels, earthworms, invertebrates, insect larvae, snakes, freshwater crabs, small mammals such as rats, and bird eggs. More rarely, it may take smaller birds.

Especially during the breeding season, the maguari stork forages solitarily or in pairs. However, it may also feed in larger aggregations outside the breeding season, often in association with other wading bird species. Because prey are concentrated in the shallowness of these pools, tactile foraging would be highly efficient in this situation.

Nesting: The adult plumage is white, with black flight feathers and a forked blacked tail which is shorter than the stiff white under-tail coverts, so that these protrude from underneath the tail and may function aerodynamically in flight. The forked tail clearly distinguishes this stork from the white stork, and is easily observed in flight from the ground thanks to the white under-tail coverts.

Unlike other stork species, this stork is commonly found to nest on the ground, whereas many other stork species habitually nest at higher elevation. The nest always lies near to shallow water amongst tall grass and reeds, since aquatic organisms form the bulk of the nestlings' diet. The maguari stork's nest is also unusual in extensively comprising grass and reeds. Common species used in nest fabrication include the reed *Cyperus giganteus* and the marsh grass *Zizianopsis bonariensis*, alongside other aquatic plants. It is primarily a colonial nester, although it also less frequently nests solitarily. Colonies typically consist

of 5-15 nests, some of which are within 50 cm apart in tree colonies, but at different heights. The clutch size is typically 2-4 eggs.

Cool Facts: During flight, this stork offers an impressive sight. It soars at least a hundred meters above the ground with an outstretched neck and extended legs, intermittently beating its broad wings to gain momentum for long glides. It flaps its wings at a rate of 181 beats per minute. This stork needs to make three long jumps before it can take off from the ground.

Common Name: Black Stork
Scientific Name: *Ciconia nigra*

Size: 37-39 inches (95–100 cm); **Wingspan:** 57-61 inches (145-155 cm)

Habitat: Africa and Eurasia; it breeds in scattered locations across Europe (predominantly in Portugal and Spain, and central and eastern parts), and east across the Palearctic to the Pacific Ocean. It is a long-distance migrant, with European populations wintering in tropical Sub-Saharan Africa, and Asian populations in the Indian subcontinent. When migrating between Europe and Africa, it avoids crossing broad expanses of the Mediterranean Sea and detours via the Levant in the east, the Strait of Sicily in the center, or the Strait of Gibraltar in the west. An isolated non-migratory population lives in Southern Africa.

It prefers wooded areas, and breeds in large marshy wetlands with interspersed coniferous or broadleaved woodlands. It usually inhabits ponds, rivers, edges of lakes, estuaries and other freshwater wetlands. It will go to more agricultural areas in the Caspian lowlands, but even here it avoids close contact with people. Its wintering habitat in India comprises reservoirs or rivers with nearby scrub or forest, which provide trees that black storks can roost in at night. In southern Africa it is found in shallow water in rivers or lakes, or swamps, but is occasionally encountered on dry land.

Status: Least Concern**. Global Population:** 24,000–44,000 adult individuals with a stable population trend. It is considered to be a

species of least concern by the International Union for Conservation of Nature, but its actual status is uncertain. Despite its large range, it is nowhere abundant, and it appears to be declining in parts of its range, such as in India, China and parts of Western Europe, though increasing in others such as the Iberian Peninsula. Various conservation measures have been taken for the black stork, like the Conservation Action Plan for African black storks by Wetlands International. It is also protected under the African-Eurasian Waterbird Agreement and the Convention on International Trade in Endangered Species of Wild Fauna and Flora. On 31 May 1968, South Korea designated the species as natural monument 200.

Diet: Amphibians, small fish and insects.

It is a shy and wary species. It is seen singly or in pairs, usually in marshy areas, rivers or inland waters.

Nesting: The sexes are identical in appearance, except that males are larger than females on average. It has long red legs, a long neck and a long, straight, pointed red beak. The plumage is black with a purplish green sheen, except for the white lower breast, belly, armpits, auxiliaries and under-tail coverts. The breast feathers are long and shaggy, forming a ruff which is used in some courtship displays. It has brown irises, and bare red skin around its eyes. Molting takes place in spring, with the iridescent sheen brighter in new plumage. The juvenile resembles the adult in plumage, but the areas corresponding to the adult black feathers are browner and less glossy. The scapulars, wing and upper tail coverts have pale tips. The legs, bill and bare skin around the eyes are grayish green.

Breeding pairs usually build nests in large forest trees, most commonly deciduous but also coniferous, which can be seen from long distances, as well as on large boulders, or under overhanging ledges in mountainous areas. The female lays two to five grayish-white eggs, which become soiled over time in the nest. Incubation takes 32 to 38 days, with both sexes sharing duties, and fledging takes 60 to 71 days.

Cool Facts: It was first described by Carl Linnaeus in the 10th edition of his Systema Naturae.

Common Name: Black-necked Stork
Scientific Name: *Ephippiorhynchus asiaticus*

Size: inches (110–137 cm); **Wingspan:** inches (190–218 cm)

Habitat: Asia and Oceania; it is found in southern and eastern Pakistan, Nepal, India, Sri Lanka and mainland southeastern Asia. Race *australis* is endemic to southern New Guinea, northern and eastern Australia.

It chiefly frequents and requires extensive, comparatively undisturbed freshwater wetlands, including swamps, rivers, oxbow lakes, lagoons, flooded grasslands, water meadows and billabongs. It also occurs at times on dry floodplains, irrigated crops (especially rice paddies, and in open, grassy woodlands). It is not usually found along the coast, or frequenting mangroves, mudflats, beaches, salt marshes and tidal creeks. In arid parts of Australia, it frequents small artificial water bodies, including farm water supplies, irrigation storage and sewage ponds.

Status: Near Threatened. **Global Population:** 11,000 -21,000 adult individuals with a declining population trend. The nominate species population is estimated at approximately 1,000 individuals and Race *australis* with 10,000-20,000. It is

threatened by habitat loss due to conversion of wetlands to fields, felling of nest-trees, overfishing, overgrazing, hunting and excessive capture for zoos. Conservation efforts in Uttar Pradesh, India, which have involved retention of wetlands and nest-trees have benefited the species.

Diet: Fish, including eels and catfish, but also frogs, snakes, hatchling turtles, freshwater turtles and their eggs, crabs, prawns, molluscs, beetles and other arthropods. It has been known to capture waterbirds, including Little Grebe (*Tachybaptus ruficollis*) and Common Coot (*Fulica atra*), which were swallowed whole.

It usually feeds in shallow water, up to 0.5 m deep, probing or sweeping bill side to side and stabbing at prey. It also waits motionless in areas with clear water; sometimes dashes around or jumps up in an awkward manner to snatch prey. Snakes are battered or skewered to death.

Nesting: Adult birds of both sexes have a heavy bill and are patterned in white and irridescent blacks, but the sexes differ in the color of the iris with females sporting yellow irises and males having dark-colored irises.

It nests in trees, usually in a secluded part of swamp in south parts of range, but frequently at sites surrounded by cultivation in India. The clutch size normally 2–3 eggs. Chicks have gray down when hatched an the fledging period is 100–115 days.

Cool Facts: There are two subspecies:

- *E. a. asiaticus.* The nominate subspecies is found in southern and eastern Pakistan, Nepal, India, Sri Lanka and mainland southeastern Asia; formerly to Malay Peninsula (now extirpated).
- *E. a. australis*. This subspecies is endemic to southern New Guinea, northern and eastern Australia. In Australia, it is known as a ‘jabiru’ although that name refers to a stork species found in the Americas. It is one of the few storks that are strongly territorial when feeding and breeding.

Common Name: Saddle-billed Stork
Scientific Name: *Ephippiorhynchus senegalensis*

Size: 59 inches (150 cm); **Wingspan:** 98 inches (250 cm)

Habitat: Africa; the core of the range is from Uganda and Kenya to northern Botswana, Namibia, and extreme eastern South Africa. Aside from vagrants or dispersing immatures, it is absent from the desert southwest of the continent. Populations from Chad and Central African Republic to coastal Senegal are primarily restricted to the edge of the Sahel, where historic declines have left populations highly fragmented with questionable connectivity.

It is found in a variety of open freshwater and saltwater wetlands, including rivers, lakes, floodplains, swamps, marshes, pans, and estuaries.

Status: Least Concern. **Global Population:** 17,000 mature individuals with a declining population trend. Wetland and waterway degradation has negatively affected some populations, especially in West Africa. Compounded impacts in Mali's Inner Niger Delta included overfishing following the introduction of nylon

nets in the 1960s, and dam construction upstream that altered the flooding regime. Additionally, years-long drought in the Sahel region beginning in the 1970s probably contributed to extirpation in Mali. Damming of the Senegal, White Volta, and Oti Rivers in West Africa seems to have similarly caused declines and/or local extirpations. Conversely, the species seems to have disappeared from Namibia's Nyae Nyae Conservancy since 2000 following an increase in surface water. Thus, it seems it is sensitive to hydrological changes that affect preferred foraging habitat (not too much water and not too little).

Diet: Aquatic prey such as fish, mollusks, frogs, and crustaceans, but it is also known to eat reptiles, small mammals, young birds, and insects.

Foraging can occur singly or in groups depending on prey availability. Typical foraging is tactile and involves moving slowly through the water while probing substrate, vegetation, and the water column. When prey is felt with the bill it snaps shut, is raised from the water, and the prey item is tossed backward into the esophagus

Nesting: Adults have a black head, neck, upper wing coverts, tail, and upper and under-wing coverts which form a longitudinal band. The flight feathers and marginal and primary coverts are white, as are the back and underside. The black feathers, especially of the head and neck, have a purple to green iridescence in certain lighting conditions. Iridescence in head and neck plumage is more pronounced during breeding, which is the only distinguishable characteristic between non-breeding and breeding plumage. Eye-color varies by sex: males have a dark brown iris, while females have a yellow iris. In addition, there is usually bare skin around the eye that is red in color.

It generally times its breeding so chicks fledge during the dry season when foraging is optimal. Reproduction therefore seems to be dependent on rainfall, which means they may not necessarily breed every year. Nests are large, flat platforms made mostly of sticks placed high in trees. The clutch size is 2-3 eggs. The incubation period is 30–35 days with fledging occurring at around 70 days.

Cool Facts: It is named for the yellow, fleshy patch at the dorsal base of the bill, a characteristic unique in the stork family. This species, or closely related ones, are known from numerous fossils in North Africa, where it was historically widespread. As recently as about 4,500 years ago, it was found in the Egyptian Nile Delta, where its occurrence was captured in hieroglyphs and artwork by ancient Egyptians.

Common Name: Lesser Adjutant
Scientific Name: *Leptoptilos javanicus*

Size: inches (110-120 cm); **Wingspan:** 80 inches (200 cm)

Habitat: Asia; it is endemic to Nepal, India and Sri Lanka to southern China (now probably extinct), Indochina, Greater Sundas and Bali.

It prefers mangroves, mudflats, coastal swamp, marshes, flooded grassland, lakes, paddy fields. It is much more coastal than the Greater Adjutant (*L. dubius*).

Status: Near Threatened.
Global Population: 8,000-15,000 adult individuals with a declining population trend. This is due to persistent and unregulated harvesting of eggs and chicks at colonies, loss of nesting trees and loss and degradation of wetland habitats.

Diet: Fish (especially mudskippers), but also frogs, reptiles, crustaceans, locusts, rats and some carrion.

It walks, searches and probes, when trying to catch mudskippers. It often thrusts its head, and even sometimes most of neck into mud, when probing. On mudflats, it tends to feed along water's edge, often one bird every about 50 m.

Nesting: It has a bony plate on its crown and lacks pendant air sac. It differs from the Greater Adjutant (*L. dubius*) in retaining dark slaty blue-black upper-parts during breeding; inner greater upper-wing coverts narrowly edged white; under-tail

coverts are pure white (dark tipped in *L. dubius*). The non-breeding adult has bare parts duller. The immature has duller upper-parts and more feathering on neck.

Breeding season occurs November through January in Assam, January through February in Chhattisgarh, India, on Sumatra, May, September and October on Borneo. It is a tree nester in colonies, sometimes with other species, such as *Mycteria cinerea* and *L. dubius.* It builds a large stick nest in large tree, such as silk cotton or typically in mangroves. Normally, three eggs are laid.

Cool Facts: A lesser adjutant paired and hybridized with a painted stork at Dehiwala Zoo, Sri Lanka and at Kuala Lumpur Zoo. The hybrid young had plumage and bill-size of the adjutant, but stance and bill shape of the painted stork.

Most storks fly with their neck outstretched, but the three Leptoptilos species retract their neck in flight as herons do, possibly due to the heavy bill.

Common Name: Greater Adjutant
Scientific Name: *Leptoptilos dubius*

Size: 57-59 inches (145–150 cm); **Wingspan:** 98 inches (250 cm)

Habitat: Asia; Eastern Nepal, Northern India (modern-day records only from Assam Valley, Westeren Bengal, Bihar, and Eastern Uttar Pradesh) and Northern Bangladesh, and Indochina (principally in Cambodia); breeding now probably restricted to Assam, Bihar and Cambodia.

Status: Near Threatened to Endangered.
Global Population: 1,000 adult individuals with a declining population tend. Conservation measures have included attempts to breed them in captivity and to reduce fatalities to young at their natural nesting sites. Nearly 15% of the chicks are killed when they fall off the nests and die of starvation, so some conservationists have used nets positioned below the nests to prevent injuries to falling young. These fallen birds are then fed and raised in enclosures for about five months and then released to join their wild siblings.

In Kamrup district, Assam, which is home to one of the few large colonies of greater adjutants, outreach efforts including cultural and religious programming, especially aimed at village women, have rallied residents to conserve the birds. The locals, who formerly regarded the birds as pests, now see the storks as special and take pride in protecting them and the trees in which they breed. Locals have even added prayers for the safety of the storks to hymns, and included stork designs to the motifs used in traditional weaving. Similar measures have been used with success in other parts of India where adjutants breed.

Diet: Carrion and large fish.

During the day, it soars in thermals along with vultures with whom it shares the habit of scavenging.

Nesting: It is a huge, dark-colored stork with very heavy, dark-based pale bill and pendulous saffron-yellow neck-pouch. Its forehead and face are mostly dark brown or blackish, but its head and neck are redder. The head covered with dark scabs of dried blood. It has pale gray greater coverts and tertials contrasting with otherwise dark upper-wings. The under-wing-coverts are paler than the flight feathers, with fine white fringes to the wing-linings. It has a white axillary spur. The legs are dark (with reddish upper tibia in breeding season), but appear whitish or gray, due to urohydrosis, as in all Leptoptilos. It has a much heavier bill than *L. javanicus,* which is smaller, lacks neck pouch, has black greater coverts and tertials. Non-breeding adult has its upper-parts darker and blacker.

The greater adjutant breeds during winter in colonies that may include other large waterbirds such as the spot-billed pelican. The nest is a large platform of twigs placed at the end of a near-horizontal branch of a tall tree. Nests are rarely placed in forks near the center of a tree, allowing the birds to fly easily from and to the nests.

The beginning of the breeding season is marked by several birds congregating and trying to occupy a tree. While crowding at these sites, male birds mark out their nesting territories, chasing away others and frequently pointing their bill upwards while clattering them. They may also arch their body and hold their wings half open and drooped. When a female perches nearby, the male plucks fresh twigs and places it before her. The male may also grasp the tarsus of the female with the bill or hold his bill close to her in a preening gesture. A female that has paired holds the bill and head to the breast of the male and the male locks her by holding his bill over her neck. Other displays include simultaneous bill raising and lowering by a pair.

The clutch, usually of three or four white eggs, is laid at intervals of one or two days and incubation begins after the first egg is laid. Both parents incubate and the eggs hatch at intervals of one or two days, each taking about 35 days from the date of laying. Adults at the nest have their legs covered with their droppings and this behaviour termed as urohidrosis is believed to aid in cooling during hot weather. Adults may also spread out their wings and shade the chicks. The chicks are fed at the nest for about five months.The chicks double in size in a week and can stand and walk on the nest platform when they are a month old. At five weeks, the juveniles leap frequently and can defend themselves. The parent birds leave the young along for longer periods at nest at this stage. The young birds leave the nest and fly around the colony when about four months but continue to be fed occasionally by the parents.

Cool Facts: The English name is derived from their stiff "military" gait when walking on the ground (see adjutant). Most storks fly with their neck outstretched, but the three Leptoptilos species retract their neck in flight as herons do, possibly due to the heavy bill.

Common Name: Marabou Stork
Scientific Name: *Leptoptilos crumenifer*

Size: 45.3-59.8 inches (115–152 cm); **Wingspan:** 88.8-113 inches (225–287 cm)

Habitat: Africa; western Somalia and southward to Namibia and northern and eastern South Africa (Northern Cape, Free State, KwaZulu-Natal).

It frequents open dry savanna, grassland, swamps, river banks, lake shores and receding pools. It is seldom encountered in forest or desert. In eastern and central Africa numbers are frequently present near human habitation (in and around fishing villages, slaughterhouses and rubbish dumps).

Status: Least Concern. **Global Population:** 10,000 adult individuals with a stable population trend. Its ugly appearance and habits may have made it less attractive to potential hunters. It is also sometimes protected both by local superstitions and by a realization that it helpful in cleaning up carcasses and rubbish, thus helping to control disease; in the 1990s a plan to poison the birds at Kampala, Uganda, was canceled following objections by the local people.

Diet: Carrion as well as scraps of fish and other food discarded by humans, which is often scavenged at refuse dumps. A wide diversity of vertebrate and invertebrate prey is also taken, including fish, termites, locusts, frogs, lizards, rats, mice, snakes and birds. These last include locally both adult and young flamingos, captured at the flamingo nesting

colonies.

Numbers may attend alongside vultures at carcasses of large mammals killed by predators. The bill is unsuited for dismembering carcasses so it normally steals scraps from vultures or snatches up morsels that are dropped. Fishing is often conducted with the submerged bill partly open and so is then probably tactile. It also fishes by sight, and sometimes walks about in shallows, repeatedly jabbing the bill into water. It has been reported to associate at times associates with herds of large herbivorous mammals, capturing insects that the mammals disturb by their movements.

Nesting: It is unmistakable due to its size, bare head and neck, black back, and white under-parts. It has a huge bill, a pink gular sac at its throat (*crumeniferus* meaning "carrier of a pouch for money"), a neck ruff, and white legs and black wings. The sexes are alike, but the young bird is browner and has a smaller bill.

The breeding season in the tropics normally begins in the dry season and ends in the rains. However, it is more variable in the equatorial zone, where dry seasons much shorter. The nesting success of the outpost population in Swaziland is closely associated with rainfall, with nests started late in the season exposed to higher rainfall and showing lower success. Colonies are typically of 20–60 pairs but may be as large as several thousand pairs. Nests are often mixed with those of other species, especially other *Ciconiiformes*.

It nests are usually in trees, 10–30 m off ground; also on cliffs and even in main streets of towns. The clutch size is normally 2–3 eggs with the incubation period lasting 29–31 days. Chicks have pale grqy, then white down. Fledging occurs after about 95–115 days. Sexual maturity is apparently reached after at least 4 years.

Cool Facts: The common name marabou is thought to be derived from the Arabic word *murābit* meaning quiet or hermit-like. The species was originally described as *Ciconia crumenifera*. When the species was moved into the genus *Leptoptilos*, the ending was modified to *crumeniferus* and this was used by many authors until it was noted that the correct masculine ending to match the genus is *crumenifer*.

Special Thanks to my beta testers…

Alisa and Flinthawk

Where are the Five Remaining Storks?

The remaining storks not included in this set can be found here:

- Songbird ReMix Shorebirds v1: Wading Birds (Jabiru, Painted Stork, White Stork and Wood Stork)
- Songbird ReMix Shorebirds v4: More Wading Birds (Oriental Stork)

Species Accuracy and Reference Materials

Many birds of the same species do vary considerably in color. This package tries to emulate the colors and markings in the most commonly found variants.

The author-artist has tried to make these species as accurate to their real life counterparts as possible. With the use of one generic model to create dozens of unique bird species, some give and take is bound to occur. The texture maps were created in Painter with as much accuracy as possible. Photographic references from photographs from various Internet searches and several field guides were used.

Field Guide Sources:

- **Wikipedia** (https://www.wikipedia.org)
- **BirdForum.net** (http://www.birdforum.net)
- **Birdlife International** (http://www.birdlife.org)
- **Cornell Labs Birds of the World** (https://birdsoftheworld.org/bow/home)

Other Resources:

- **Songbird ReMix.com**
- **Songbird ReMix on Facebook**


Songbird ReMix
Merchandise
PENGUINS
Spix's Macaw
www.empken.com/store