

# Avian Models for 3D Applications

Characters and Texture Mapping by Ken Gilliland

## Songbird ReMix

# BIRDS of PREY

## Volume IV: Eagles of the World

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## Songbird ReMix

# BIRDS of PREY

## Volume IV: Eagles of the World

### Introduction

Eagles are large and powerfully built birds of prey. They have elongated heads, heavy beaks and long, broad wings. There are sixty species of eagles; most of which are found in Eurasia and Africa. Outside this area, just fourteen species can be found – two in the United States and Canada, nine in Central and South America, and three in Australia.

Eagles are informally divided into four groups; Fish Eagles, Booted Eagles, Snake Eagles, and Harpy Eagles. Sea eagles or fish eagles take fish as a large part of their diets, either fresh or as carrion. Booted eagles or "true eagles" have feathered lower legs. Snake or serpent eagles are adapted to hunting reptiles. Harpy eagles or "giant forest eagles" are large crested eagles that inhabit tropical forests.

Eagles throughout history have been icons of strength. From national symbols to the sports teams and rock group, eagles are well represented in many cultures in a variety of ways. The Eagle represents spiritual protection, carries prayers, and brings strength, courage, wisdom, illumination of spirit, healing, creation, and knowledge of magic. The eagle has an ability to see hidden spiritual truths, rising above the material to see the spiritual. The eagle has an ability to see the overall pattern, and the connection to spirit guides and teachers. The eagle represents great power and balance, dignity with grace, a connection with higher truths, intuition and a creative spirit grace achieved through knowledge and hard work.

### Overview

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):
  - ***Birds of Prey (Order Falconiformes)***
- **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".

## 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

Physical-based renderers such as **Iray** and **Superfly** require more CPU and memory horsepower than the legacy renderers for DAZ-Studio and Poser because of ray-trace bounces and higher resolution meshes needed for displacement. Superfly, in particular, may crash *especially* when using the GPU-based options. The best solution is to render using one of the CPU-based options. Limiting the number of ray-trace bounces by setting "Pixel Samples" to "2" or "1" will also reduce crashes and speed renders. Of course, upgrading memory and your CPU will also help.

## Where to find your birds

Type Folder	Bird Species
<b>Birds of Prey (Order Falconiformes)</b>	African Crowned Hawk-eagle African Fish-eagle Bald Eagle Crested Serpent-eagle Golden Eagle Greater Spotted Eagle Harpy Eagle Martial Eagle Mountain Hawk-eagle Ornate Hawk-eagle Pallas's Fish-eagle Philippine Eagle Short-toed Snake-eagle Steppe Eagle Wedge-tailed Eagle



## Where to find your poses

Type Folder	For what species?
Birds of Prey (Order Falconiformes)	All Birds of Prey

## Morphs and their Use

All Songbird ReMix models have morphs that change the look of the loaded model to achieve additional movements and expressions that joint movements can't achieve. These are referred to in the Songbird ReMix model as "Action Morphs". Other morphs that are included can subtly or sometimes dramatically, alter the model to resemble specific species. These morphs are referred to as "Creation Morphs".

Here is a brief explanation of where the morphs are found and what they do:

### BODY section:

- **Action Morphs**
  - **Common Controls**
    - BeakOpenClose- Controls the opening and closing of the bill
    - EyesFwdBack - Controls the forward and backward movement of the eyes
    - EyesUpDown - Controls the up and down movement of the eyes
    - EyeLidsCloseOpen - Controls the opening and closing of both eyelids. Dialing to -1 will give a rounded eye shape. The individual EyeWink controls should not be used in conjunction with this morph.
    - WingsFold- Puts both Wings into a folded position. Dialing numbers between 0 and 1 sometimes will give geometry issues (intersections, odd shapes) due to the nature of the complex morph.
    - TailFeathersSpread – Controls the tail feather fanning action.
    - Breast Out - Moves the breast out.
  - **Wing and Tail Controls**
    - These controls allow both wings and each individual wing to perform numerous wing actions and also allows the Tail feather action of cupping.
  - **Neck Bending**
    - These controls allow global bending, twisting and moving side-to-side of the seven neck sections. Partial bending controls can also be found in each individual neck section. There is also a control to scrunch and stretch the neck.
  - **Head Controls**
    - Exp-Smile- Creates a smile expression.

- Exp-Frown- Creates a frown expression.
- **Eyelid Movement Section**- has individual controls for left and right EyeWink. These individual EyeWink controls will not work properly when the master EyeLidsCloseOpen morph is used.
- **Tongue Movement Section**- various morphs control the movement of the tongue.
- **Crest Controls** (these controls are only used with crested eagles and will be non-operational if none of the crest morphs in “Creation Morphs” are active.)
  - CrestDown- Pulls the crest feathers down along the back of the head.
  - FeatherLength- Controls the length of the crest feathers.
  - FeatherWidth- Controls the width of the crest feathers.
  - CrestDisplay- Fans the crest feathers
  - MidFeatherLength- Lengthens the middle feathers of the crest.
  - MidFeatherFwd- Pulls the middle feathers of the crest forward.
  - TopFeatherAskew- Moves the middle feather of the crest askew.
- **Feather Fluff Controls**
  - **Head & Neck**
    - BlowBack- Pulls the fluff feathers from hip to head back.
    - FluffHead- Fluffs up all head feathers.
    - CrestFluffUp- Pulls the head feathers up/out.
    - CrestFluffLength- Controls the length of the head feathers.
    - CrestFluffHide- Hides the head feathers.
    - BackHdFluffUp- Pulls the back head feathers up/out.
    - BackHdFluffLength- Controls the length of the back head feathers.
    - BackHdFluffHide- Hides the back head feathers.
    - JowlFluffOut- Pulls the feathers under the eye area (jowls) out.
    - JowlFluffLength- Controls the length of the jowl feathers.
    - JowlFluffHide- Hides the jowl feathers.
    - ThroatFluffOut- Pulls the feathers on the throat area out.
    - ThroatFluffLength- Controls the length of the throat feathers.
    - ThroatFluffHide- Hides the throat feathers.
    - NeckFluffLength- Controls the length of the neck feathers.
    - NeckFluffOut- Pulls the neck feathers up/out.
    - NeckFluffDroop- Droops the front facing neck feathers.
  - **Main Body**
    - BreastFeathersOut- Pulls the breast feathers out.
    - BreastFluffSidesIn- Pulls the breast feathers sides in so they don’t intersect with folded wings.
    - RaiseBackFeathers- Ruffles the feathers on the back of the bird.
    - FlankFluffLength- Controls the length of the flank feathers.
    - FlankFluffOut- Pulls the flank feathers out (not recommended when wings are folded).
    - RumpTopFluff- Controls the transparency feathers on the topside rump/tail of the bird.

- RumpBtmFluff- Controls the transparency feathers on the underside rump/tail of the bird.
  - RumpFluffSides-Reduces the Fluff on the sides of the rump. Useful when wings are folded.
- **Thighs**
  - ThighFluffBack- Pulls the thigh feathers back on the thighs.
  - ThighFluffOut- Pulls the thigh feathers out to be more fluffy.
  - ThighFluffLength- Controls the length of the thigh fluff.
  - ExpandAnkleBell- Expands the width of the ankle feathers. This control will only work when the “HideShinFeathers” morph in “Creation Morphs” is inactive.
- **Correction Morphs**
  - ThighsIn4Flight - Reduces the thigh lumps caused when legs are brought fully back for flight. This morph should only be used if BOTH thighs are pulled backward for flight.
  - lShinFluffFootUp & rShinFluffFootUp. Raises and lowers the ankle feathers to mitigate feather/foot intersections. These controls will only work when the “HideShinFeathers” morph in “Creation Morphs” is inactive.
- **Creation Morphs**
  - **Common Controls**
    - Sleeker- Thins the torso of the bird.
    - AddBulkTorso- Adds bulk to the torso of the bird.
    - AddBulkThighs- Adds bulk to the thighs of the bird.
    - BreastIn- Reduces/Adds to breast shapes.
    - BreastCrease- Creates a center crease on the breast.
    - BackFlutter- Reduces the curve on the back.
    - RumpAddBulk- Adds bulk to the lower portion of the rump.
    - RumpSleeker- Streamlines the Hip-to-Tail Sections.
    - RumpShorten- Reduces/adds to the length of the rump and tail sections.
    - RumpTaper- Reduces the width of the rump and tail sections.
    - RumpTopFluffWidth- Controls the width of the feathers on the topside rump/tail of the bird.
    - RumpTopFluffExtend- Controls the length of the feathers on the topside rump/tail of the bird.
    - RumpBtmFluffExtend- Controls the length of the feathers on the underside rump/tail of the bird.
    - LegLength- Allows lengthening of the legs.
    - LegThickness- Increases the girth of the shins.
    - FootSize- Controls the size of the feet.
    - MassiveTalons- Lengthens the talons.
    - HideShinFluff- This removes the fluff from the shins for non-“booted” eagles. This morph also makes “ExpandAnkleBell” and the “ShinFluffFootUp” morphs inactive.

- **Species Crest Shapes-** These morphs create very specific looks to resemble certain species. Using any of these morphs will unlock the morphs found in “Crest Controls” in the “Actions Morphs” section.
  - AfrCrownedUnhide- Used with the African Crowned eagle.
  - AfrHarrierCrestUnhide- For use with the African Harrier-hawk.
  - CrestedEagleUnhide-- Used with Crested eagles.
  - HarpyCrestUnhide- Used with Harpy Crested-like eagles.
  - LowCrestUnhide- Used with low-crested eagles.
  - PhilippineEagleUnhide- Used with the Philippine eagle. It creates a lion’s mane-like crest.
- **Head Shaping**
  - **Head Shapes-** These morphs control the shape of the head.
    - Hd-BigHead- Makes the head and neck parts around 30% larger
    - Hd-WedgeHead- Tapers the head from bill to back of head.
    - Hd-Rounder- Adds to the width of the head.
    - Hd-PuffOutBHead- Adds to the width of the back portions of the head.
    - Hd-ThickenUpperNeck- Adds bulk to the upper neck.
    - Hd-ThickenNeckSides- Adds bulk to the sides of the upper neck.
    - Hd-FillOutNeck- Adds bulk to the sides of the whole neck.
    - Hd-FlattenCrown- Flattens the crown of the head.
    - Hd-RaiseCrown- Raises the crown of the head.
    - Hd-ForeheadLow- Reduces the forehead extending to the beak.
    - Hd-NoForehead- Reduces the forehead portion and expands the beak.
    - Hd-ForeheadOut- Adds to the forehead extending to the beak.
    - Hd-Nostrillump- Adds or subtracts from the forehead/beak area.
    - Hd-BackHeadDown- Reduces/slopes the back of the head to neck.
    - Hd-BackHeadUp- Expands/angles the back of the head to neck.
    - Hd-BigBrows- Expands the eyebrow area out.
    - Hd-BrowDownFront- Angles the front of the eyebrow area down.
    - Hd-BigBrowFwd- Expands the entire brow area forward.
    - Hd-ExpandJowls- Thickens the jowl/cheek area.
    - Hd-ForeheadSplit- Adds a center crease to the forehead area.
    - HawkHead- Shapes the head for Hawks.
    - SuperOrbitalRidges- Makes Super-orbital Ridges (common in many Birds of Prey, especially eagles) more pronounced.
  - **Eye Shapes-** These morphs can change the appearance of the eyes.
    - Ey-Dilate- Controls the pupil size of the eyes.
    - Ey-BiggerEyes- Makes eyes about 20% larger.
  - **Beak Shapes-** These morphs can change the appearance of the bill.
    - Bk-Length- Controls the length of the beak.
    - Bk-Height- Controls the height of the beak.
    - Bk-Width- Controls the width of the beak.



- Bk-SidesIn- Controls the width of the mid-portion of the beak.
- Bk-UpperRounder- Rounds the top of the upper beak.
- Bk-UpperFlatter- Flattens/angles the top of the upper beak.
- Bk-UpperBeakCurve- Adds some curving to the mouth edge of the upper beak.
- Bk-UpperBeakRaiseEnd—Raise the end of the upper beak giving an eagle-like shape.
- Bk-TomialTooth- Adds the tomial tooth found in the falcon family.
- Bk-Notch- Adds a beak notch common in the hawk family.
- Bk-Hook- Extends the hook on the upper beak.
- Bk-CornersBack- Moves the corners of the beak forward or back.
- **Nostril Shapes**
  - Bk-MoveNostrils- Moves the nostrils on the bill forward and back.
  - Bk-ThinNostrils- thins the nostrils.
  - Bk-NostrilLength- makes the nostrils longer.
  - Bk-TearDropNostril- makes the nostrils more of a comma-type shape.
  - Bk-VerticalNostril- makes the nostrils shape a vertical slit rather than it's default more horizontal shape.
- **Tongue Shapes**
  - Tng-Length- Controls the length of the tongue.
  - Tng-Width- Controls the width of the tongue.
- **Wing Shapes-** These morphs control the shape of the wings.
  - WingSpan- Allows control of Wing Length.
  - WingWidth- Expands the width of the wings.
  - WingsPoint- Brings the tips of the wings to a point.
  - HawkWingShape1- Controls the shape of the leading primary flight feathers
  - HawkWingShape2- Controls the shape of the secondary flight feathers
- **Tail Shapes-** These morphs control the shape of the tail feathers.
  - TailFanStyle- Creates the shape of the tail spread. 1=Fan, 0=Wedge,
  - Length- Controls the length of the tail feathers.
  - Width- Controls the width of the tail feathers.
  - Round- Rounds the tail feathers.
  - SplitTailFeathers- Creates a wedge-shape for the tail feathers.
  - GraduatedTail- Graduates the tail feathers length from short (outside) to long (inside).
  - SquareEnds- Makes tail feathers have square ends.
- **Scale-** Controls the size of the model. The scale is proportional to the standard human characters in Poser and DAZ Studio.

**Songbird ReMix**

# **BIRDS of PREY**

Volume IV: Eagles of the World

## **Field Guide**

### **Sea or Fish Eagles**

Bald Eagle  
African Fish-eagle  
Pallas's Fish-eagle

### **Booted Eagles**

Golden Eagle  
Greater Spotted Eagle  
Martial Eagle  
Steppe Eagle  
Wedge-tailed Eagle

### **Snake Eagles**

Philippine Eagle  
Short-toed Snake-eagle  
Crested Serpent-eagle

### **Harpy or Giant Forest Eagles**

Harpy Eagle  
Mountain Hawk-eagle  
Ornate Hawk-eagle  
African Crowned Hawk-eagle

**Common Name:** Bald Eagle

**Scientific Name:** *Haliaeetus leucocephalus*

**Size:** 28-40 inches (70-102 cm); **Wingspan:** 69-89 inches (180-230 cm)

**Habitat:** North America; breeds in Canada, USA, Mexico, and the French island territories of Saint Pierre and Miquelon. It is considered a vagrant in Belize, Bermuda, Ireland, Puerto Rico, and the US Virgin Islands. Bald eagles will also congregate in certain locations in winter. From November until February, one to two thousand birds winter in Squamish, British Columbia, about halfway between Vancouver and Whistler. The birds primarily gather along the Squamish and Cheakamus Rivers, attracted by the salmon spawning in the area.

It occurs during its breeding season in virtually any kind of American wetland habitat such as seacoasts, rivers, large lakes or marshes or other large bodies of open water with an abundance of fish. It requires old-growth and mature stands of coniferous or hardwood trees for perching, roosting, and nesting. Tree species reportedly is less important to the eagle pair than the tree's height, composition and location.

**Status:** Least Concern. **Global population:** 250,000 adult individuals with an increasing population trend. This species has had a 779% increase over 40 years, equating to a 72.2% increase per decade.

Once abundant in North America, the species became rare in the mid-to-late 1900s—the victim of trapping, shooting, and poisoning as well as pesticide-caused reproductive failures. In 1978 the bird was listed



for protection under the Endangered Species Act. Since 1980, conservation efforts with the banning of DDT (the bird's main pesticide threat) have led to a dramatic resurgence. By the late 1990s, breeding populations of Bald Eagles could be found throughout most of North America. In June 2007, the bird's recovery prompted its removal from the Endangered Species list. Continuing threats to Bald Eagle populations include lead poisoning from ammunition in hunter-shot prey, collisions with motor vehicles and stationary structures, and development-related destruction of shoreline nesting, perching, roosting and foraging habitats. They are still vulnerable to environmental pollution, as evidenced by the 1989 Exxon Valdez oil spill in Prince William Sound, Alaska. An estimated 247 Bald Eagles died from oil exposure. Population levels in the Sound decreased by almost four percent the following year. The local population returned to pre-spill levels by 1995.

**Diet:** Mostly Fish (56% fish, 28% birds (mostly waterfowl and shorebirds), 14% mammals and 2% other prey). They take their prey live, fresh, or as carrion. Bald Eagles sometimes gorge, ingesting a large amount of food and digesting it over several days. They can also survive fasting for many days, even weeks.

The highly developed talon of the hind toe is used to pierce the vital areas of prey while it is held immobile by the front toes. Bald Eagles often go after other creatures' catches. A Bald Eagle will harass a hunting Osprey until the smaller raptor drops its prey in midair, where the eagle swoops it up. A Bald Eagle may even snatch a fish directly out of an Osprey's talons.

**Nesting:** Males and females are alike however females are 25% larger than males. Eagles in the far Northern Hemisphere are larger than more southern ones. The plumage of an adult bald eagle is evenly dark brown with a white head and tail. The tail is moderately long and slightly wedge-shaped. The beak, feet and irises are bright yellow. The legs are feather-free, and the toes are short and powerful with large talons. The beak is large and hooked, with a yellow cere.

Bald eagles are sexually mature at four or five years of age. When they are old enough to breed, they often return to the area where they were born. Bald eagles mate for life, however if one member of a pair dies or disappears, the other will choose a new mate. A pair which has repeatedly failed in breeding attempts may split and look for new mates. Bald eagle courtship involves elaborate, spectacular calls and flight displays. The flight includes swoops, chases, and cartwheels, in which they fly high, lock talons, and free fall, separating just before hitting the ground.

Nests are located in trees that are 38 m (52 to 125 ft) in height. Preferred tree height depends on location. In Chesapeake Bay, nesting trees averaged 82 cm (32 in) in diameter and 28 m (92 ft.) in total height, while in Florida, the average nesting tree stands 23 m (75 ft.) high and is 23 cm (9.1 in) in diameter. Trees used for nesting in the Greater Yellowstone area average 27 m (89 ft.) high. Trees or forest used for nesting should have a canopy cover of no more than 60%, and no less than 20%, and be in

close proximity to water. Most nests have been found within 200 m (660 ft) of open water. When breeding where there are no trees, the bald eagle will nest on the ground, as has been recorded in areas largely isolated from terrestrial predators.

The nest base is built out of large sticks. Both sexes bring materials to the nest, but the female does most of the placement. They weave together sticks and fill in the cracks with softer material such as grass, moss, or cornstalks. The inside of the nest is lined first with lichen or other fine woody material, then with downy feathers and sometimes sprigs of greenery. The typical nest is 5 to 6 feet in diameter and 2 to 4 feet tall, and ranging in shape from cylindrical to conical to flat, depending on the supporting tree. The largest recorded nest was found in Florida in 1963, and was measured at nearly 10 feet wide and 20 feet deep.

1-3 eggs are laid. Both the male and female take turns incubating the eggs, but the female does most of the incubation. The parent not incubating will hunt for food or look for nesting material during this stage. For the first two to three weeks of the nestling period at least one adult is at the nest almost 100% of the time. After five to six weeks, the attendance of parents usually drops off considerably (with the parents often perching in trees nearby). A young eaglet can gain up to 170 g (6.0 oz.) a day, the fastest growth rate of any North American bird. The young eaglets pick up and manipulate sticks, play tug of war with each other, practice holding things in their talons, and stretch and flap their wings. The young fledge at anywhere from 8 to 14 weeks of age, though will remain close to the nest and attended to by their parents for a further 6 weeks.

**Cool Facts:** The Bald Eagle has been the national emblem of the United States since 1782 and a spiritual symbol for native people for far longer than that. Bald eagles are not actually bald; the name derives from an older meaning of "white headed". They can live a long time, with a longevity record of 28 years in the wild and 36 years in captivity.

Bald Eagles have been known to play with plastic bottles and other objects pressed into service as toys. One observer witnessed six Bald Eagles passing sticks to each other in midair.

There are two subspecies of bald eagle:

- *H. I. leucocephalus* (by Linnaeus in 1766) is the nominate subspecies. It is found in the southern United States and Baja California.
- *H. I. washingtoniensis* (by Audubon in 1827), the northern subspecies, is larger than southern nominate species. It is found in the northern United States, Canada and Alaska.

**Common Name:** African Fish-eagle

**Scientific Name:** *Haliaeetus vocifer*

**Size:** 25-30 inches (63-75 cm); **Wingspan:** 72-96 inches (200-240 cm)

**Habitat:** Africa; indigenous to sub-Saharan Africa, ranging over most of continental Africa south of the Sahara Desert. Several examples of places where they may be resident include the Orange River in South Africa and Namibia, the Okavango Delta in Botswana, and Lake Malawi bordering its namesake country Malawi, Tanzania and Mozambique. The African fish eagle is thought to occur in substantial numbers around the locations of Lake Victoria and other large lakes that are found in Central Africa, particularly the Rift Valley lakes.

The African fish eagle is a generalist species, requiring only open water with sufficient prey and a good perch. This is evident by the number of habitat types that this species may be found in, including grassland, swamps, marshes, tropical rainforest, fynbos and even desert bordering coastlines, such as that of Namibia. The African fish eagle is absent from arid areas with little surface water.



**Status:** Least Concern. **Global population:** Unknown amount of adult individuals with a stable population trend. The species is not known to be directly persecuted by humans, even though it is very numerous and probably a direct competitor for fish. Neither is it particularly affected by habitat loss. In some regions a build-up of



organochloride pesticides in water bodies and therefore in their fish prey, could result in eggshell thinning.

**Diet:** Primarily fish, but it will also take eggs and chicks of shore birds, lizards and frogs, as well as carrion when prey is scarce. Juveniles are known to feed at large mammal carcasses alongside vultures and Tawny Eagles.

**Nesting:** The species nests near water, in tall acacias or other suitable trees, and occasionally on rock outcrops. Nests are up to 1.5m in diameter and are composed of sticks and papyrus, lined with rush heads and occasionally, weaver nests. Breeding can occur at any time within Equatorial regions, but spans April - October in southern Africa; June - December in the east; and October – April in the west.

**Cool Facts:** The bird figures in the Coat of arms of Namibia and the Coat of arms of Zambia. It also appears on the Coat of arms of South Sudan against two crossed bush spears and a shield.



**Common Name:** Pallas's Fish-eagle  
**Scientific Name:** *Haliaeetus leucoryphus*

**Size:** 28-33 inches (72-84 cm); **Wingspan:** 71-85 inches (180-215 cm)

**Habitat:** Asia; occurs across a huge range from Kazakhstan (it may no longer breed there, although a positive trend has been noted in recent surveys), southern Russia (where it possibly still breeds), Tajikistan, Turkmenistan (probably dispersing non-breeders) and Uzbekistan, east through Mongolia and China, south to northern India, Pakistan, Bhutan, Bangladesh and Myanmar. It is a passage migrant and winter visitor to Nepal and non-breeding visitor to Afghanistan. The main breeding populations are believed to be in China, Mongolia and the Indian subcontinent.

It is closely associated with wetlands, principally large lakes and rivers, from the lowlands to 5,000 m. It generally nests in trees near water.



**Status:** Vulnerable. **Global population:** 2,500-9,990 adult individuals with a decreasing population trend. Key threats are habitat loss, degradation and disturbance. Across the Indian subcontinent, and probably most of its range, wetlands have been drained or

converted for agriculture and human settlements. The felling of large trees near wetlands has reduced the availability of nest and roost sites. The spread of water hyacinth (*Eichhornia crassipes*) is a problem in India, as is the siltation of lakes due to catchment deforestation. Pollution of wetlands with pesticides and industrial effluents reduces breeding success. Habitat loss and degradation are compounded by disturbance of wetlands. Reductions in the prey base, primarily through hunting and over-fishing, are further consequences of increasing human pressure. In Myanmar, the development of oil and gas fields is a threat and, in China, hunting is a localized problem. In Mongolia, during surveys in summer 2009, it was noted that two recently completed hydroelectric dams were severely disrupting water levels in the affected drainage basins and could potentially affect all sites where the species occurs in the Great Lake Basin. Over-fishing was also noted at several sites and low rainfall was leading to falling water levels in some areas.

**Diet:** Large freshwater fish. They also regularly predate water birds.

They are known to hunt in pairs. Sometimes they steal food from other birds.

**Nesting:** Males and females are alike however females are 25% larger than males. Adults are dark brown, with a warm buffish to whitish head, neck and upper mantle and a blackish tail with broad, white central band. Juveniles are more uniformly dark, with all-dark tail, but in flight they show strongly patterned underwings, with a whitish band across coverts and prominent, whitish primary flashes.

Their call is a loud, creaky "*kha kha kha kha*" and they are noisy during the breeding season. Pairs are monogamous. The breeding season is October-June in the southern part of their range, March-July in the north, and May-September in Tibet.

The nest is built out of sticks by both parents and placed in a tall tree close to water. It is lined with green leaves, hay, rushes, straw, and fine twigs. Nests are sometimes used for years in a row and can be up to 2 m across and 2 m deep. Clutch size is 2-4 eggs, which are incubated for 40-45 days, by both parents though the female does the majority. The chicks hatch two days apart and the younger always dies due to its inability to compete with the older sibling. Fledging takes 70-105 days and juveniles are dependent on their parents for around 30 days after that.

**Cool Facts:** Pallas's Fish-eagles have been seen killing adult greylag geese, by assaulting them on the surface of the water and then flying off with the kill. Since that goose species is slightly heavier than the eagle, this is one of the greatest weight-lifting feats ever recorded for a flying bird.

**Common Name:** Golden Eagle  
**Scientific Name:** *Aquila chrysaetos*

**Size:** 26-40 inches (66-102cm); **Wingspan:** 71-92 inches (180-234 cm)

**Habitat:** Worldwide; it is widespread, ranging across the Nearctic and Palearctic (70°N to 20°S), and fringing Indomalaya and the Afrotropics. It is uncommon to scarce across its range. In general, the species is sedentary, with juveniles dispersing as far as 1000km in their first few years. Birds occupying the mostly northerly regions (>65°N), such as Alaska, northern Canada, Fennoscandia and northern Russia, migrate south. In the Nearctic there are southwards movements to southern Alaska and southwest USA in September, via regular flyways, in particular through southwest Alberta. In the Palearctic, movements occur in a broad front to wintering areas in southeast Europe, the Russian steppes, Mongolia, northern China and Japan. Juveniles and immatures will go as far as North Africa.

The species occupies a wide range of flat or mountainous, largely open habitats, often above the tree line, from sea level to 4000m. In the Himalayas it has been recorded as high as 6200m.



**Status:** Least Concern. **Global population:** 170,000 adult individuals with a stable population trend. Because their common prey animals (mammals) don't tend to ingest pesticides, Golden Eagles have escaped the harm sustained by fish-eating or bird-eating raptors from DDT and related chemicals. When these pesticides thinned the eggshells of many birds of prey, Golden Eagles' shells retained normal thickness. Pesticide concentrations in their blood stayed below levels known to cause reproductive problems. Biologists, engineers, and government officials have also cooperated in developing and publicizing power-pole designs that reduce raptor electrocutions—caused when the large birds' wings or feet accidentally touch two lines and form a circuit. Since the early 1970s, utility companies have modified poles to prevent eagle electrocutions. And some new power lines in nonurban areas have been built to “raptor-safe” construction standards.

“Hacking,” an age-old falconry technique, is helping rebuild Golden Eagle populations. Humans feed caged, lab-reared nestlings at a nest-like hack site until the birds reach 12 weeks old, when the cage is opened and they begin feeding themselves. The fledglings continue to receive handouts from their hack-site caretakers for several weeks, until they gain full independence in the wild.

**Diet:** Mammals, birds, reptiles, fish, amphibians, insects and carrion, depending on the regional prey availability. Although capable of killing large prey such as cranes, wild ungulates, and domestic livestock, the Golden Eagle subsists primarily on rabbits, hares, ground squirrels, and prairie dogs.

Usually found alone or in pairs, Golden Eagles typically soar or glide with wings lifted into a slight “V” and the wingtip feathers spread like fingers. They capture prey on or near the ground, locating it by soaring, flying low over the ground, or hunting from a perch.

**Nesting:** Sexes are alike but females are larger. Adults are dark brown with a golden sheen on the back of the head and neck. For their first several years of life, young birds have neatly defined white patches at the base of the tail and in the wings.

Golden Eagles possess astonishing speed and maneuverability for their size. Diving from great heights, they have been clocked at close to 200 miles per hour. In an undulating territorial and courtship display known as “sky-dancing,” a Golden Eagle performs a rapid series of up to 20 steep dives and upward swoops, beating its wings three or four times at the top of each rise. In “pendulum flight,” the eagle dives and rises, then turns over to retrace its path. Single birds and pairs engage in aerial play with objects such as sticks or dead prey, carrying these items high into the sky, then dropping and retrieving them.

The breeding season spans March – August throughout the majority of its range, and in southern areas begins as early as November; whilst in the most northerly regions it will start as late as April. Nesting occurs on cliff ledges and where these are not available, in



large trees or similar artificial structures. Starting 1–3 months before egg-laying, a Golden Eagle pair builds a nest of sticks and vegetation—sometimes also including bones, antlers, and human-made objects such as wire and fence posts. They line the nest with locally available vegetation, such as yucca, grasses, bark, leaves, mosses and lichens, or conifer boughs. They often include aromatic leaves, possibly to keep insect pests at bay. Resident birds continue adding nest material year-round, reusing the same nest for multiple seasons and sometimes alternating between two nests. Nests are huge, averaging some 5-6 feet wide, and 2 feet high, enclosing a bowl about 3 feet by 2 feet deep. The largest Golden Eagle nest on record was 20 feet tall, 8.5 feet wide.

**Cool Facts:** The Golden Eagle is the most common official national animal in the world—it's the emblem of Albania, Germany, Austria, Mexico, and Kazakhstan.





**Common Name:** Greater Spotted Eagle

**Scientific Name:** *Aquila clanga*

**Size:** 24.4-29.1 inches (62-74 cm); **Wingspan:** 63-71.6 inches (160-182 cm)

**Habitat:** Eurasia and Africa; this species occupies a fragmented range, breeding in Estonia, Finland, Poland, Belarus, Moldova, Russia, Ukraine, Kazakhstan, mainland China and Mongolia, and in tiny numbers in Pakistan and north-west India. Passage or wintering birds occur in small numbers over a vast area, including central and eastern Europe, North Africa, East Africa, the Middle East, the Arabian peninsula, the Indian Subcontinent, south Asia and South-East Asia. Wintering birds have also been reported in Hong Kong (China). The population probably numbers fewer than 10,000 mature individuals with Russia holding 2,800-3,000 pairs. The European population is probably no more than 900 pairs (with c.150 pairs in Belarus). Numbers appear to have declined in the western half of its range and in some parts of its Asian range.



They occupy lowland forest and forest edges near wet areas, including meadows, bogs, and marshes, along with river-valley woodland. In their wintering grounds they also prefer wetter habitat than most eagles, and are found in river deltas, mangroves,

marshes, and lake margins; though in Africa they inhabit semi-arid acacia savannah. They have been recorded as high as 4,000+ meters above sea level in Iran, but they're more often within a range from 0-1,000 m.

**Status:** Vulnerable. **Global population:** 3,300-8,800 adult individuals with decreasing population trend. This species is suspected to have undergone at least a moderately rapid decline over the last three generations. While habitat destruction and disturbance are considered the main reasons for its decline, poaching and electrocution can be considered important. Suitable habitat mosaics have been lost as a result of afforestation and wetland drainage. In eastern Europe, agricultural intensification and the abandonment of traditional floodplain management have reduced habitat quality. Birds are intolerant of permanent human presence in their territories. Forestry operations are a major cause of disturbance. Shooting is a threat in Russia, the Mediterranean, South-East Asia and Africa, together with deliberate and accidental poisoning across much of its range. In Israel, poisoning and electrocution are major causes for casualties of wintering population.

**Diet:** Small mammals (to the size of hares), birds (including waterfowl), amphibians, lizards, snakes, frogs, small fish, carrion, and insects. In many areas, the main prey item is the Northern Water Vole (*Arvicola terrestris*).

They hunt for prey in flight or from a perch in a tree. This species engages in kleptoparasitism from each other and from other raptor species.

**Nesting:** Sexes are alike but females are larger. Greater Spotted Eagles are polymorphic with dark, intermediate, and pale morph forms. Dark morphs are black-brown both above and below with pale upper wing coverts and a light, whitish U-shape above the tail. Pale morphs, called *fulvescens*, have black tails, flight feathers, and greater wing coverts, but are otherwise rufous to buff with dark markings along the breast, flanks, wing edges, and around the eyes. Intermediates are pale with yellow-brown streaking on the upper wing coverts and a buff-colored breast. The cere and feet are yellow, and the eyes are brown.

Juveniles are brown to black with buff spotting and white bands along the upper wings. The tail and flight feathers are tipped with white, except for the outer primary feathers. They reach full adult plumage after 5-6 years.

Eagles are monogamous. The breeding displays include circling, high soaring, and dives done by the male toward a soaring female with loud calling usually accompanying the displays. The breeding season is from April-August and November-March in Pakistan.

A large stick nest placed below the canopy in a tree in a deciduous forest (rarely in coniferous forest). Old nests of another species of raptor or Black Storks are sometimes used. The clutch size is usually 1 to 3 white eggs with reddish-brown markings.

Incubation starts with the laying of the first egg and lasts for about 42 days. The nestling period is 63-67 days. Usually, only one chick survives, as the result of cannibalism

**Cool Facts:** There is strong evidence of hybridization between this species and Lesser Spotted Eagle (*Aquila pomarina*). In some European countries mixed pairs can constitute 50% of Greater Spotted Eagle pairs. It is unclear whether this represents a new phenomenon or a conservation concern, but *A. pomarina* is far more numerous than *A. clanga* in the zone of overlap, and the range of *A. pomarina* appears to be spreading east, further into the range of *A. clanga*.



**Common Name:** Martial Eagle

**Scientific Name:** *Polemaetus bellicosus*

**Size:** 31-38 inches (66-102cm); **Wingspan:** 74-102 inches (188-260 cm)

**Habitat:** Africa; most of sub-Saharan Africa, wherever food is abundant and the environment favorable. It is never common, but greater population densities do exist in southern Africa, especially in Zimbabwe and South Africa. Generally, these birds are more abundant in protected areas such as Kruger National Park and Kgalagadi Transfrontier Park in South Africa, or Etosha National Park in Namibia.

Its preferred habitat is open woods and woodland edges, wooded savannah and thornbush habitats. It is not found in dense tropical forests such as the Guinean and Congolian forests, but needs trees to nest in and to use for obstruction while hunting. In southern Africa, they have adapted to more open habitats, such as semi-desert and open savanna with scattered trees, wooded hillocks and, as a recent adaptation, around



pylons. They usually seem to prefer desolate or protected areas. The territory can vary greatly in size from more than 1,000 km<sup>2</sup> (390 sq mi) to areas where nests are less than 10 km (6.2 mi) distant. This disparity is due to differences in food supply.

**Status:** Vulnerable. **Global population:** 170,000 adult individuals with a decreasing population trend. The species suffers from direct persecution (shooting and trapping) by farmers, indirect poisoning (these two threats by far the most important causes of losses), drowning in sheer-walled reservoirs, electrocution on power lines, and habitat alteration and degradation. Poisoning is largely carried out by a few large-scale commercial farmers, but is also a problem in tribal small-stock farming communities. Deforestation may be having less of an impact on this species than on other large eagles as it can utilize man-made structures for nesting. Large mammal populations in West Africa are highly threatened and the threats are likely to increase in the future as human populations continue to grow. Reduction in natural prey may lead to an increase in predation on domestic animals which may in turn lead to increased persecution by farmers. In some areas birds may be taken for use in traditional medicine, and parts have been found in muthi markets in Johannesburg. The majority of protected areas in Kenya are too small to hold a single pair, and the size of territory means that birds nesting in protected areas will generally forage far outside them, making them more vulnerable to persecution. In South Africa the highest declines were observed in areas with the greatest increase in temperature and areas with high densities of power lines, probably due to collisions and electrocutions. In Kruger National Park, higher densities of elephants were related to larger declines in Martial Eagles, probably as a result of a reduction in nesting sites or changes in habitat quality.

**Diet:** Mammals, birds, reptiles, fish, amphibians, insects and carrion. Among bird prey, martial eagles often choose to predate medium-sized ground-dwelling species such as francolins, guineafowl or bustards. Other birds predated have included young ostriches, storks, herons, other waterfowl, hornbills and quelea flocks. Among regular mammal prey are hares, hyraxes, mongooses, squirrels, springhares, rats, genets, foxes, baboons, other monkeys, young warthogs, dikdiks, young impala, and various other young or small antelope.

The martial eagle hunts mostly in flight, circling high above its territory, and stooping sharply to catch its prey by surprise. Prey may be spotted from 3 to 5 kilometers away. On occasion, they may still-hunt from a high perch or concealed in vegetation near watering holes. A behavior unusual for a bird of its size, it may hover while hunting. Birds are typically killed on the ground or in trees.

**Nesting:** The adult's plumage consists of dark grey-brown coloration on the upperparts, head and upper chest, with slightly lighter edging to these feathers. The body underparts are white with blackish-brown spotting. The underwing coverts are brown, with pale flight feathers being streaked with black. The female is usually larger and more spotted than the male. The immature is paler above, often whitish on the head and chest, and has less spotted underparts. It reaches adult plumage in its seventh year. Martial eagles have a short erectile crest, which is often not prominent. It often perches

in a quite upright position, with its long wings completely covering the tail. The bill, at 5.5 cm (2.2 in), is strong and the legs are feathered to the heavy, powerful feet.

Martial eagles may breed in various months in different parts of their range. The mating season is in November through April in Senegal, January to June in Sudan, August to July in northeast Africa and almost any month in eastern Africa, though mostly in April–November. Martial eagles have been thought to have no distinctive display flight, but they do engage in a subtle one, with the males flying mildly around in circles. Rarely, the female joins him and the pair grasp talons with each other. During the breeding season, these typically silent birds utter a loud cry *klee-klee-klee-kloeee-kloeee-kuleee*.

They build their nests in large trees, often placing them in the main fork of a tree at 6–20 m (20–66 ft) off the ground. Often trees used are on the sides of cliffs, ridges, valley or hilltop, with one nest having been found within a cave. The nest is a huge construction of sticks. In the first year of construction, the nest is 1.2 to 1.5 m (3.9 to 4.9 ft) in diameter and 0.6 m (2.0 ft) deep. After regular use over several years, the nests can regularly measure in excess of 2 m (6.6 ft) in both diameter and depth.

Martial eagles have a slow breeding rate, laying usually one egg (rarely two) every two years. The egg is incubated for 45 to 53 days and the chick fledged at 96 to 104 days. Despite increasing signs of independence (such as flight and beginning to practice hunting), juvenile birds will remain in the care of their parents for a further 6 to 12 months. Due to this long dependence period, these eagles can usually only mate in alternate years.

**Cool Facts:** Martial eagles have been noted as remarkable for their extremely keen eyesight (3.0–3.6 times human acuity). Due to this power, they can spot potential prey from a very great distance.

There are few serious identification challenges for the species. The black-chested snake eagle is smaller, with a relatively more prominent head and white lining the flight feathers. The crowned eagle, which also regularly perches in an erect position, has distinctly shorter wings and a distinctly longer tail and, though its plumage is fairly variable, it is more scaled on the back and it has distinctive barring on the underparts and the wings. More so than any other African eagle, the martial eagle is often seen only in flight.



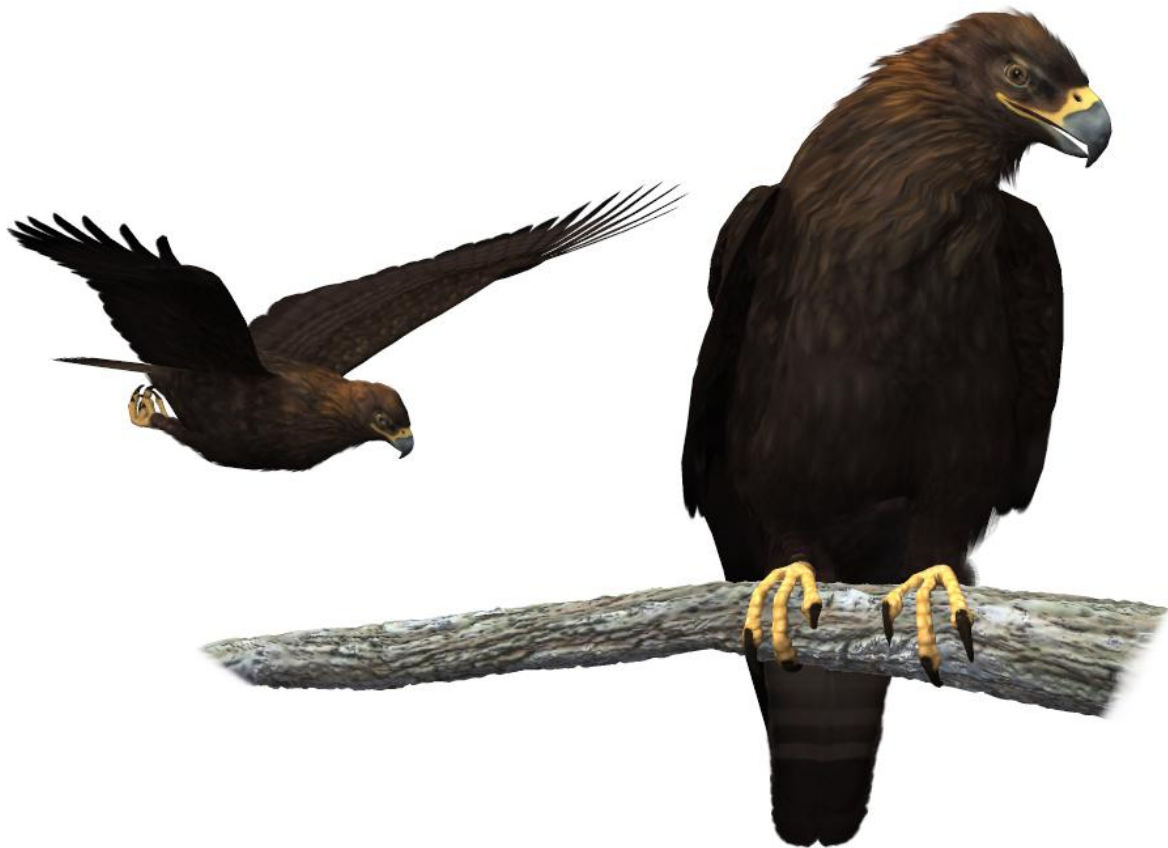
**Common Name:** Steppe Eagle  
**Scientific Name:** *Aquila nipalensis*

**Size:** 24-32 inches (62-81 cm); **Wingspan:** 64-85 inches (165-215 cm)

**Habitat:** Eurasia and Africa; it breeds from Romania east through the south Russian and Central Asian steppes to Mongolia. The European and Central Asian birds winter in Africa, and the eastern birds in India.

Throughout its range, it is found in open, dry habitats, such as desert, semi-desert, steppes, or savanna. During the breeding season, *A. n. orientalis* can be found in lowlands and low hills, whereas *A. n. nipalensis* is found in mountainous areas up to elevations of 2,300 meters.

**Status:** Least Concern. **Global population:** 160,000 adult individuals with a decreasing population trend. The population is declining owing to habitat destruction (especially conversion of steppe into agricultural land), persecution, and collisions with power lines (electrocution is a serious problem). Locally populations are declining owing to heavy predation of their chicks.



Steppe eagles are opportunistic scavengers, which may expose them to the risk of diclofenac poisoning.

**Diet:** Small mammals, birds, insects and carrion. It hunts small mammals on its breeding grounds, with susliks (a type of ground squirrel) forming the vast majority of its diet in some areas. When wintering, it feeds mainly on mole rats in East Africa, and termites and birds such as the Red-billed Quelea that predominate in southern Africa.

Typically, this species soars high above its prey, before making a steep dive and seizing the animal in its powerful talons, but it may also steal prey from other raptors while in flight, or catch prey while on the ground, often by waiting outside a burrow entrance.

**Nesting:** Females are slightly larger than males. Sexes are alike with brown upper-parts and blackish flight feathers and tail. There are well-defined bars on the flight and tail feathers. The gape (edge of the mouth) extends beyond the center of the eye and the nostril is an oval shape. There is also a reddish-brown patch on the nape of the neck.

Immature birds are less contrasted than adults, but both show a range of variation in plumage color.

Steppe eagles arrive at their summer breeding grounds around April, at the start of spring. Large nests, up to a meter wide, are constructed from twigs and lined with various materials, such as old rags and camel dung. Nests have traditionally been built as large platforms on the ground, although recent habitat alterations by humans seem to have caused a shift to building a few meters higher in bushes or trees.

It lays 1–3 eggs in its nest. The incubation time is about 45 days. The young stay in the nest for about 60 days. Cainism (the killing of young eagles by their older siblings) does not occur with this.

**Cool Facts:** Formerly thought to be the same species as the Tawny Eagle (*Aquila rapax*) with which the Steppe Eagle is closely related. Today, they are definitely regarded as separate species.

There are two subspecies of Steppe Eagle:

- *A. n. nipalensis*. The nominate eastern subspecies. It is larger and darker than *A. n. orientalis*.
- *A. n. orientalis*. The European and Central Asian species.

The oldest recorded Steppe Eagle lived 41 years in captivity.

**Common Name:** Wedge-tailed Eagle

**Scientific Name:** *Aquila audax*

**Size:** 32-42 inches (81-106 cm); **Wingspan:** 72-91 inches (182-232 cm)

**Habitat:** Oceania; found throughout mainland Australia, Tasmania and southern New Guinea.

It is found from sea level to alpine regions in the mountains, but prefers wooded and forested land and open country, generally avoiding rainforest and coastal heath vegetation. Eagles can be seen perched on trees or poles or soaring overhead to altitudes of up to 2000 m.



**Status:** Least Concern to Endangered. **Global population:** Unknown adult individuals with an increasing population trend. The population is increasing owing to introduction of rabbits and deforestation. However it is still persecuted in parts of its range through shooting, trapping and poisoning using poisoned carcasses. The subspecies from

Tasmania (*A. a. fleayi*) is listed as endangered by the Environment Protection and Biodiversity Conservation Act 1999 (EPBC Act) with fewer than 200 pairs left in the wild. The eagle was once subject to a bounty in Tasmania, as it was believed to prey on livestock.

Decreasing numbers of Tasmanian devils may be beneficial to the wedge-tailed eagles in Tasmania, as it could reduce competition for road kill and devil predation on wedge-tailed eagle young.

**Diet:** Mammals; the introduced rabbit and brown hare have become the primary items of the eagle's diet in many areas. Larger introduced mammals such as foxes and feral cats are also occasionally taken, while native animals such as wallabies, small kangaroos, possums, koalas and bandicoots are also preyed on. In some areas, birds such as cockatoos, ducks, crows, ibis, and even emu are more frequent prey items. Reptiles are less frequently taken, however frill-necked lizards, goannas and brown snakes are occasionally preyed on.

Most prey is captured on the ground in gliding attacks or less frequently in the air. It spends much of the day perching in trees or on rocks or similar exposed lookout sites such as cliffs from which it has a good view of its surroundings.

They may hunt singly, in pairs or in larger groups. Working together, a group of eagles can attack and kill animals as large as adult kangaroos.

**Nesting:** Females are larger and slightly paler than males. Young eagles are a mid-brown color with slightly lighter and reddish-brown wings and head. As they grow older, their color becomes darker, reaching a dark blackish-brown shade after about ten years.

As the breeding season approaches, a pair of wedge-tailed eagles will perch close to each other and preen one another. They also perform dramatic aerobatic display flights together over their territory. Sometimes the male dives down at breakneck speed towards his partner. As he pulls out of his dive and rises just above her on outstretched wings, she either ignores him or turns over to fly upside down, stretching out her talons. The pair may then perform a loop-the-loop.

Wedge-tailed Eagles build their nest in a prominent location with a good view of the surrounding countryside. It may be built in either a living or dead tree, but usually the tallest one in the territory. In some parts of Australia, where tall trees are absent, small trees, shrubs, cliff faces or even the ground may be used. The density of active nests depends on the abundance of prey and other resources. In most years, nests are usually 2.5 km - 4 km apart. If conditions are particularly good, the distances apart may be less than 1 km because the birds require smaller areas to find sufficient food.

If using an existing nest, both birds will either rebuild the nest or add new sticks and leaf lining to an old nest. Nests can be 2–5 meters deep and 2–5 meters wide. The female usually lays two eggs, which are incubated by both sexes. A clutch consists of white

eggs measuring 73 mm x 59 mm with varying amounts of reddish brown spots and blotches. These are laid at intervals of two to four days. Incubation starts with the laying of the first egg. Because of the intervals between laying, the eggs do not hatch simultaneously. The first chick hatches larger than the second, which in turn is larger than the third. Survival rates of the chicks vary considerably depending on local conditions, including prey abundance and the amount of disturbance. A breeding pair usually rears only one young per clutch, although in a good year, two chicks may fledge in some nests. Because of the differences in size, the oldest and largest chick has the best chance of surviving. If food is scarce, it will kill and eat its smaller nest mates

After about 45 days, the chicks hatch. At first, the male does all the hunting. When the chicks are about 30 days old, the female stops brooding them and joins her mate to hunt for food.

The young wedge-tailed eagles depend on their parents for food for up to six months after hatching. They leave only when the next breeding season approaches.

The eagle patrols the boundary of this home range and advertises its ownership with high-altitude soaring and gliding flights. It may defend its territory by diving on intruders. Adults are avian apex predators and have no natural predators but must defend their eggs and nestlings against nest predators such as corvids, currawongs, or other wedge-tailed eagles and in Tasmania there is often conflict with the white-bellied sea eagle over nest sites.

**Cool Facts:** The wedge-tailed eagle is the largest bird of prey in Australia. It is sometimes known as the "eaglehawk". Both names are misnomers, as it is not a hawk, and its tail is shaped more like a diamond.

Their keen eyesight extends into the infrared and ultraviolet bands. This helps them spot prey and allows them to see rising thermals, which they can use to gain altitude while expending little energy. The wedge-tailed eagle is the only bird that has a reputation for attacking hang gliders and paragliders (presumably defending its territory). There are recorded cases of the birds damaging the fabric of these gliders with their talons.

The Wedge-tailed Eagle has become emblematic throughout Australia. Parks and Wildlife Service Northern Territory use the wedge-tailed eagle, superimposed over a map of the Northern Territory, as their emblem. The New South Wales Police Force emblem contains a wedge-tailed eagle in flight, as does the Northern Territory Correctional Services. La Trobe University in Melbourne also uses the wedge-tailed eagle in its corporate logo and coat of arms. The Royal Australian Air Force and Australian Air Force Cadets Use the Wedge-Tailed on their badge. Early in 1967, the Australian Army 2nd Cavalry Regiment received its new badge, a wedge tailed eagle swooping, carrying a lance bearing the motto "Courage" in its talons. The regiment's mascot is a Wedge-tailed Eagle named "Courage". The West Coast Eagles AFL football club uses a wedge-tailed eagle as their club mascot.

**Common Name:** Philippine Eagle  
**Scientific Name:** *Pithecophaga jefferyi*

**Size:** 34-40 inches (86-102 cm); **Wingspan:** 72-87 inches (184-220 cm)

**Habitat:** Asia; endemic to the Philippines and can be found on four major islands: eastern Luzon, Samar, Leyte, and Mindanao. The largest numbers of eagles reside on Mindanao, with between 82 and 233 breeding pairs. Only six pairs are found on Samar, two on Leyte, and a few on Luzon. It can be found in Northern Sierra Madre National Park on Luzon and Mount Apo, Mount Malindang and Mount Kitanglad National Parks on Mindanao.

This eagle is found in dipterocarp and mid-montane forests, particularly in steep areas. Its elevation ranges from the lowlands to mountains of over 1,800 m (5,900 ft).





**Status:** Critically Endangered. **Global population:** 150-500 adult individuals with a decreasing population trend. Forest destruction and fragmentation, through commercial timber extraction and shifting cultivation, is the principal long-term threat. Old-growth forest continues to be lost rapidly, such that as little as 9,220 km<sup>2</sup> may remain within the eagle's range. Moreover, most remaining lowland forest is leased to logging concessions. Mining applications pose an additional threat. Uncontrolled hunting (for food and, at least formerly, zoo exhibits and trade) is perhaps the most significant threat in the short term. Naive juvenile birds are easily shot or trapped, as are adults nesting near forest edges. Birds are also vulnerable to accidental capture in traps intended for wild pigs and deer, and there are several records of individuals caught in snares presumably whilst hunting on the forest floor. Pesticide accumulation is another potential but unproven threat which may reduce its already slow reproductive output.

Killing a Philippine eagle is punishable under Philippine law by 12 years in jail and heavy fines.

**Diet:** Mammals, birds and reptiles. It is an opportunist that takes prey based on its local level of abundance and ease. The primary prey varies from island to island depending on species availability, particularly in Luzon and Mindanao, because the islands are in different faunal regions. For example, the tree squirrel-sized Philippine flying lemurs are the preferred prey in Mindanao (in some locations it is estimated to make up 90% of the raptor's diet), while the primary prey for the eagles seen in Luzon are monkeys, birds (even other birds of prey), flying foxes, giant cloud-rats and reptiles such as large snakes and lizards. Indeed most other animals found in the Philippines, short of adult ungulates and humans, may be taken as prey. This can include Asian palm civets (12% of the diet in Mindanao), macaques, flying squirrels, tree squirrels, fruit bats and rats. They have even been reported to capture young pigs and small dogs.

Philippine eagles primarily use two hunting techniques. One is still-hunting, in which it watches for prey activity while sitting almost motionlessly on a branch near the canopy. The other is perch-hunting, which entails periodically gliding from one perch to another. While perch-hunting, they often work their way gradually down from the canopy to lower branches and, if not successful in finding prey in their initial foray, will fly or circle back up to the top of the trees to work them again.

**Nesting:** Sexes are alike. It has long, brown feathers that form a shaggy crest. These feathers give it the appearance of possessing a lion's mane, which in turn resembles the mythical griffin. The eagle has a dark face and a creamy-brown nape and crown. The back of the Philippine eagle is dark brown, while the underside and underwings are white. The heavy legs are yellow, with large, powerful dark claws, and the prominent large, high-arched, deep beak is a bluish-gray. The eagle's eyes are blue-gray. Juveniles are similar to adults except their upperpart feathers have pale fringes.

The complete breeding cycle of the Philippine eagle lasts two years. The female matures sexually at five years of age and the male at seven. Like most eagles, the Philippine eagle is monogamous. Once paired, a couple remains together for the rest of

their lives. If one dies, the remaining eagle often searches for a new mate to replace the one lost.

The beginning of courtship is signaled by nest-building, and the eagle remaining near its nest. Aerial displays also play a major role in the courtship. These displays include paired soaring over a nesting territory, the male chasing the female in a diagonal dive, and mutual talon presentation, where the male presents his talons to the female's back and she flips over in midair to present her own talons. Advertisement displays coupled with loud calling have also been reported. The willingness of an eagle to breed is displayed by the eagle bringing nesting materials to the bird's nest. Copulation follows and occurs repeatedly both on the nest and on nearby perches.

Breeding season is in July; birds on different islands, most notably Mindanao and Luzon, begin breeding at different ends of this range. The amount of rainfall and population of prey may also affect the breeding season. The nest is normally built on an emergent dipterocarp, or any tall tree with an open crown, in primary or disturbed forest. The nests are lined with green leaves, and can be around 1.5 m (4.9 ft.) across. The nesting location is around 30 m (98 ft.) or even more above the ground. As in many other large raptors, the eagle's nest resembles a huge platform made of sticks. The eagle frequently reuses the same nesting site for several different chicks. 8 to 10 days before the egg is ready to be laid, the female is afflicted with a condition known as egg lethargy. The egg is incubated for 58 to 68 days (typically 62 days) after being laid. Both sexes participate in the incubation, but the female does the majority of incubating during the day and all of it at night.

Both sexes help feed the newly hatched eaglet. Both parents take care of the eaglet for a total of 20 months and, unless the previous nesting attempt had failed, the eagles can breed only in alternate years.

**Cool Facts:** Upon its discovery, the Philippine eagle was first called the “Monkey-eating Eagle” because of reports from natives that it preyed exclusively on monkeys. Later studies revealed, however, that the alleged monkey-eating eagle also ate other animals, such as colugos, civets, large snakes, monitor lizards, and even large birds, such as hornbills. This led to a presidential proclamation to change its name to “Philippine eagle” in 1978, and in 1995, it became the national emblem of the Philippines.

**Common Name:** Short-toed Snake-eagle  
**Scientific Name:** *Circaetus gallicus*

**Size:** 24-26 inches (62-67 cm); **Wingspan:** 67-73 inches (170-185 cm)

**Habitat:** Eurasia and Africa; Birds breeding in the Palearctic are migratory, with the population in South-East Asia resident. Most migrants winter in tropical North Africa, with some eastern birds moving to the Indian Subcontinent. Migrants move south between August and November, and north between February and May. Birds are usually observed singly or in pairs, even on migration, though migrants will sometimes form groups of up to 12.

It uses a variety of habitats within warm temperate and tropical environments, and is recorded up to 2,300 m. It is found in open cultivated plains, arid stony deciduous scrub areas and foothills and semi-desert areas. It requires trees for nesting.



**Status:** Least Concern. **Global population:** 51,000-156,000 adult individuals with a stable population trend. The species suffered a marked decline in northern Europe in the 19th-20th centuries, due to habitat loss and persecution. It still suffers from shooting on Malta. It is also very highly vulnerable to the effects of potential wind energy development. It has suffered a steep decline in numbers and range in Europe and is

now rare and still decreasing in several countries due to changes in agriculture and land use.

**Diet:** Reptiles, particularly snakes and lizards. It hunts mostly nonpoisonous snakes from the family *Colubridae* (for example the Grass Snake, *Natrix natrix*). It is also capable of killing venomous snakes from the family *Viperidae*. Occasionally, they prey on small mammals up to the size of a rabbit, and rarely birds and large insects.

It hunts either from a perch or from flight, and hovers regularly, attacking prey with fast stoops. Sometimes, there is a longer struggle until the snake is dead, with the snake trying to wrap itself around the eagle to crush it in defense.

The short-toed snake eagle is an accomplished flier and spends more time on the wing than do most members of its genus. It favors soaring over hill slopes and hilltops on updrafts, and it does much of its hunting from this position at heights of up to 500 meters (550 yards). When quartering open country it frequently hovers like a Kestrel.

**Nesting:** Sexes are alike, although the females are larger. Adults have grayish-brown upper-parts and a predominantly white underside. The chin, throat and upper breast are a pale, earthy brown. The tail has 3 or 4 bars. Additional indications are an owl-like rounded head, brightly yellow eyes and lightly barred under wing.

The nest is almost always built relatively low in a tree. Clutch size is 1 unmarked white egg, and the incubation period is 47 days

**Cool Facts:** Snake eagles can live up to 17 years. Contrary to popular belief, the Short-toed Eagle is not immune against snake poison.



**Common Name:** Crested Serpent-eagle  
**Scientific Name:** *Spilornis cheela*

**Size:** 25.5-29.5 inches (65-75 cm); **Wingspan:** 48.5-61 inches (123-155cm)

**Habitat:** Asia; widespread range across tropical portions of the Indian subcontinent and southern Asia, from the Himalayas, the Kashmir region, and Nepal east to Tibet, southern China, and the Malay peninsula, along with the Philippines, Indonesia, Borneo, and the Andaman Islands.



They occur in a wide range of habitats, including rain forest, open savannah, mangrove swamps, plantations, ravines, evergreen and deciduous forest, and tidal creeks.

Crested Serpent Eagles tolerate habitat disturbance, as long as there are some large trees. They live from 0-1,500 meters above sea level, but go as high as 2,500 m in Taiwan and 3,350 m in Nepal. They are irruptive or local migrants.

**Status:** Least Concern to Critically Endangered. **Global population:** adult individuals with a stable to decreasing population trend depending on location.

**Diet:** Reptiles; primarily snake and some lizards.

They roost in the interiors of trees with dense foliage. A radio-telemetric study of the species in Taiwan found that the birds spend 98% of the day perched and usually finding food in the morning hours. They appear to use a sit and wait foraging strategy. They will sometimes follow snakes on the ground.

**Nesting:** This medium-large, dark brown eagle is stocky, with rounded wings and a short tail. Its short black and white fan-shaped nuchal crest gives it a thick-necked appearance. The bare facial skin and feet are yellow. The underside is spotted with white and yellowish-brown. The wings are short and the tail appears long in comparison. In soaring flight, the broad and paddle-shaped wings are held in a shallow V. The tail and underside of the flight feathers are black with broad white bars. Young birds show a lot of white on the head. The tarsus (legs) are unfeathered and covered by hexagonal scales. The upper mandible does not have an overhanging festoon to the tip.

The call is a distinctive *Kluee-wip-wip* with the first note being high and rising. They call a lot in the late mornings from their perches where they spend a lot of time and they rise on thermals in the mornings. When alarmed, they erect the crest and the head appears large and framed by the ruff.

The breeding season begins in late winter when they start courting and establishing territories. The nest is a large platform built high on a tree. Both birds in a pair build the nest but the female alone incubates. The nests are lined with green leaves collected from nearby and are placed facing down on the nest floor. The eggs are laid in early summer. The male guards when the female forages. The usual clutch is one egg but two are sometimes laid and only a single chick is successfully raised in a season. When eggs are lost, a replacement is laid two to seven weeks later. The eggs hatch after about 41 days and the young fledge after about two months. Nests are defended by the parents.

**Cool Facts:** The specific name *cheela* is derived from the Hindi name for kites.

There are 21 populations that have been named as subspecies:

- *S. c. cheela* is the most widespread subspecies. They are the nominate form along the sub-Himalayan range in India and Nepal.
- *S. c. melanotis* is found in Peninsular India. It is smaller and has gray cheeks and two tail bands.



- *S. c. spilogaster* is found in Sri Lanka. It has a brown breast and gray cheeks and throat.
- *S. c. burmanicus* is found in most of Indochina. It is lighter in color with more barring and browner cheeks and throat than the nominate species.
- *S. c. ricketti* is found in northern Vietnam and southern China. It is pale brown with little spotting and barring.
- *S. c. malayensis* is found in the Thai-Malay Peninsula and northern Sumatra.
- *S. c. pallidus* is found in northern Borneo. It is medium-sized, and darker.
- *S. c. richmondi* is found in southern Borneo. It is pale brown with gray cheeks and throat, and no barring on breast.
- *S. c. bido* is found in Java and Bali. It is medium-sized, has a dark breast and upperparts, and clear white spots on the belly.
- *S. c. batu* is found in southern Sumatra and Batu. It is smaller, and darker in color than the nominate species.
- *S. c. hoya* is found in Taiwan. It has dark brown cheeks and throat and white barring and spots on underparts.
- *S. c. rutherfordi* is found in Hainan. It is darker with clearer markings.
- *S. c. palawanensis* is found in Palawan. It is medium-sized with rufous barring.
- *S. c. davisoni* is found in the Andamans. It is paler with dark barring on the breast and two tail bands.
- *S. c. minimus* (Central Nicobar serpent eagle) is found in the central Nicobars. It has a black head with brown underparts and clear white spotting on underside.
- *S. c. perplexus* (Ryukyu serpent eagle) is found in Ryukyu.
- *S. c. natunensis* (Natuna serpent eagle) is found in Natuna.
- *S. c. abbotti* (Simeulue serpent eagle) is found in Simeulue.
- *S. c. sipora* (Mentawai serpent eagle) is found in Mentawai.
- *S. c. asturinus* (Nias serpent eagle) is found in Nias.
- *S. c. baweanus* (Bawean serpent eagle) is found in the Baweans. The Bawean serpent eagle with a declining population has about 26–37 pairs left, which makes it critically endangered.

**Common Name:** Harpy Eagle  
**Scientific Name:** *Harpia harpyja*

**Size:** 34-42 inches (86.5-107 cm); **Wingspan:** 69-88 inches (176-224 cm)

**Habitat:** Central and South America; it sparsely distributed and generally rare throughout its extensive range in south Mexico, Guatemala, Belize, Honduras, Nicaragua, Costa Rica, Panama, Colombia, Venezuela, Guyana, Suriname, French Guiana, Ecuador, Peru, Bolivia, Brazil, Paraguay and north-east Argentina.

It occurs in uninterrupted expanses of lowland tropical forest, but will nest where high-grade forestry has been practiced, and use forest patches within a pasture/forest mosaic for hunting.



**Status:** Near Threatened. **Global population:** 20,000- 49,000 adult individuals with a decreasing population trend. This species is suspected to lose up to 46% of suitable habitat within its distribution over three generations, so the species is therefore suspected to decline by 25-30% over three generations.

Although, it is still reasonably common in the Amazonian forests of Brazil and Peru, it will only survive in the long term if the escalating rate of forest destruction in the region is brought under control and a network of inviolate reserves are established. Low overall population densities and slow reproductive rates make shooting the most significant threat over its entire range.. It could perhaps survive in disturbed forests or even forest mosaics if its large size and boldness in the face of humans did not make it an irresistible target for hunters. It presumably also suffers from competition with humans for prey

**Diet:** Mostly tree-dwelling mammals (sloths and monkeys). Additional prey items reported include reptiles (such as iguanas, tejus and snakes) and birds (mostly macaws).

The most common hunting technique of the species is perch-hunting, which consists of scanning around for prey activity while briefly perched between short flights from tree to tree. When prey is spotted, the eagle quickly dives and grabs the prey. Sometimes, they may also hunt by flying within or above the canopy. They have also been observed tail-chasing, a predation style common to hawks that hunt birds. This comprises the eagle pursuing another bird in flight, rapidly dodging among trees and branches, which requires both speed and agility.

**Nesting:** Sexes are alike, although female are much larger. The upper side of the harpy eagle is covered with slate black feathers, and the underside is mostly white, except for the feathered tarsi (legs), which are striped black. There is a broad black band across the upper breast, separating the gray head from the white belly. The head is pale grey, and is crowned with a double crest. The upper side of the tail is black with three gray bands, while the underside of it is black with three white bands. The iris is gray or brown or red, the cere and bill are black or blackish and the tarsi and toes are yellow.

This species is largely silent away from the nest. There, the adults give a penetrating, weak, melancholy scream, with the incubating male's call described as "whispy screaming or wailing". The females calls while incubating are similar but are lower pitched. While approaching the nest with food, the male calls out "rapid chirps, goose-like calls, and occasional sharp screams". Vocalization in both parents decreases as the nestlings age, while the nestlings become more vocal. The nestlings call *Chi-chi-chi...chi-chi-chi-chi*, seemingly in alarm in response to rain or direct sunlight. When humans approach the nest, the nestlings have been described as uttering croaks, quacks and whistles.

In ideal habitats, nests may be fairly close together at 3 km (2 mi). In less ideal areas, with fragmented forest, breeding territories were estimated at 25 km (16 mi). The female harpy eagle lays two white eggs in a large stick nest, which commonly measures 1.2 m (3.9 ft.) deep and 1.5 m (4.9 ft.) across and may be used over several years. Nests are located high up in a tree, usually in the main fork, at 16 to 43 m (52 to 141 ft.).

**Cool Facts:** The harpy eagle possess the largest talons of any living eagle. The harpy's feet are extremely powerful and can exert a pressure of 42 kgf/cm<sup>2</sup> (4.1 MPa or 530 lbf/in<sup>2</sup> or 400 N/cm<sup>2</sup>) with its talons.

In many South American cultures it is considered bad luck to cut down the kapok tree (the preferred nesting tree), which may help safeguard the habitat of this species.

It is thought to be locally or regionally extinct in large parts of its former range, notably most of central and north Central America and possibly Rio Grande do Sul, Brazil, but recent records suggest that the population in the southern Atlantic forests may be migratory.





**Common Name:** Mountain Hawk-eagle  
**Scientific Name:** *Nisaetus nipalensis*

**Size:** 27-33 inches (69-84 cm); **Wingspan:** 53-69 inches (134-175 cm)

**Habitat:** Asia; breeds in the Indian subcontinent, from India, Nepal to Thailand, Taiwan, Indonesia and Japan.

It breeds in heavily forested montane areas up to about 2,000 m, descending to lower elevations in winter. It inhabits subtropical and broad-leaved forests and fir forest at higher altitudes in Bhutan but avoids pine forests.

**Status:**

Least  
Concern to  
Threatened.

**Global  
population:**

<10,000  
Adult  
individuals  
with a  
decreasing  
population  
trend. The  
population is  
in decline  
owing to  
ongoing  
habitat  
destruction  
throughout  
its range.  
Though it is  
not  
considered a  
globally

threatened species, the Japanese population is declining. As the species usually produces only one offspring, it was feared that the ongoing population reduction of *N. n. orientalis* might lead to loss of genetic diversity, and consequently inbreeding depression. However, genetic diversity was shown to be still considerable at present. The estimated Japanese subspecies population was <1,800 individuals in 2004.

**Diet:** Small mammals (especially hares) and terrestrial birds, including jungle fowl, domestic poultry, ducks, and pheasants, large snakes, and lizards. There are anecdotal



accounts from several parts of its range of this eagle taking small monkeys as prey, but these may involve sick or dying animals.

Typically, these eagles still-hunt from a perch, stooping to take prey on the ground.

**Nesting:** Adults have brown upperparts and pale underparts, with barring on the undersides of the flight feathers and tail. The breast and belly and underwing coverts are heavily streaked. The wings are broad with a curved trailing edge, and are held in a shallow V in flight. Sexes are similar, but young birds are often whiter-headed. The Sri Lankan and south Indian population is smaller and has unstreaked buff underwing coverts.

Juveniles are pale in plumage coloration. They are particularly white from the chest to the abdomen. The iris varies greatly in color depending on the age. Their irises are ashy blue in fledglings, pale yellow at the age of 3, and almost yellow at the age of 4-5. Afterward, the yellow of the iris gradually deepens with age to become orange, hanging from orange to red and finally a deeper red.

They build a large stick nest placed in a tree, often growing in an isolated location. The nest size is 120cm by 100cm on average, and the thickness varies according to the age of use. They use thick dead branches for the frame and relatively thin branches for the upper structure. They lay twigs with green leaves in the inner cup. Eggs are laid from February to April. The clutch size is one egg and is white in color. It is about 57mm by 70mm in size.

The incubation period is about 43-50 days. Females mostly incubate eggs and nestlings, while males provide food. The nestling period is about 70-80 days and the young fledge from June to August. The fledging day is difficult to determine because the fledglings frequently return to the nest even after they left the nest and receive the food that the parent birds bring back.

**Cool Facts:** They were earlier placed within the genus *Spizaetus* but molecular studies show that the Old World representatives were closer to the genus *Ictinaetus* than to the New World *Spizaetus* (in the stricter sense).

There are several subspecies:

- *N. n. orientalis* is found in Japan. The Japanese subspecies is larger, lighter, and has only a very small crest, which is much larger in the other two subspecies
- *N. n. kelaarti*, Legge's Hawk-eagle. The Sri Lankan and south Indian population is smaller and has unstreaked buff underwing coverts. A 2008 study based on the geographic isolation and differences in call suggest that this be treated as a full species, *Nisaetus kelaarti*.
- *N. n. nipalensis* is the nominate species.

**Common Name:** Ornate Hawk-eagle

**Scientific Name:** *Spizaetus ornatus*

**Size:** 22-27 inches (56-68.5 cm); **Wingspan:** 46-56 inches (117-142cm)

**Habitat:** Central and South America; the nominate species occurs from east Colombia east through Venezuela. It is uncommon to rare in Guyana, Suriname, French Guiana and Trinidad and Tobago. The taxon's range extends south through east Ecuador,

north-east Peru and north-east Bolivia. It reaches south Brazil, where it has declined in areas of heavy deforestation, and further south to Paraguay. In north Argentina it is also known to have declined. The subspecies, *S. o. vicarious*, occurs from south-east Mexico through Belize, Guatemala, El Salvador, Honduras, Nicaragua, Costa Rica and Panama to northern South America. It is rare in west Colombia, and is also known to reach west Ecuador.

The preferred habitat is humid rainforests below 1800 meters.



**Status:** Near Threatened. **Global population:** <50,000 adult individuals with a decreasing population trend. This species is suspected to lose 40% of suitable habitat within its distribution over three generations (56 years) based on a model of Amazonian deforestation. Although the species is susceptible to hunting, it can survive in fragmented landscapes. Based on these projections, scientists expect a decline by 25-29% over three generations.

**Diet:** Mammals, birds and reptiles. Prey species have included little blue herons, curassows, toucans, wood quail, pigeons, macaws, parrots, cotingas, chickens, and



even a black vulture. Mammals are also significant prey, with agoutis, squirrels, rats, procyonids, and monkeys often taken. Reptiles are also occasionally hunted.

They are often seen in early morning as they perch on emergent snags or along forest edges. In the late morning they are most often detected as they circle low over the canopy, often calling tirelessly. Their most common call is a loud, ringing whistle with an down-slurred note at the beginning followed by piping "*whep*" notes : "*whit, wheEEuuu, whep whep whep whep*"

**Nesting:** Females are larger than males. Adults have blackish upper parts and crown, bright chestnut sides to the neck and breast, and a black-edged white throat and central breast. The rest of the under parts and feathered legs are white barred with black, and the tail has broad black bars. The under wings are white, with barred flight feathers; due to the heavy pattern, birds usually look rather dark in flight.

Young birds have a white head and under parts, with a grey crest, brown upper parts, and barring only on the flanks and legs.

The male's courtship display is a dive with folded wings, and a climb, sometimes completing a loop. The pair touch talons in flight as the female rolls on her back. This species builds a large stick nest in a high tree (e.g. Ceiba), many meters above ground. The nest is around 1 m (3 ft.) in diameter. Most breeding activity occurs around April or May, differing slightly according to location; in Guatemala, breeding activity was observed from March to June, in Costa Rica in April and May, in Panama from November/December to May, and in the lowlands of Ecuador in March and April.

**Cool Facts:** While this eagle is no larger than a hawk, it can take a prey up to 5 times its own weight.

The crest can be erected or laid back on the head, and sometimes the species is misidentified by those who expect Ornate Hawk-Eagle to be prominently crested at all times.

There are two subspecies:

- *S. o. vacarius* is the more northerly of the two, occurring throughout the Middle American portions of the range and west of the Andes from western Colombia to southwestern Ecuador (formerly northwestern Peru).
- *S. o. ornatus*, the nominate species, is found in the remainder of the range, from eastern Colombia, Venezuela, and Trinidad, south to Bolivia, northern Argentina, and southern Brazil. The nominate form has brighter, richer rufous on the head and neck than *S. o. vacarius*.

**Common Name:** African Crowned Hawk-eagle  
**Scientific Name:** *Stephanoaetus coronatus*

**Size:** 31-39 inches (80-99 cm); **Wingspan:** 59-71 inches (151-181 cm)

**Habitat:** Africa; widespread resident of sub-Saharan Africa, occurring in easternmost Sudan and South Sudan, western Ethiopia, southernmost Senegal, Guinea-Bissau, Guinea, Liberia, Côte d'Ivoire, Ghana and southern Togo, southern Nigeria and Cameroon, through Gabon, into Congo and Democratic Republic of Congo, south to north-western Angola, east to Uganda, Kenya and Tanzania, south-east through Zambia, Malawi and Mozambique, to northern and eastern Zimbabwe, north-eastern, eastern and south-eastern South Africa and Swaziland.

It inhabits forest, woodland, savanna and shrub land, as well as some modified habitats, such as plantations and secondary growth, and can persist in small forest fragments. It shows high resilience to heavy deforestation and degradation in some areas, although such changes are assumed to cause local declines in population density.



**Status:** Near Threatened. **Global population:** 5,000-50,000 adult individuals with a decreasing population trend. Although the species is welcomed by foresters in some areas, it is subjected to a number of significant threats throughout much of its range, including deforestation (carried out for timber extraction, charcoal production, the encroachment of agriculture and plantations, shifting cultivation and mining), competition from humans for prey species (with apparently unsustainable levels of exploitation for bush meat in some areas), direct persecution in an estimated 90% of its range (e.g. for food, arrow-fletching, witchcraft, ornaments and its pest status and threat to humans) and human disturbance. In Ghana, it is threatened by deforestation and hunting, including of its main prey. Some once-occupied areas in Ghana have now been almost totally deforested, whilst others, such as Bosomoa Forest Reserve, have been converted to teak plantations. The species may have altered its diet to partly accommodate declines in primate abundance in parts of Ghana, but its population is unlikely not to have been affected by such a dramatic decline in its prey base (which has probably worsened further since the mid-1990s). Although the species appears to be doing well at Udzungwa, Tanzania, it may be absent as a breeding species from several areas (e.g. Uzungwa scarp, Kising'a-Rugaro, New Dabaga), owing to prey depletion by humans. In Nigeria, it seems likely that the population has been impacted by widespread forest clearance in the south of the country.

**Diet:** Mammals; the usual prey taken shows pronounced regional differences. Throughout its range the principal prey items are small ungulates (such as duikers, chevrotains), rock hyrax and small primates such as monkeys. Birds and large lizards are rarely taken.

**Nesting:** Sexes are alike; however females are 15% larger. The adult crowned eagle is quite strikingly plumaged. Its crown is dark to rufous-tinged brown with a prominent, oft-raised black-tipped double crest, which can give the head a somewhat triangular appearance. The upperparts of an adult are a blackish brown-grey color, with a variable tinge of blue. The throat is brown while the belly and breast are white overlaid densely with blackish bars and blotches, variably marked with cream or rich buff-rufous coloration. The wing primaries are white at the base, broadly tipped with black and crossed by two black bars. The tail is black with brownish-grey bands. The thighs and legs are barred and closely spotted with black and white. The underwing coverts of adults are a bold chestnut coloration, spotted lightly with black. The adult crowned eagle has eyes that can range from yellow to almost white, a cere and feet of an ochre-yellow color and black talons.

Juveniles have strikingly different looking plumage compared to the adults. Much variation occurs as the maturation process occurs. A great majority of juveniles have a white head and underside, which contrast with the thighs and legs, which are heavily spotted with black. The juvenile eagle's back is light-brown or grayish-brown, with pale feather edgings that often give the back a scaled appearance, especially on the upperwing coverts. There is often a pinkish red wash on the upper chest. Just-fledged chicks tend have dark patched faces, freckled bibs and slightly barred chests and spotted legs. Less common juvenile crowned eagle plumages, possible even when they are under a

year of age and still under parental care, may include eagles so stripy that they could easily have been aged as two to three-year olds. The tail of the juvenile is black with three pale bars and a narrow black tip. The juvenile eagle's cere is grey and the feet are dull-yellow. By 4 months post-fledgling, the inner thighs, previously poorly covered with downy type feathers, are covered with small feathers. While the pale 'morph' young just prior to leaving the nest usually have unmarked tarsus, they soon get spots on the front part of the tibio tarsal joint. The tibio tarsal pad is still bare and obvious up until it is a year old, whereupon it vanishes only to return to incubating females. Eye color is variable too with some having khaki light brown just prior to fledging and others with adult-like yellow ochre eyes. Up to 15 months after leaving the nest, the immature eagles more closely resemble the plumage they have at first independence than the adult's plumage. The juvenile may be confused with the similarly-colored juvenile martial eagle, especially in flight. It is distinguished from the martial species in having a much longer, more heavily barred tail, much shorter wings and spotted thighs.

The male performs an elaborate rise-and-fall display over the forest canopy both during the breeding season and outside it as a territorial proposition. Usually, territorial displays, which outnumber breeding displays, occur around the periphery of the bird's home range while breeding displays are likely to be over or at least near the nest. Displays consist of a series of steep dives and ascents, with a few wing-flaps at the top of each climb and descending circles and figures of eight. During descents, eagles can drop as much as 60 m (200 ft.) at a time before circling back up. During this display, the male is noisy, uttering a shrill *kewee-kewee-kewee* while throwing his head back, often calling for a spell of approximately 30 seconds. The displaying male may reach heights exceeding 900 m (3,000 ft.), sometimes even near cloud level at over 2,000 m (6,600 ft) above the ground. The adult female may also perform independent display flights, uttering a lower *kooee-kooee-kooee*. The female seems to display less often and tends to have a mellower voice. Pairs also perform visually-striking mutual displays, sometimes arising from the first type or when the pairs come together after a brief absence. Spectacular tandems, interlocking talons and falling some distance from the sky are typical of mutual displays.

Crowned eagles have one of the most prolonged breeding cycles of any bird. It is common for raptors that live around the tropics to have a relatively elongated breeding period. Crowned eagle pairs breed once every two years; a single breeding cycle lasts for approximately 500 days in duration. Most other eagle species complete a breeding cycle in less than six months, or in about 35% of the time it takes the crowned eagle.

After engaging in the breeding display described above, the pair collaborate in building a massive nest in a fork of a large forest tree, typically from 12 to 45 m (39 to 148 ft) above the ground. While the female fetches more nesting material, the male tends to be more active in nest construction. A nest built from scratch may take up to 5 months to construct, however existing nests are often repaired and re-used during successive breeding seasons, a process that can take as much as 3 months. It is typical for an eagle pair to use a nest for more than five years and, unlike several other booted eagles, crowned eagle pairs rarely build more than one nest for alternate use. Most large eagles

build a very large nest and the crowned eagle is no exception, as it builds one of the largest nests of any eagle. In the first year they build a nest, it may measure 1.5 m (4.9 ft) across and 50 cm (20 in) deep. However, a larger nest, usually after several years of usage, may measure up to 2.5 m (8.2 ft) across and up to 3 m (9.8 ft) deep. The nest may consist of both dead and greener branches and have a light coverage of leaves and animal matter. Copulation takes place in the nest, several times a day.

In South Africa, the crowned eagle lays its eggs from September to October; in Rhodesia, it lays from May to October; mainly near October around the Congo River; anywhere from June to November in Kenya, with a peak in August through October; in Uganda from December to July; and in West Africa, laying peaks in October.

The clutch of the crowned eagle either contains 1 or 2 eggs. Eggs are usually just white, though may sometimes be overlaid with sparse red-brown markings. Incubation lasts for approximately 49 days. 80-90% of egg incubation is done by the female during the day. Food is mainly brought to the nest by the male in the early stages of breeding, though sometimes both sexes may deliver food. Male brings food to the incubating female every 3 to 5 days. When they initially hatch, the young tend to be quite quiet. If two eggs are laid, the younger one dies by starvation after being out-competed for food by the older one or even directly killed by its older sibling. No nest of wild crowned eagles has been known to successfully produce more than one fledgling, though in captivity two have been known to survive with human interference (supplemental feeding the chick or taking it out of the nest).

**Cool Facts:** Mature crowned eagles are reportedly nearly fearless towards humans and, unless shy from prior interactions, unusually prone to treat humans aggressively. Some biologists consider this species highly intelligent, cautious, independent and inquisitive when compared to other accipitrids. In falconry, crowned eagles cannot be induced to direct their hunting instinct towards large prey by increasing their hunger, as is done with *Aquila* eagles. Amongst post-fledging eagles in a semi-captive state, it has been noted that they border on helpless in terms of feeding and defending themselves compared to other accipitrids and are even described as “cowardly”, unwilling to even simulate attacking prey until many months after fledging. This implies a learning element occurs in wild crowned eagles during their exceptionally long post-fledging period. Crowned eagles are reportedly variable in temperament as individuals to a degree greater than that found in most other raptors.

## *Special Thanks to...*

....**my betatesters** (Flinthawk, and Jan Wilson) and Nerd3D (for his invaluable help in special Poser coding).

## *Species Accuracy and Reference Materials*

The author-artist has tried to make these species as accurate to their real life counterparts as possible. Birds of the same species vary considerably, just as all others do in nature. The birds were created using the correct field markings and the most common similarities.

With the use of one generic model to create dozens of unique bird species, some give and take is bound to occur. In addition, 3D-models have many technical challenges, which make exact representations difficult, if not impossible. It's best to think of these birds represented as resembling the particular species, and they may not, in some cases, be 100% scientifically accurate.

The model and morphs were created using Luxology's Modo. The texture maps were created in Corel's Painter. The model was rigged in Smith-Micro's Poser and adapted for use in DAZ's DAZ Studio.

### *Field Guide Sources:*

- **"The Sibley Guide to Birds"** by David Allen Sibley.
- **"Illustrated Checklist of the Birds of the World. Volume 1: Non-passerines"** by HBW and BirdLife International
- **"Raptors of the World"** by James Ferguson-Lees and David A. Christie

### *Internet Sources:*

- **Cornell Lab of Ornithology** (<http://www.birds.cornell.edu>)
- **Wikipedia** (<http://www.wikipedia.com>)
- **Birdlife International** (<http://www.birdlife.org>)
- **Planet of the Birds** (<http://www.planetofbirds.com>)
- **The Peregrine Fund** (<http://www.peregrinefund.org>)
- **Arkive.org** (<http://www.arkive.org>)



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