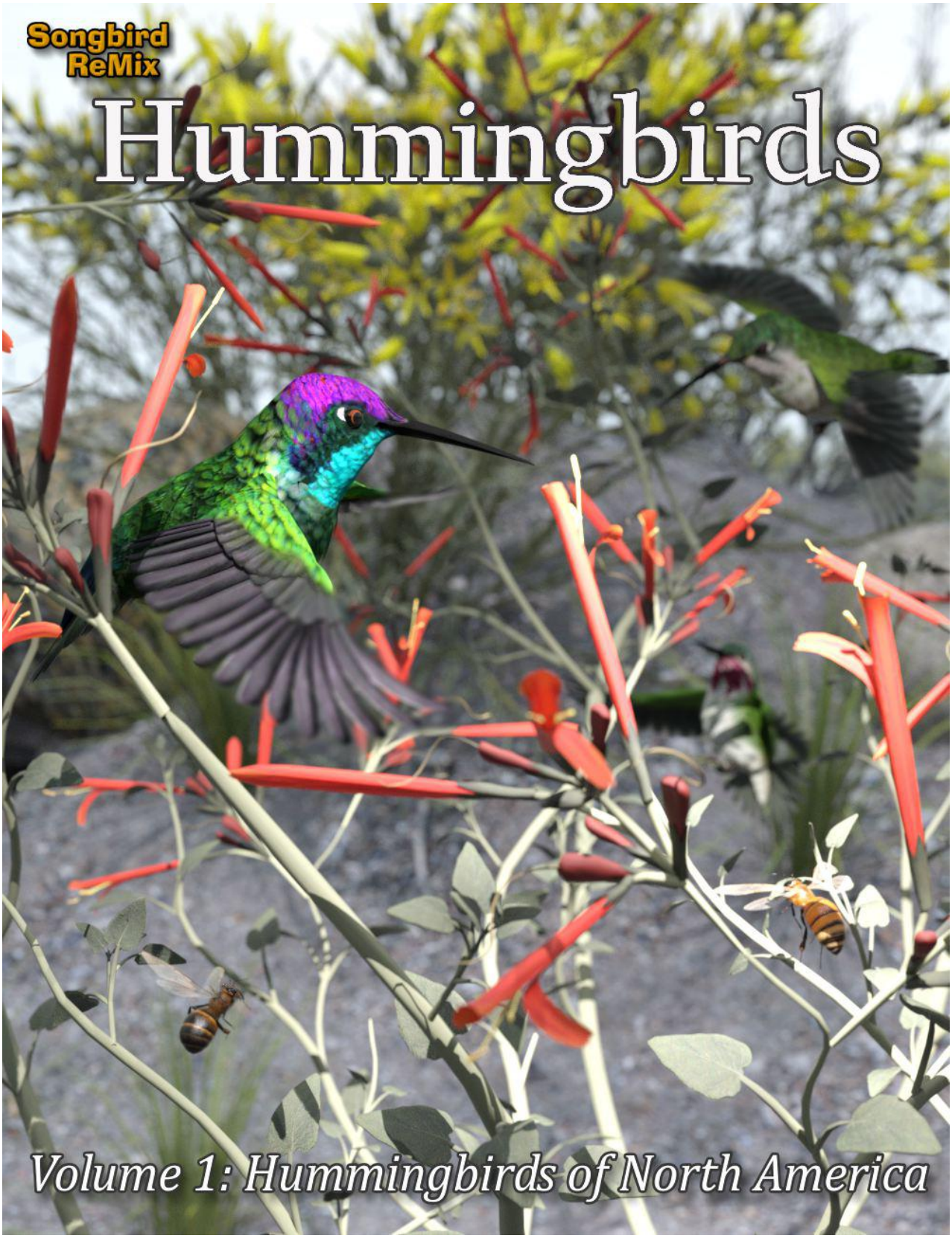


Avian Models for 3D Applications

by Ken Gilliland

Songbird ReMix

Volume 1: Hummingbirds of the North America

Manual

Field Guide

Songbird ReMix

Volume 1: Hummingbirds of the North America

Introduction

“Hummingbirds of the Americas” adds the smallest of songbirds to the Songbird ReMix series. While endemic to the Americas, they have been adopted worldwide as one of the most popular and beloved songbirds. Hummingbirds have been a staple in both ancient and modern cultures as a sign of vigor, energy, and skill.

This collection includes hummingbirds found throughout North America from the feeders of the Western and Eastern US suburbs to tropical islands in the Caribbean.

Included is the Zunzuncito (or Bee hummingbird) of Cuba, the smallest bird on the planet which measures only 2 inches in length and one of the largest hummingbirds, the Red-billed Streamertail from Jamaica, which measures over 10 inches with the tail.

Whether you choose to create art with a message or you are simply looking for realistic and attractive birds for your imagery, this package will easily fulfill those needs.

Overview and Use

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

- **Bird Library:** This folder holds the actual species and poses for the "premade" birds. Birds are placed into a "type" folder (such as "Birds of Prey (Order Falconiformes)" which for example would hold falcons, hawks and eagles). The birds for this set can be found in the following folder(s):
  - **Hummingbirds and Swifts (Order Apodiformes)**
- **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. When using physical renderers such as Iray and Superfly, SubD should be turned to at least “3”. For DAZ Studios 3Delight renders, the SubD must be turned from the “High Resolution” setting to the “Base” setting (otherwise some areas will render incorrectly transparent).

Poser Use

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

DAZ Studio Use

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

Physical-based Rendering

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

Posing & Shaping Considerations

This volume has various species, so when using generic poses not every pose will work perfectly with every bird. You may find that some minor alteration on the stock poses may be warranted.

Here are some of the most common alterations you may need to make:

- Birds will not be flat on the zero plane due to leg size and overall scale.

- Because of the numerous beak shapes, closing the beak may range from 0.5 to 1. Usually 0.8 is about right.
- **Raise Upper Beak** ***(in Action Controls):*** This morph is a “one size fits all” control. Because of the variety of beak shapes. It may not work with all birds.

IK Concerns

Some poses may go askew when IK is turned on. By default, Poser’s IK feature is turned off when loading a bird. To turn it on, select the “Figure” category from the main tool bar and “Use Inverse Kinematics” from the submenu.

By default, DAZ Studio’s IK feature is turned on when loading a bird. This will cause the thigh and shin rotations change when the character is moved. The **CTRL K** keypress will turn IK on and off in DAZ Studio. IK doesn’t work that well in Studio, so I suggest selecting the character in the **Scene tab** and simply deleting the two IK body parts to remove IK.

Where to find your poses and birds

Type Folder	For what species?
Hummingbirds and Swifts (Order Apodiformes)	• Allen's Hummingbird • Anna’s Hummingbird • Bahama Woodstar • Bee Hummingbird • Black-chinned Hummingbird • Broad-billed Hummingbird • Calliope Hummingbird • Costa's Hummingbird • Cuban Emerald • Rivoli’s Hummingbird • Mexican Woodnymph • Red-billed Streamertail • Ruby-throated Hummingbird • Rufous Hummingbird

Songbird ReMix

Volume 1: Hummingbirds of the North America

Field Guide

Allen's Hummingbird
Anna's Hummingbird
Bahama Woodstar
Bee Hummingbird (aka Zunzuncito)
Black-chinned Hummingbird
Broad-billed Hummingbird
Calliope Hummingbird
Costa's Hummingbird
Cuban Emerald (aka Zun-zun)
Rivoli's Hummingbird
Mexican Woodnymph
Red-billed Streamertail (aka the Doctor-bird)
Ruby-throated Hummingbird
Rufous Hummingbird

Hummingbird Facts

Hummingbirds comprise the *Phaethornithinae* and *Trochilinae* families. There are 356 species of hummingbird with 51 species currently having an “endangered status”. They are among the smallest of birds, most species measuring in the 3–5 inches (7.5–13 cm) range. The smallest living bird species is the Bee Hummingbird (2 inches (5 cm)).

They can hover in mid-air by rapidly flapping their wings 12–90 times per second (depending on the species and can fly at speeds exceeding 34 mph (54 km/h). Hummingbirds are the only birds in the world that can fly backwards, but most are incapable of walking or hopping.

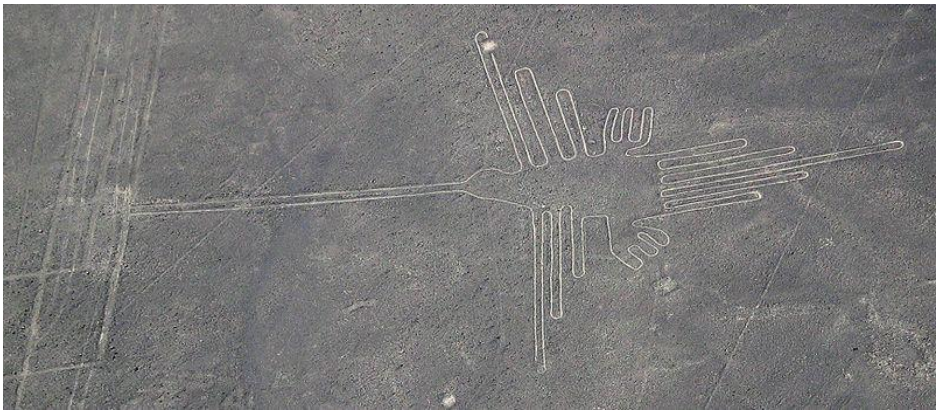
At rest, their heart beats an average of 480 beats per minute. On cold nights they go into torpor, and the heart rate drops to 45–180 beats per minute. Breathing rate when resting is 245 breaths per minute at 91 degrees Fahrenheit; this rises to 420 breaths per minute when the temperature drops to 55 degrees Fahrenheit. Torpid hummingbirds breathe sporadically.

With most hummingbirds, females average larger than males, and young birds average larger than their parents.

Hummingbirds consume about 1.6 to 1.7 times their body weight in nectar each day. Because hummingbirds sip from so many different flowers on any given day, they are integral to the process of pollination.

Their English name derives from the characteristic humming sound made by their rapid wing beats.

A group of hummingbirds has many collective nouns, including a “bouquet", "glittering", "hover", "shimmer", and "tune” of hummingbirds.



Hummingbirds play a strong role in Mesoamerican cultures. In Peru, one of the Nazca Lines depicts a hummingbird. The Nazca "drew" several hundred simple but huge curvilinear animal and human figures by this technique. In total, the earthwork project is huge and complex: the area encompassing the lines is nearly 500 square kilometers (190 sq. mi), and the largest figures can span nearly 270 meters (890 ft.). The lines were made by removing the reddish-brown iron oxide-coated pebbles that cover the surface of the Nazca desert. When the gravel is removed, it leaves a shallow trough ranging

from 10 centimeters (3.9 in) to 15 centimeters (5.9 in) deep and the light-colored earth beneath shows in lines of sharply contrasting color and tone. This sub-layer contains high amounts of lime which with the morning mist hardens forming a protective layer that shields the lines from winds therefore preventing erosion. The extremely dry, windless, and constant climate of the Nazca region has preserved the lines well.

Aztecs wore hummingbird talismans, the talismans being representations as well as actual hummingbird fetishes formed from parts of real hummingbirds: emblematic for their vigor, energy, and propensity to do work along with their sharp beaks that mimic instruments of weaponry, bloodletting, penetration, and intimacy.

The Aztec god Huitzilopochtli is often depicted as a hummingbird. The Nahuatl word huitzil (hummingbird) is an onomatopoeic word derived from the sounds of the hummingbird's wing-beats and zooming flight.

Hummingbirds captured the imagination of European settlers as well and by the middle of the nineteenth century there was a large market for hummingbird skins in Europe. Sadly, hundreds of thousands of hummingbirds were killed in South America and shipped to markets in London and other cities throughout Europe, where they were purchased for collections, to make artificial flowers, and other ornamental uses.

American bird artist, John James Audubon, referred to hummingbirds as "glittering garments of the rainbow." Emily Dickinson, after seeing a Ruby-Throated Hummingbird in her garden, she wrote:

He never stops, but slackens
Above the Ripest Rose --
Partakes without alighting
And praises as he goes,
Till every spice is tasted.

What's a Gorget?

A gorget is a patch of colored feathers found on the throat or upper breast of male hummingbirds. Gorgets are typically iridescent. The term is derived from the "gorget" used in military armor to protect the throat.

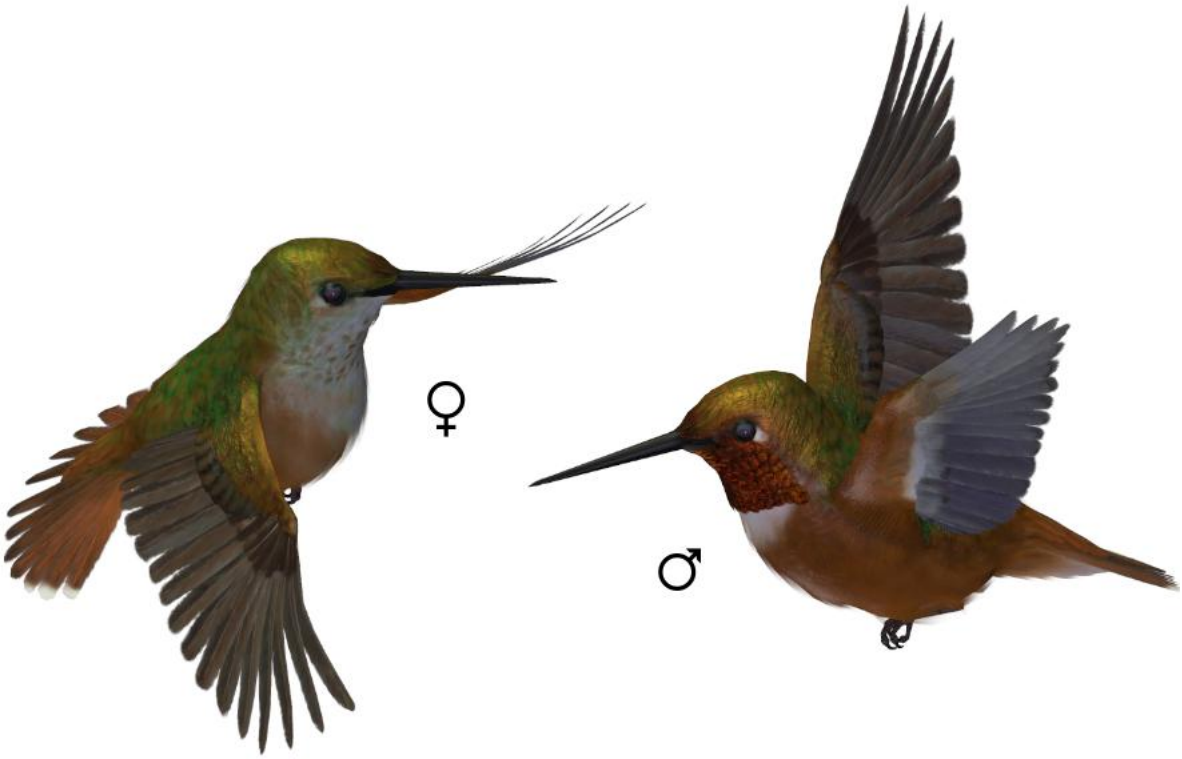
Feather wear and exposure to the sun can produce changes in the apparent color of iridescent gorget feathers. For example, fresh gorget feathers on the Anna's Hummingbird are rose red; these fade to a coppery bronzy color with age. A number of social functions have been suggested for the gorget. It may aid in mate attraction or in resource defense. It may signal social status or allow species to identify conspecifics. While gorgets are typically found only on male hummingbirds, in rare instances, females may have them; they appear to serve primarily for signaling threats.

Common Name: Allen’s Hummingbird
Scientific Name: *Selasphorus sasin*

Size: 3.5 inches (9 cm)

Habitat: North America; found on the coastal strip of the Pacific ocean from Southern Oregon to Mexico. Breeds in moist coastal areas, scrub, chaparral, and forests. Winters in forest edge and scrub clearings with flowers.

Status: Least Concern **Global Population:** 500,000 mature individuals. Populations may be declining (Cornell Lab of Ornithology/IUCN).



Diet: Flower nectar, small insects, and tree sap. Comes to hummingbird feeders.

Breeding: Males have iridescent magenta gorgets. Females have white throats. Both sexes have greenish copper upper parts. Immatures resemble adult females.

Breeding male and female Allen's Hummingbirds have different habitat preferences. The male sets up a territory overseeing open areas of coastal scrub vegetation or riparian shrubs, where he often perches conspicuously on exposed leafless branches. The female selects nest sites in more densely vegetated areas and forests. The courtship flight of the male Allen's Hummingbird is a frantic back and forth flight arc of

about 25 feet (10 m) similar to the motion of a swinging pendulum, followed by a high-speed dive from about 100 feet (30 m). The male is also highly aggressive and territorial.

The Allen's Hummingbird constructs its nest out of plant fibers, down, and weed stems, coating the nest with lichens to give it structure. The nest is placed above ground on a tree branch or the stalk or stem of a plant. The female lays two white eggs, which she will incubate for 15 to 17 days. The young will leave the nest about three weeks after hatching. The mother will continue to feed the fledglings for several more weeks, then the young are left to fend for themselves.

Cool Facts: Two subspecies of Allen's Hummingbirds are recognized. The nominate race of Allen's Hummingbird *S.s. sasin* is migratory, and winters along the Pacific coast of central Mexico. A second race *S.s. sedentarius* is a permanent resident on the Channel Islands off southern California. This population colonized the Palos Verdes Peninsula of Los Angeles County in the 1960s and has since spread over much of Los Angeles and Orange Counties.

Allen’s Hummingbirds closely resemble the smaller Rufus Hummingbirds and 10% of each species has the exact field markings of its counterpart, but for the most part, Rufus Hummingbirds have coppery backs and Allen’s have greenish backs. Both the birds are distinctive by their metallic sounding wingbeat.

The Allen's Hummingbird is a remarkably early migrant compared with most North American birds. Northbound birds may depart on spring migration as early as December and arrive on the summer breeding grounds as early as January. Adult males may begin their southward fall migration in mid-May and arrive on winter grounds as early as August.

The common name commemorates Charles Andrew Allen (1841-1930), American collector and taxidermist.

Subspecies:

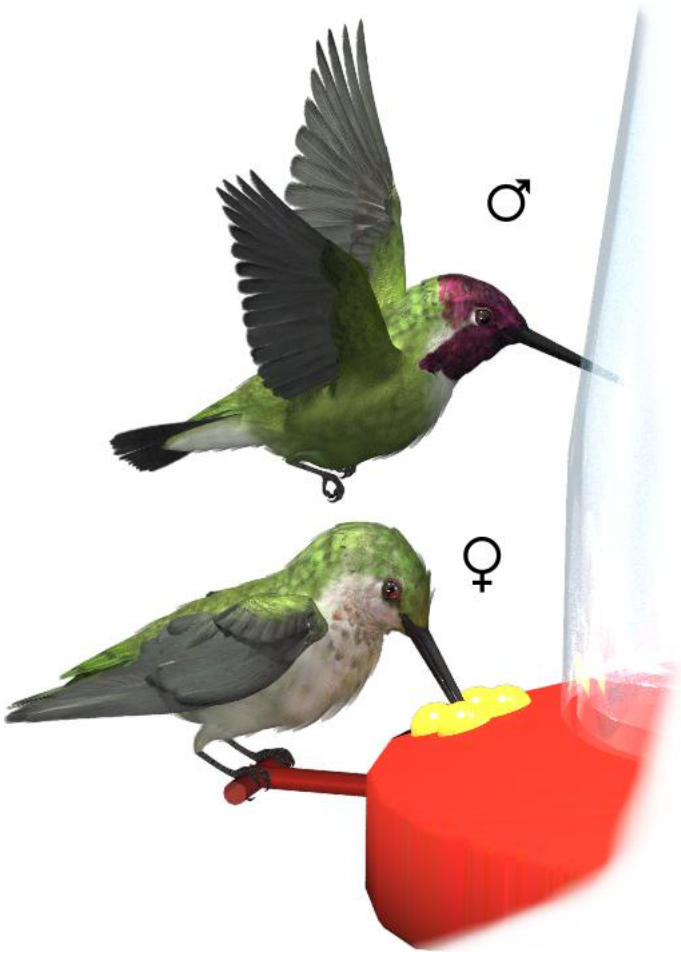
- *S. s. sasin.* First reported by Lesson in 1829. The nominate subspecies breeds from extreme southwestern Oregon to southern California. It winters from southern California to southwestern Mexico.
- *S. s. sedentarius.* First reported by Grinnell in 1929. It is endemic to the Channel Islands and on the nearby mainland of California, from the Palos Verdes Peninsula south through Orange County. Post-breeding birds have been collected in Santa Monica mountains (65 km from breeding grounds on in Palos Verdes), and birds that breed on San Miguel Island may winter on neighboring Santa Rosa Island (an island that supports groves of introduced winter-blooming eucalyptus). It looks like the nominate, but the wing and bill long. Also the wingbeat frequency is perhaps lower.

Common Name: Anna's Hummingbird
Scientific Name: *Calypte anna*

Size: 4 inches (10 cm)

Habitat: North America; West coast from Canada to Mexico, but primarily California. They live in chaparral near open woodland, and urban and suburban areas.

Status: Least Concern. **Global Population:** 1,500,000 mature individuals with an increasing population trend. It has expanded its range dramatically since the mid-1930s. It once nested only on the Pacific slope of northern Baja California and California north to the San Francisco Bay area, but now breeds north to Vancouver Island, British Columbia, eastward through southern Arizona, and it has an increasing presence in West Texas. This species' effective use of widely cultivated urban and suburban exotic plants and hummingbird feeders has contributed to its increased numbers and expanded range. In many localities Anna's is present throughout the year, although it is rarely known if nesting birds are resident or if they are replaced by individuals from another region.



Diet: Pollen and small insects.

At times, hummingbirds will fly-catch by diving into clouds of gnats.

Breeding: It is a medium sized, stocky hummingbird that is an iridescent bronzy-green dorsally and grayish below with straight bill of medium length and fairly broad tail.

Adult males (and some young males) have both a rose to magenta gorget (with elongated feathers projecting to the sides) and crown which is unlike any other North American hummingbird. They have dark sepia tails. Adult females may have some rose

feathers in the center of their gorget, but only very rarely have any magenta feathers on the crown. Juveniles may have some gorget color, and lack rufous in tail (the central rectrices are green, outer ones blackish subterminally with whitish tips as in adult females).

Male Anna's Hummingbirds attract attention through their elaborate dive displays, in which they ascend about 35 meters and then plummet toward their target; a female Anna's Hummingbird or other bird. Males sing more conspicuously than any other North American hummingbird, and their songs are learned and complex, unusual in nonpasserine birds.

Female Anna's Hummingbirds are less conspicuous than males and sometimes defend feeding territories, but usually away from those of males. They associate with males only long enough to copulate

Females construct tiny nests out of leafy material, feathers and are bound together with spider webs. The nests are placed on crotches of branches. Once the nest is completed, the female begins courtship with a male. Unlike most hummingbirds, the Anna's sings during courtship. After courtship, the male leaves and the female incubates two eggs. She cares for the hatchlings by herself. Young hummingbirds are born naked and blind and fledge after about three weeks.

Cool Facts: The Anna's Hummingbird was named after the 19th century Italian duchess Anna De Belle Massena. Naturalist, Rene Primevere Lesson, discovered the first specimen and named it after his patron's name. It is also the largest of the hummingbirds of North America.

The Anna's hummingbird is the only hummingbird that stays put. Though some winter in Mexico and some travel as far as Canada, most Anna's Hummingbirds stay year round in California.

Mishaps can occur trying to get lunch… bees and wasps may become impaled on the bill, causing the bird to starve to death**.** The male Anna's hummingbird is <u>extremely</u> territorial.

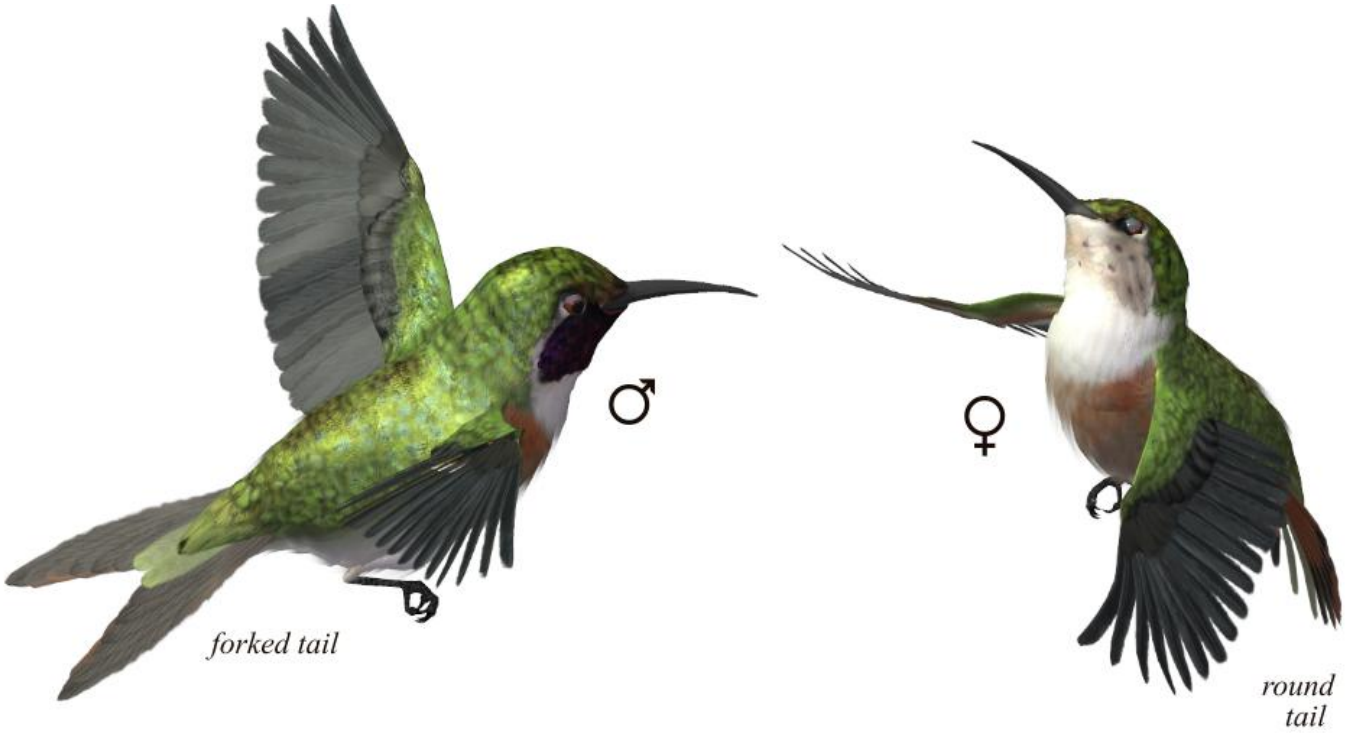
Common Name: Bahama Woodstar
Scientific Name: *Nesophlox evelyna*

Size: 3-5 inches (7.8-8.2 cm)

Habitat: North America; endemic to the Bahamas (except Inagua) and Caicos Islands.

It is found in many different habitats on all the islands in the Bahamas.

Status: Least Concern. **Global Population:** 235,000 mature individuals with a stable population trend. Although the Bahama Woodstar is not listed on the IUCN Red List of Threatened Species, it is protected by Bahamian law under the Wild Birds Protection Act. The Convention for International Trade of Endangered Species (CITES) lists the Bahama Woodstar in Appendix II which limits the exportation of the species as it can cause the species to become endangered.



Diet: Nectar of flowering shrubs, vines and trees (native and introduced), including Russelia, Leonotis, Ipomea, Euphorbia fulgens, Pedilanthus, Duranta, Lantana, Stachytarpheta, Ernodes, Dicliptera, Cordia and Bauhinia.

Insects are caught in the air by hawking. Males defend territories in flowering shrubs and trees.

Breeding: Both have a short, slightly decurved black bill. The backs are iridescent green and there is a small postocular white spot. On the male the chin and throat are a

glittering violet-purple with a white breast. The belly rufous with mixed with green while the lower flanks are rufous. The tail is deeply forked with the central tail feathers being green and the others are with partly cinnamon-rufous inner webs. After breeding, the iridescent throat of male is replaced by a pale gray “eclipse” plumage. The females upper parts are dull green with the small postocular spot, chin and throat pale whitish to light gray with some small green discs on the cheek sides. The chest is whitish and the belly rufous. The tail is rounded with the central tail feathers being green and the others a cinnamon with broad black subterminal band. Juveniles are similar to the adult female. The young male has a narrow pale buffy tips to the upper parts feathers, pale gray to dusky cinnamon throat with lines of dusky flecks and typically a few magenta-rose spots, while tail is more deeply forked, the outer rectrices slightly longer and narrower, mostly blackish with less cinnamon at base and smaller cinnamon tips. The young female also has a narrow pale buffy to gray tips to upper parts when feathers are fresh, paler cinnamon sides and flanks (without green spotting), and cinnamon in tail is also paler.

Nests are created year-round, but mostly in January through April. The nest is a small cup made of plant down, bark and cobwebs. The female lays 2 elliptical white eggs, which will incubate for 15-18 days.

Cool Facts: The Bahama Woodstar was originally classified *Calliphlox evelyna* and thought to be conspecific with *Nesophlox lyrura (*formerly *C. e. lyrura).* It was demonstrated that present species is sister to genus *Mellisuga*, thus the reclassification.

The Bahama Woodstar will nest all year round and does not migrate.

While most hummingbirds are aggressive to any bird, with the exception of their mates, the Bahama Woodstars may gather where flowers are abundant. However they are not truly sociable birds. There are times that they will chase an intruding neighbour away as well as birds of other species.

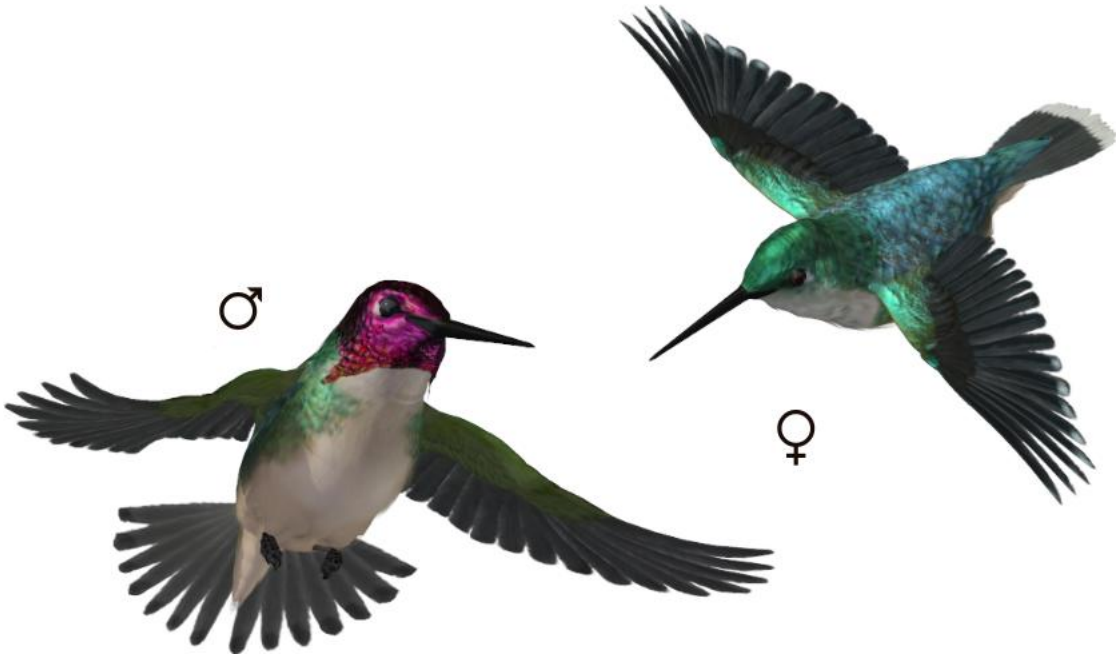
Common Name: Bee Hummingbird or Zunzuncito
Scientific Name: *Mellisuga helenae*

Size: 2 inches (5-6 cm)

Habitat: Central America; endemic to Cuba and Isla de la Juventud. It is easily found only in three regions of Cuba, namely the extreme west, on the Guanahacabibes Peninsula, further east in the vicinity of the Zapata Swamp, and more widely in the far east of the island.

It occurs in woodland, swampland, shrubbery and gardens. It is seen occasionally in fairly open country, but generally requires mature growth with thick tangles of lianas and rich in epiphytes.

Status: Near Threatened. **Global Population:** 218,000 mature individuals with a declining population trend. The historic decline is principally the result of habitat modification and destruction. Much of Cuba's natural vegetation has been converted to cultivation and pasture for cattle, with only 15-20% of land remaining in its natural state, and the recent expansion of cacao, coffee and tobacco production poses a further serious threat.



Diet: The nectar of Aloe, Laguncularia, Goethea, Hibiscus, Malvaviscus, Leucaena, Hamelia, Ixora, Russelia and Duranta species. It has also been seen taking nectar from flowers of the mangrove (*Avicennia germinans*). During breeding, female observed

feeding on *Seufamia diversifolia, Pavonia spicata, Calophyllum antillanum* and an Oxidiun orchid. It will also take small insects.

Breeding: The male bee hummingbird exhibits extravagant breeding plumage, with iridescent, fiery red-pink feathers on the head and throat, which are elongated around the neck. The rest of the upper parts are bluish-green, and the under side is off-white, with blue spots on the wing tips and black-tipped tail feathers. The brightly colored feathers are only apparent before and during the breeding season, and are shed shortly after, when they are replaced by more drab plumage. The female bee hummingbird is slightly larger than the male, with green upper-parts, white tips to the tail feathers, and without the iridescent plumage.

Breeding season occurs March through June. Using bits of cobwebs, bark, and lichen, the female bee hummingbird builds a cup-shaped nest that is only about 1 inch (2.5 cm) in diameter. Nests have been built on single clothespins. She lines the nest with soft plant fibers. In this nest she lays her eggs, which are no bigger than peas. She alone incubates the eggs and raises the young. Nesting takes place between April and June.

Cool Facts: The diminutive bee hummingbird has the incredible distinction of being the smallest living bird in the world. The bee hummingbird beats its wings an estimated 80 times per second — so fast that the wings look like a blur to human eyes.

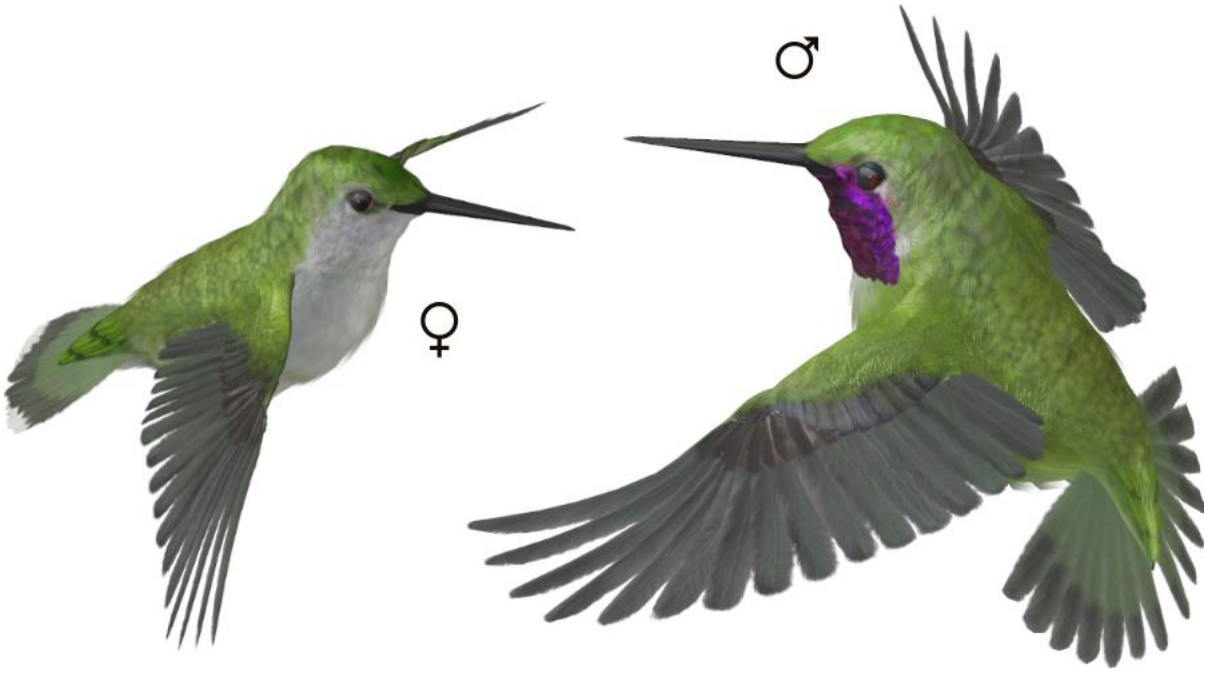
In the Spanish name, Zunzuncito, “Zun zun” refers to the birds speed and “cito” means very small.

Common Name: Black-chinned Hummingbird
Scientific Name: *Archilochus alexandri*

Size: 3.25 inches (8.25 cm)

Habitat: North America; **Summer:** Breeding habitat includes open semi-arid areas near water in the western United States, northern Mexico and southern British Columbia. There are two distinct ranges; a narrow coastal strip from Baja California to San Francisco (California) and from central Mexico through western interior of Northern America (west of the Rockies) to Canada. **Winter:** The western coast and interior of Mexico.

The Black-chinned Hummingbird is a habitat generalist, found in lowland deserts and mountainous forests, in “natural” habitats and very urbanized areas as long as there are tall trees and flowering shrubs and vines.



Status: Least Concern. **Global Population:** 2,000,000 mature individuals. This species has undergone a large and statistically significant increase over the last 40 years in North America (72.6% increase over 40 years, equating to a 14.6% increase per decade; data from Breeding Bird Survey and/or Christmas Bird Count.

The introduction of exotic plants and the maintenance of feeders containing sugar water has significantly impacted the Black-chinned and other hummingbird species. High-

quality food supplies, often when native sources are not available, have increased population levels in urban and suburban settings. Previously unoccupied habitats are now populated, which in turn has increased population levels of the species. With a larger population, there is an increase in the number of long-distance and vagrant occurrences. Habitats that historically supported only the Black-chinned Hummingbird now support other species of hummingbirds.

Diet: Flower nectar, small insects, and tree sap. Some of the most important plant groups include beardtongue (Penstemon), century-plants (Agave), desert-honeysuckle (Anisacanthus), larkspur (Delphinium), paintbrush (Castilleja), sage (Salvia), skyrockets (Ipomopsis), thistle (Cirsium), and vines (Campsis, Lonicera). Additional plants include firecracker-bush (*Bouvardia glaberrima*), hummingbird-bush (*Justicia californica*), ocotillo, and tree tobacco.

It hovers at flowers and feeders, darts erratically to take tiny swarming insects, perches atop high snags to survey its territory, watching for competitors to chase off and for flying insects to eat.

Breeding: Adults are metallic green above and white below with green flanks. Their black bill is slightly decurved. The adult male has a black face and chin, a glossy purple throat band and a dark forked tail. The female has a dark rounded tail with white tips and no throat patch; they are similar to female Ruby-throated Hummingbirds. During courtship and territorial defense, males display by diving 66-100 feet.

Females build a well-camouflaged nest in a protected location in a shrub or tree using plant fiber, spider webs and lichens. A Black-chinned Hummingbird’s eggs are about the size of a coffee bean. The nest, made of plant down and spider and insect silk, expands as the babies grow.

Cool Facts: A hybrid between this species and Anna's Hummingbird was called *Trochilus violajugulum*. It is also known to hybridize with the Costa's Hummingbird.

Female and young Black-chinned Hummingbirds resemble those of several other species making identification difficult and sometimes impossible. The adult male Black-chinned Hummingbird whose throat is mostly black-purple is likely to be confused with the Ruby-throated Hummingbird whose throat is mostly crimson in poor light. Female Black-chinned Hummingbirds are distinguished from female Anna's Hummingbirds and Costa's Hummingbirds on basis of shape and width of inner primary flight feathers (inner primaries approximately as wide or wider than outer primaries in species *Calypte*. The inner primaries are much narrower than outer 4 primaries in species *Archilochus.* The Anna's adult female is larger, with metallic magenta feathers in the center of the throat, and it has gray under parts. Nearly half of the adult Costa's Hummingbirds females have a small patch of metallic violet feathers on the throat, but other half have

their throats entirely white. The female Black-chinned has club-shaped outer primary while the Ruby-throated has knife-shaped outer primary.

The Black-chinned Hummingbird's tongue has two grooves; nectar moves through these via capillary action, and then the bird retracts the tongue and squeezes the nectar into the mouth. It extends the tongue through the nearly closed bill at a rate of about 13–17 licks per second, and consumes an average of 0.61 milliliters (about a fifth of a fluid ounce) in a single meal. In cold weather, may eat three times its body weight in nectar in one day. They can survive without nectar when insects are plentiful. They aren't so much drawn to the red coloring as they are to the colors of recent nectar sources.

The oldest known Black-chinned Hummingbird lived to be 10 years, 1 month old.

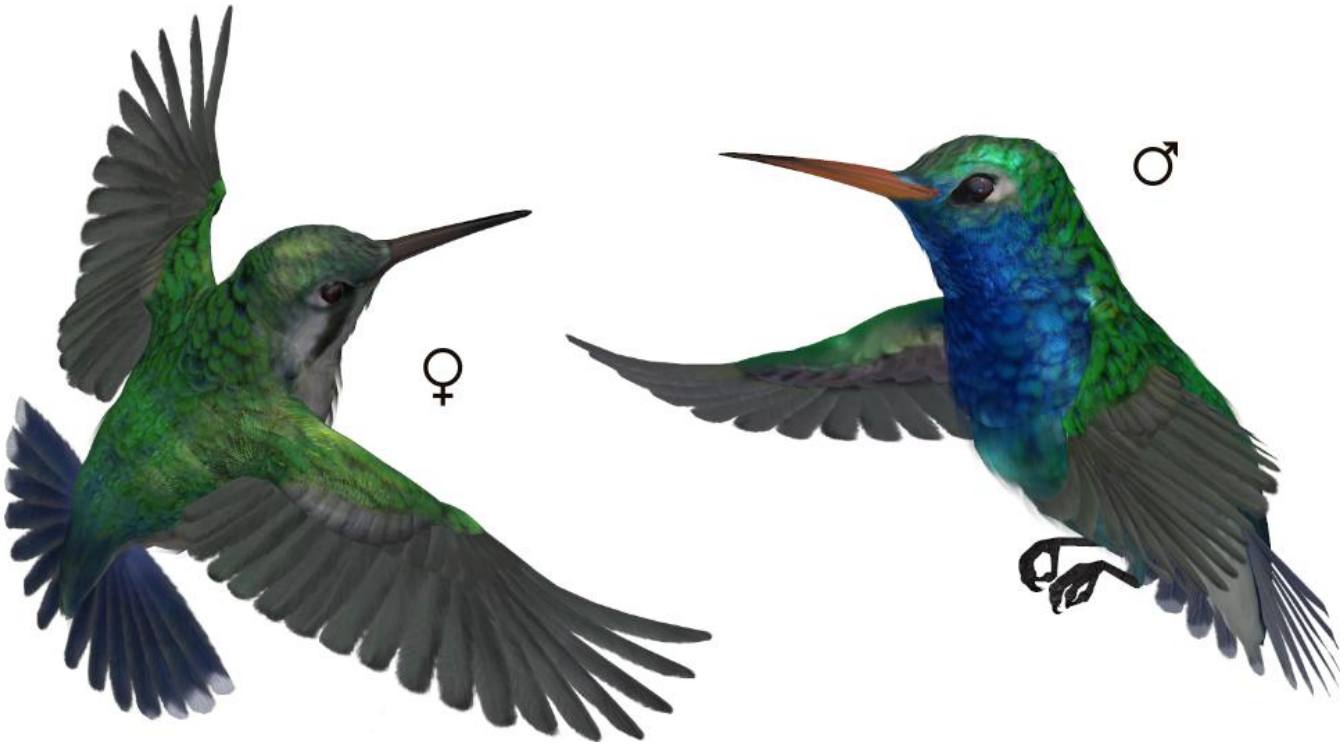
Common Name: Broad-billed Hummingbird
Scientific Name: *Cynanthus latirostris*

Size: 3.25-3.5 inches (9-10 cm)

Habitat: North America; Mexico to southeastern Arizona. Broad-billed Hummingbirds that nest in Arizona are migratory; populations in Mexico are resident year-round in their breeding range.

Found in arid scrub, open deciduous forest, semi-desert and other open situations in arid habitats.

Status: Least Concern. **Global Population:** 2,000,000 mature individuals. The population trend is increasing in North America.



Diet: Flower nectar, small insects, and tree sap.

Breeding: Adults are colored predominantly a metallic green on their upper parts and breast. The under tail coverts are predominately white. The tail is darkly colored and slightly forked. The bill of the male is straight. It is orange-red in coloration, and shows a black tip. His throat is a deep blue. The female is less colorful than the male with an off-white throat and breast. She usually shows a white eye stripe.

The male Broad-billed Hummingbird performs a courtship display, starting by hovering about a foot from the female and then flying in repeated arcs, like a pendulum. The female builds a nest in a protected location in a shrub or tree. Females lay two white eggs.

Cool Facts: One of the smallest and most colorful hummingbirds in North America. Broad-bills weigh approximately three to four grams.

Northern populations show a weak trend toward increasing size from north to south, with the largest birds in central Mexico. The ventral color of the male tends to become darker (bluer or greener) from north to south, with little or no break in color of under parts from east to west or farther to the south. There are four subspecies. These subspecies differ subtly in color and size, except for race *lawrencei*, which is more distinctive.

Northern Latirostris Group:

- *C. l. magicus*. First reported by Mulsant and Verreaux in 1872). It breeds from southern Arizona and southwestern New Mexico south along the Sierra Madre Occidental to Colima and Aguascalientes. The northernmost breeders migrate south for the winter. It is a vagrant to southern California and elsewhere in the western North America. Its forehead and crown are a dull bronzy green. The dorsum is emerald green and the under tail coverts are white. The males throat is blueand the ventrum (often dull) is green in the male or white with little or no green mottling in the female. The basal part of rectrices is a bright green and the central rectrices without or with a reduced, bluish subterminal band. The tail of the male is notched shallowly. Its size is average.
- *C. l. latirostris.* First reported by Swainson in 1827. The nominate race is a resident in east-central Mexico from Nuevo León, San Luis Potosí, and Tamaulipas south to northern Veracruz, Morelos, and the Valley of Mexico. It is similar to race *magicus*, but the under tail coverts are dark gray (not white) and on the male, the blue on the throat more sharply demarcated from the breast. Of all the races, it is one of the largest.
- C. l. propinquus. First reported by Moore in 1939. It is a resident in central Mexico from Guanajuato through Michoacán to northern Guerrero. It also is like race *magicus*, but darker overall with the crown more metallic green (less bronzy). On the male, the blue of the throat extends into the breast. It size is similar to the nominate. Within the range of this subspecies, there is a trend toward increasing blue on the breast.

Tres Marias Islands Group:

- *C. l. lawrencei.* First reported by Berlepsh in 1887. It is endemic to María Madre and María Cleofás in Islas Tres Marías, Sinaloa. It is similar to race *magicus,* but the dorsum is bronzy green (not emerald) and the throat emerald green (not blue). It averages smaller when compared to other races.

Common Name: Calliope Hummingbird
Scientific Name: *Selasphorus calliope*

Size: 3.5 inches (9 cm)

Habitat: North America; **Summers:** The Pacific Northwest from Northern California to British Columbia. **Winters:** Southern Mexico to Central America; normally wintering from Sinaloa and Durango south to Oaxaca.

Found in open montane forest, mountain meadows, willow and alder thickets while in migration and, in winter, they are also found in chaparral, lowland brushy areas, deserts and semi-desert regions. It generally inhabits cool environments, 0.5-25°C during nesting season, 0-24°C during migratory stops in Colorado, and 0-25°C wintering in Mexico and Arizona.

Status: Least Concern. **Global Population:** 1,000,000 mature individuals. This species has had stable population trends over the last 40 years in North America (data from Breeding Bird Survey and/or Christmas Bird Count: Butcher and Niven 2007).

Diet: Flower nectar and small insects. Flower species include typical red-tubular “hummingbird flowers” as well as wide variety of yellow, white, blue, and purple flowers. It will regularly feed at sap “wells” (holes in trees) created by sapsuckers.

Like other hummingbirds, it forages aerially for small insects (*Diptera, Hymenoptera, Coleoptera*) by hawking—perching on willow (*Salix spp.*) tips and flying out like a flycatcher.

Breeding: These birds have glossy green on the back and crown with white underparts. Their bill and tail are relatively short. The adult male has wine-red streaks on the throat, green flanks and a dark tail. Females and immatures have a pinkish wash on the flanks, white throat with sometimes a few small spots of male's gorget color, and a dark tail with white tips. There is no rufous coloring in central pair of female's tail feathers.

The female builds an open cup nest in a conifer under an overhanging branch.

Cool Facts: The adult male is only North American hummingbird whose iridescent gorget is divided into separate magenta-red rays, which can be elevated in elegant star-burst display against white background of throat.

Calliope hummingbirds have been known to hybridize with Anna's (*Calypte anna*) and Costa's (*C. costae*) hummingbirds. These, with specimens of Anna's x Allen's hummingbirds and of Anna's x Black-chinned hummingbirds, have led ornithologists to suggest that the species "*Selasphorus*, *Calypte*, *Archilochus* and *Stellula* may have arisen from a common ancestral stock at different times" (Banks and Johnson, 1961).

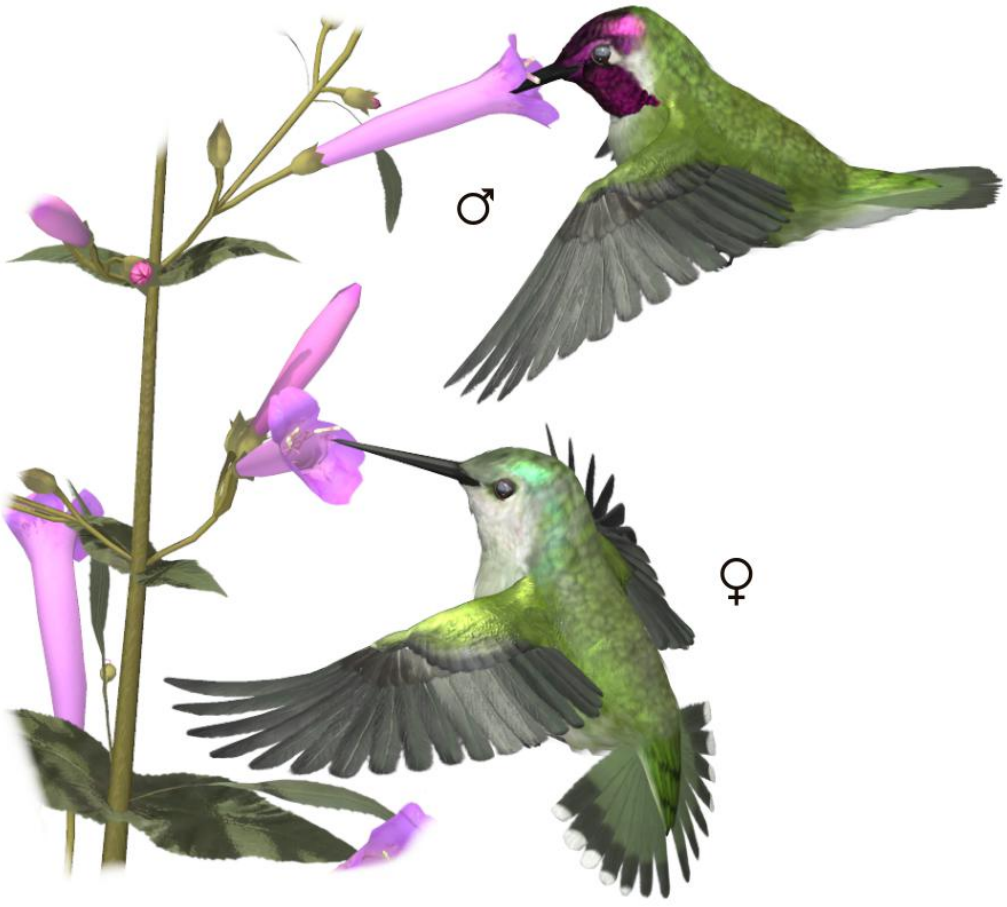
Common Name: Costa's Hummingbird
Scientific Name: *Calypte costae*

Size: 3.5 inches (9 cm)

Habitat: North America; Northwest Mexico, Baja California, Southern California, western Arizona and southern Nevada.

Desert and semi-desert, arid brushy foothills and chaparral while in migration and in winter they are also found in adjacent mountains, in open meadows and gardens.

Status: Least Concern. **Global Population:** 4,000,000 mature individuals. Loss of habitat, especially coastal scrub and Sonoran desert scrub, pose the most serious threat to the species. Availability of feeders may have a compensating effect, to an undetermined degree.



Diet: Flower nectar and small insects. Two shrubs appear especially important: chuparosa and ocotillo.

It gleans small spiders and insects from vegetation. It is opportunistic in seeking nectar. In addition to visiting classic hummingbird flowers, it probes tiny desert lavender flowers and huge saguaro flowers. Hummingbird-adapted flowers include chuparosa, ocotillo, barestem larkspur (*Delphinium scaposum*), desert honeysuckle (*Anisacanthus thurberi*), and Mojave beardtongue (*Penstemon pseudospectabilis*). All these flowers have one thing in common, relatively long, narrow floral tubes colored orange, red, or purple.

Breeding: Males have iridescent violet crowns and gorgets. The gorget ends extend out sides of throat. Females have white throats and under parts, sometimes with some violet feathers. Both sexes have green upper parts. Immatures resemble adult females, with gray-buff edging on feathers of upper parts, and a doubly-rounded tail instead of singly-rounded.

The male Costa's Hummingbird's courtship display is a spirited series of swoops and arcing dives, carefully utilizing a proper angle to the sun to show off his violet plumage to impress prospective mates. Each high-speed dive will be accented by a high-pitched sound (caused by the air flow over the tail feathers) as the male passes within inches of the female, who is perched on a nearby branch.

The Costa's Hummingbird constructs a small cup-shaped nest out of plant fibers and down, coated with lichen to hold it together. The nest will be situated above ground on a yucca stalk or tree limb. The female lays just two eggs, which are white in color, which she will incubate for 15 to 18 days before the young hatch. The young Costa's Hummingbirds leave the nest after 20 to 23 days.

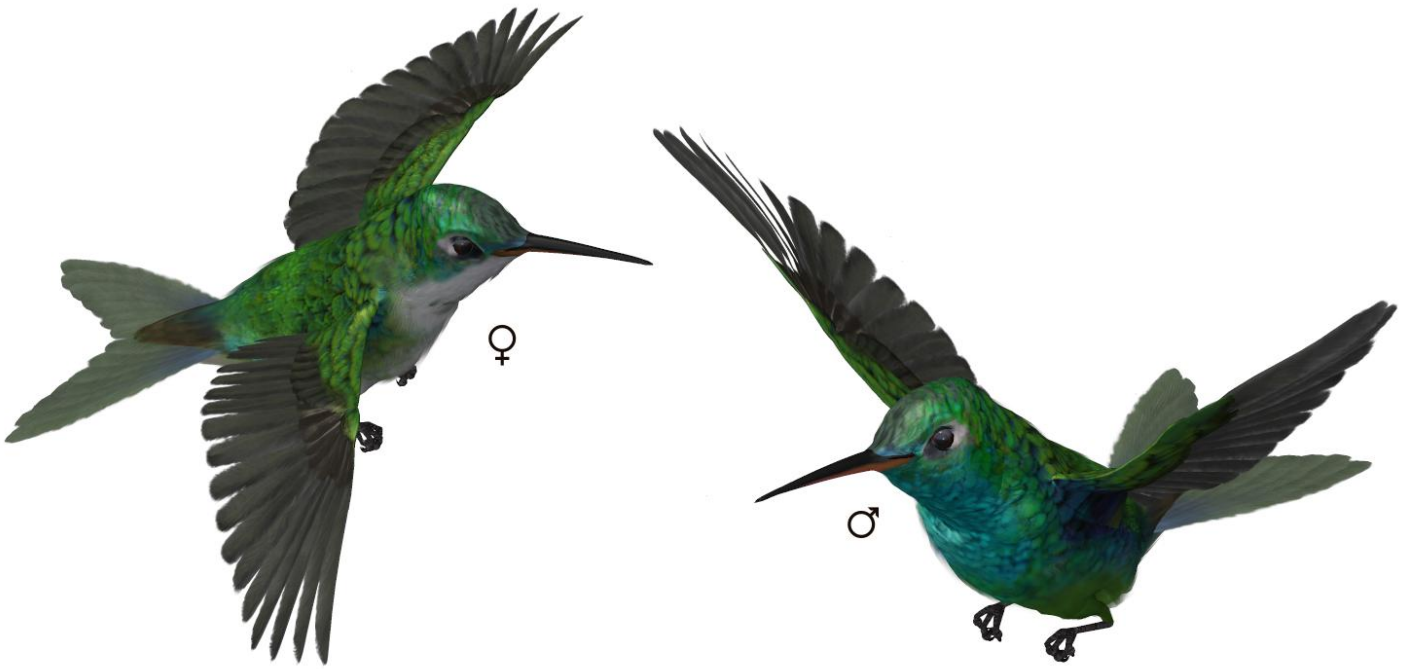
Cool Facts: Researchers have found that the Costa's Hummingbird can enter a torpid state, with slowed heart rates and reduced body temperatures, under low ambient nighttime temperatures. The hearts of torpid Costa's Hummingbirds beat about 50 times per minute, while those of non-torpid resting Costa's Hummingbirds beat 500 to 900 times per minute.

Common Name: Cuban Emerald or Zun-zun
Scientific Name: *Riccordia ricordii*

Size: 4-4.5 inches (9.5-10.5 cm female; 10.5-11 cm male)

Habitat: North America; it is found on Cuba (including Cayo Coco, Cayo Largo and numerous other cays) and the Isle of Pines; and in the Bahamas (Grand Bahama, Great Abaco, Andros, Green Cay; occasionally seen in rest of the Bahamas).

It is found in a wide range of semi-open habitats; forests, coastal vegetation, and gardens.



Status: Least Concern. **Global Population:** 492,000 mature individuals with a stable population trend. It readily inhabits man-made habitats and is generally considered “common” throughout much of its extensive range.

Diet: Flower nectar and small insects.

Insects are caught in the air by hawking, and occasionally gleaned from spider webs.

The Cuban emerald is much larger than its cousin, the bee hummingbird, and as a result feeds on a much larger array of blossoms. Because of this size difference, the two species have avoided competing with each other for food.

Breeding: The male has a short bill with a black upper mandible and a red lower mandible with a black tip. Upper parts are dark green while under parts are shiny green with a hint of metallic blue. The under-tail coverts are white and the tail is deeply forked. The female is similar but the under parts are brownish-grey with green flanks and the tail is slightly less forked. Both sexes have a whitish spot behind the eye.

The female builds a nest in a protected location in a shrub or tree. Females lay two white eggs.

Cool Facts: The Zun-zun is the national bird of Cuba.

Common Name: Rivoli's Hummingbird
Scientific Name: *Eugenes fulgens*

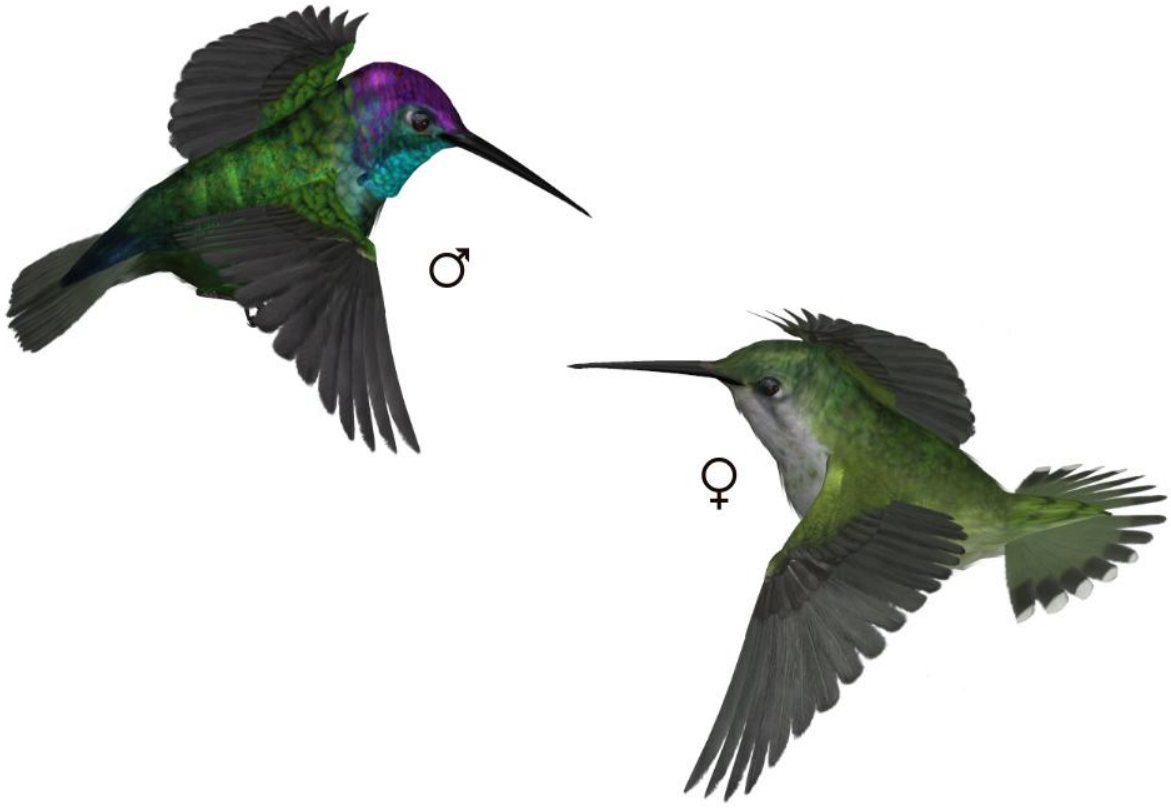
Size: 4.3-5.5 inches (11-14 cm)

Habitat: North America; from Southern Arizona to western Panama.

Humid montane forest (primarily in edge and clearings), pastures, open woodland, pine-oak association and scrubby areas.

Status: Least Concern. **Global Population:** 2,000,000 mature individuals. Habitat destruction may be a problem in Mexico and Central America, but specific effects have not been documented.

Diet: Flower nectar and small insects.



Breeding: The adult male is green-bronze dorsally, becoming more bronzed on the black-tipped tail. The crown is violet, the throat gorget bright blue-green, and the rest of the head black apart from a white spot behind the eye. The chest is green-bronze and the belly greyish. The female Magnificent Hummingbird is bronze-green dorsally and a

dull grey ventral coloring. There is a white stripe behind her eye. Immature birds are like the female, but darker and browner. Magnificent Hummingbird males perch conspicuously and defend their feeding territories aggressively.

The female is entirely responsible for nest building and incubation. She lays two white eggs in her bulky cup nest about 3 meters up near the tip of a descending branch stem. Incubation takes 15–19 days, and fledging another 20–26.

Cool Facts: Rivoli's Hummingbird was named in honor of Francois Victor Massena, the Duke of Rivoli when the species was described by René Lesson in 1829. Even when it became known that William Swainson had written an earlier description of this species in 1827, the common name, Rivoli's Hummingbird, remained until the early 1980s, when it was changed to Magnificent Hummingbird. In 2017, however, the name was restored to Rivoli's Hummingbird when the American Ornithological Society officially recognized *Eugenes fulgens* as a distinct species from *E. spectabilis*, the Talamanca Hummingbird, of the highlands of Costa Rica and western Panama.

It is the second-largest hummingbird north of Mexico. Only the Blue-throated Hummingbird is larger.

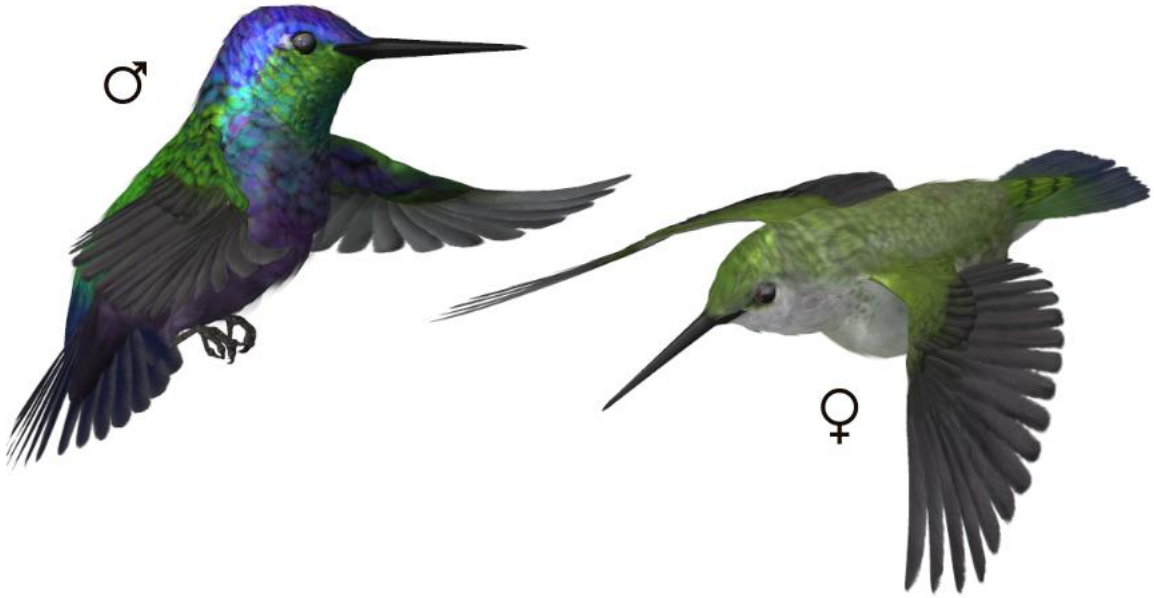
Common Name: Mexican Woodnymph
Scientific Name: *Eupherusa ridgwayi*

Size: 3.75 inches (9-10 cm)

Habitat: North America; Mexico. It is patchily distributed in south Nayarit, Jalisco and Colima states, west Mexico, where it is uncommon to locally common.

It occurs in humid, semi-deciduous woodland and shade coffee plantations at elevations of 250-1,200 m. Its ecology is poorly known, but it is often found along streams and generally avoids edge habitat.

Status: Vulnerable. **Global Population:** 6,000-14,999 mature individuals with a decreasing population trend. Its avoidance of edge habitats indicates that it is probably threatened by habitat destruction, particularly for the cultivation of sun coffee.



Diet: Flower nectar, also some insects. It prefers flowering Rubiaceae, Zingiberaceae and epiphytes (bromeliads, ericads and mistletoes)

Insects are gleaned from foliage and caught in the air by hawking.

Breeding: Medium-sized, mainly green hummingbird with black wings. Male has iridescent blue forehead and bluish-green hindcrown, iridescent emerald throat and slightly forked, bluish-black tail. Female green above with small, white postocular spot,

greyish below with green discs on flanks. Bluish-black tail with white tips to outer rectrices and green central rectrices. Straight black bill.

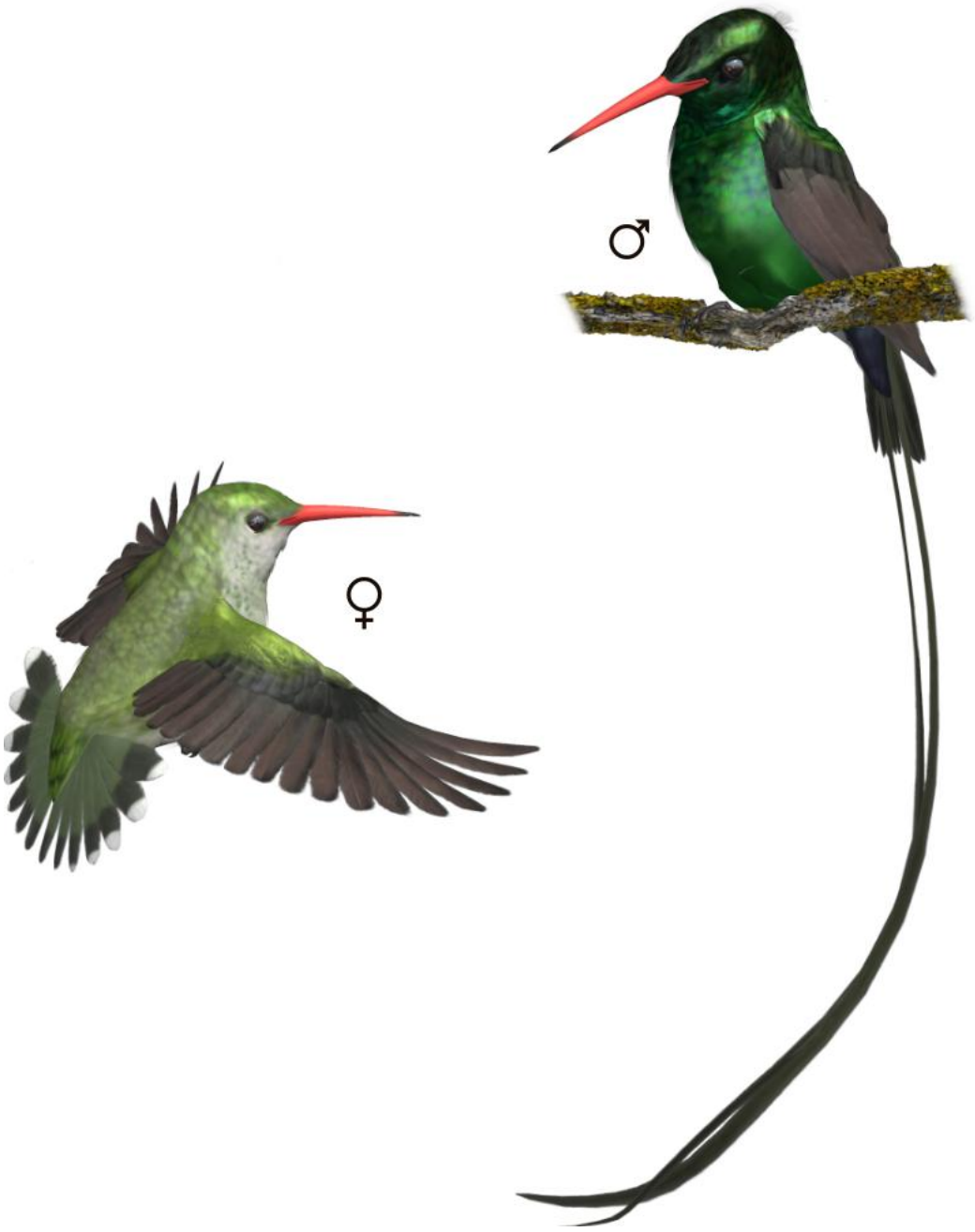
Cool Facts: It has been considered conspecific with the Violet-crowned Woodnymph of Central and northern South America. Only known vocalization an irregularly repeated liquid note "*tsip*", often in short fast series of 2–4 notes producing a liquid rattle, usually given while hovering.

Common Name: Red-billed Streamertail or Doctor Bird
Scientific Name: *Trochilus polytmus*

Size: 3.25-3.5 inches (9-10 cm); Streamers (rectrices) on males add an additional 6-7 inches (13-19 cm)

Habitat: North America; endemic to Jamaica.

It occurs in all habitats from sea level to the highest mountains wherever there are flowering plants. Absent only from the most eastern end of the island. Most abundant in closed forest, but is a common garden bird and a popular garden-feeder species.



Status: Least Concern. **Global Population:** 12,800 mature individuals. The global population size has not been quantified, but this species is described as 'common'.

Diet: Flower nectar, also some insects.

Breeding: Males have a bright iridescent emerald green body, black head with lateral crown feathers elongated behind the nape to form conspicuous ear tufts, bill is bright red with black tip. Tail is black with the second to outermost tail feathers elongated to form 'streamers' which are often crossed. The streamers, scalloped and fluted on the inside, create a high whining humming sound in flight. Immature males and males in molt lack the streamers. Females are green upper back with white under parts, gray-brown head; bill is mostly dark, red at base. No streamers in the tail, but outer tail feathers are tipped white.

Nests are a small compact cup constructed of plant materials bound together by spider's web and often camouflaged with lichens. Streamertails do breed year-round, but mainly from October to March. Females lay two bean-sized white eggs, incubation period is 2-3 weeks. Baby hummingbirds are born without feathers, fed regurgitated insects and are ready to leave the nest after 3 weeks. Up to three broods may be raised in one season.

Cool Facts: Most commonly called the "Doctor Bird," the Red-billed Streamertail is well represented in Jamaican folklore, and killing these birds is considered to bring bad fortune on one's self in most parts of rural Jamaica. The long tail feathers resemble the old-fashioned coattails of a doctor; hence, the name "Doctor Bird."

Originally, the Red-billed and Black-billed Streamertails were considered two forms of one species. The Black-billed Streamertail occurs in eastern Jamaica while the Red-billed Streamertail occurs west of a line from Morant Bay following the Morant River, and via Ginger House and the middle Rio Grande to Port Antonio. Besides location, significant differences in courtship behavior, call, bill color and width and to a lesser degree body size define them as separate species. Where the two species meet between the Blue Mountain and John Crow Mountain ranges in eastern Jamaica they form a zone of hybrids.

Red-billed Streamertail is the national bird of Jamaica.

To see a Doctor Bird up close, there is no better place than Rockland's Bird Sanctuary and Feeding Station, located just south of Montego Bay in Anchovy. Here, since the early 1950's, hummingbirds nurtured by the late Lisa Salmon have been trained to feed out of your hand. The spectacular displays and intimate encounter provided by Rockland's hummingbirds has attracted many eminent visitors including European Royalty, global heads of state (such as Winston Churchill), and Vogue Magazine to name but a few.

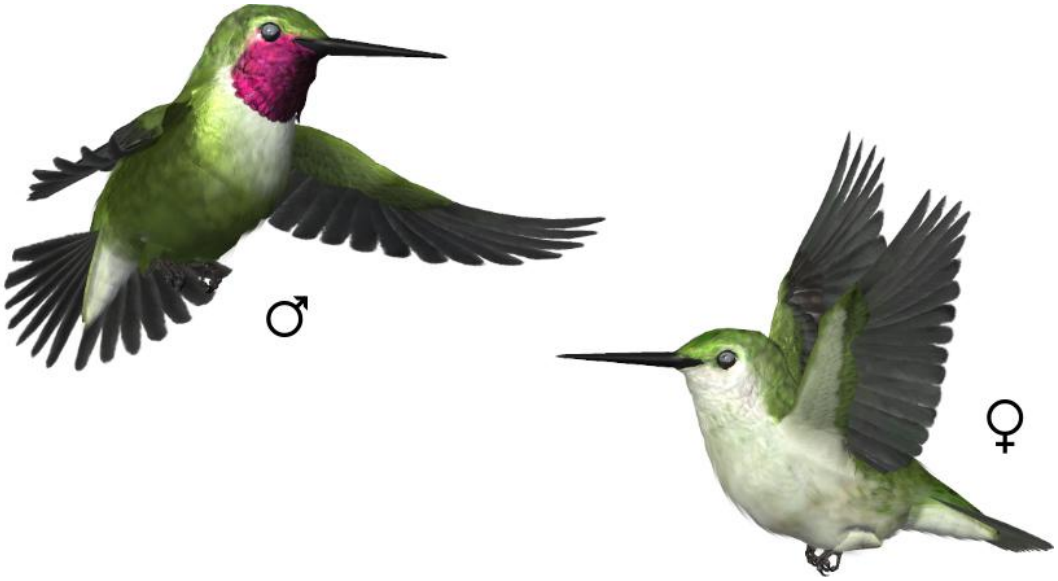
Common Name: Ruby-throated Hummingbird
Scientific Name: *Archilochus colubris*

Size: 3-3.75 inches (7.5-9 cm)

Habitat: North America; Eastern United States to Central America. Migration follows favorite pollen and insect sources.

It is found in mixed woodlands and eastern deciduous forests. It can also be found in woodland clearings and at forest edges, gardens, and orchards. In the southeastern United States, it nests regularly in pine and mixed-pine forests, as well as deciduous forests. In Fundy National Park, New Brunswick, Canada, it is common in mature sugar maple, yellow birch, and red spruce forests, as well as forest edges and old fields. In western Canada, it is associated with boreal forest and aspen stands. In Louisiana, it often nests in mature black tupelo, black gum and bald cypress.

Status: Least Concern. **Global Population:** 34,000,000 mature individuals. Populations are stable, however loss of key plant species could put this bird at risk.



Diet: Floral nectar and small insects; also tree sap when nectar is scarce or unavailable. It also eats small insects.

At times hummingbirds will fly-catch by diving into clouds of gnats.

Breeding: A small hummingbird that is metallic green dorsally. The male gorget covers entire throat and is typically brilliant metallic red. Males show a blackish mask between the gorget and crown. Lower underparts are whitish with extensive green and gray mottling to sides. Wings and tail are blackish. The females throat is dull grayish white (although some 5-yr-old and 6-yr-old females can develop up to 5–6 red feathers in

center of throat). The black mask between the gorget and crown is dark grayish in females. The female tail shows the 3 outer rectrices on each side broadly tipped with white; this does not occur in males.

Ruby-throat's nesting is determined by the location of its key feeding plants. Females construct the tiny nest out of leafy material and are bound together with spider webs and tent caterpillar nests. They sometimes decorate their nests with lichens. The nests are placed on downward sloping limbs that are protected by other branches. Once the nest is completed, the female begins courtship with a male. After courtship, the male leaves and the female incubates two eggs. She cares for the hatchlings by herself. Young hummingbirds are born naked and blind and fledge after about three weeks.

Cool Facts: The Ruby-throated Hummingbird, the only breeding hummingbird species in eastern North America, is a familiar summer inhabitant of woodlands, parks, and gardens from central Canada to the Gulf Coast that occupies the largest breeding range of any North American hummingbird.

Ruby-throated Hummingbirds have one of the longest migration paths of any hummingbird. Wintering in Central America and migrating through Mexico and Texas in the Eastern US coast. It is believed that some Ruby-throated Hummingbirds do make the 500-mile shortcut across the Gulf of Mexico. During the spring migration, males travel ahead of females to set up forging territories. Males are very territorial.

The northern migration of this hummingbird appears to be linked to the flowering of various plants in the spring. The red buckeye (*Aesculus pavia*), the Canadian columbine (*Aquilegia canadensi)* and the Clove currant (*Ribes odoratum*) are among its favorites. It is believed that up to 19 species of plant have evolved specifically to partner with the Ruby-throated Hummingbird, influenced by its pollination.

The Ruby-throated Hummingbird beats its wings 53 times a second and due to its extremely short legs it can't walk or hop. It will shuffle along a perch. Nonetheless, it can scratch its head and neck by raising its foot up and over its wing. It also doesn't care about the traditional red feeder and dyed-sugar water. Instead, it prefers specific feeder locations.

In flight, wings emit humming sound, higher and more variably pitched in male.

Common Name: Rufous Hummingbird
Scientific Name: *Selasphorus rufus*

Size: 1.8-3.5 inches (7-9 cm)

Habitat: North America; Western North America (east of the Rockies) from Alaska to Central America. **Summers:** Alaska, British Columbia and Washington state. **Winters:** Southern Mexico and Central America.

Rufous Hummingbirds typically breed in open or shrubby areas, forest openings, yards, parks, and sometimes in forests, thickets, swamps, and meadows from sea level to about 6,000 feet. During their migration, Rufous Hummingbirds can be found in mountain meadows up to 12,600 feet elevation. In Mexico, wintering Rufous Hummingbirds live in oak, pine, and juniper woods (at 7,500 to 10,000 feet elevation), shrubby areas, and thorn forests.

Status: Least Concern. **Global Population:** 6,500,000 mature individuals. The annual Breeding Bird Survey indicated a slow decline in Rufous Hummingbird numbers in Washington, Oregon, and British Columbia (1-2 percent per year from 1980 to 2004)

Diet: Flower nectar (primarily from colorful, tubular flowers including columbine, scarlet gilia, penstemon, Indian paintbrush, mints, lilies, fireweeds, larkspurs, currants, and heaths), also feeds on insects.

Breeding: Males have iridescent magenta gorgets. Females have white throats. Both sexes have coppery upper parts. Immatures resemble adult females.

Females begin nesting within 3 days of arrival on their breeding grounds. They put their nests up to about 30 feet high in coniferous or deciduous trees such as Sitka spruce, western red cedar, Douglas-fir, pines, hemlock, birch, maples, thimbleberry, and occasionally ferns or vines. Nests are hidden in drooping branches, sometimes with several nests (up to 20) in the space of just a few yards.

The female builds the nest alone using soft plant down held together with spider web. She decorates (or camouflages) the outside with lichen, moss, and bark. Finished nests are about 2 inches across on the outside, with an inner cup width of about an inch. Nests may be reused the following year, not necessarily by the same individual.

Cool Facts: The feistiest hummingbird in North America. The brilliant orange male and the green-and-orange female Rufous Hummingbird are relentless attackers at flowers and feeders, going after (if not always defeating) even the large hummingbirds of the Southwest, which can be double their weight. They've even been seen chasing chipmunks away from their nests.

The Rufous Hummingbird makes one of the longest migratory journeys of any bird in the world, as measured by body size. At just over 3 inches long, its roughly 3,900-mile movement (one-way) from Alaska to Mexico is equivalent to 78,470,000 body lengths. In comparison, the 13-inch-long Arctic Tern's one-way flight of about 11,185 mi is only 51,430,000 body lengths. (AAB).

During their long migrations, Rufous Hummingbirds make a clockwise circuit of western North America each year. They move up the Pacific Coast in late winter and spring, reaching Washington and British Columbia by May. As early as July they may start south again, traveling down the chain of the Rocky Mountains. People first realized this pattern after examining detailed field notes and specimens, noting the birds' characteristic dates of arrival on each part of the circuit. The Rufous Hummingbird breeds as far north as southeastern Alaska – the northernmost breeding range of any hummingbird in the world.

The Rufous Hummingbird has an excellent memory for location, no doubt helping it find flowers from day to day, or even year to year. Some birds have been seen returning from migration and investigating where a feeder had been the previous year, even though it had since been moved.

Special Thanks to my Beta Testing Teams…

- Original 2011 release: FlintHawk, Linda, Jan, Kelvin and Sandra
- 2021 update: FlintHawk and Alisa

Species Accuracy and Reference Materials

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

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

Sources for this Field Guide & Set

Books, Magazines and Papers

- **Birds of Venezuela (2nd Edition)** by Steven L. Hilty
- **Ecology and Behavior of the Buff-Tailed Sicklebill** (Paradisaeidae: Epimachus Albertisi) by Bruce M. Beehler, published in "*The Auk"*
- "**The Sibley Guide to Birds**" by David Allen Sibley.
- "**A Guide to the Birds of Mexico and Northern Central America**" by Steve N. G. Howell and Sophie Webb
- **"Birds of Peru"** by Thomas S. Schulenberg, Douglas F. Stotz, Antonio Brack Egg, Daniel F. Lane, John P O'Neill, Theodore A. Parker, III
- **"Birds of the West Indies"** by Herbert Raffaele, James Wiley, Orlando H. Garrido, Allan Keith, and Janis I. Raffaele (Princeton University Press)

Websites

- Wikipedia (http://www.wikipedia.com)
- Birds of North America online (http://bna.birds.cornell.edu)
- All About Birds (www.allaboutbirds.org/)
- Cornell Lab of Ornithology Neotropical Birds (http://neotropical.birds.cornell.edu)
- PBS Nature (http://www.pbs.org/)
- What Bird? (http://www.whatbird.com)
- Hummingbirds.net (www.hummingbirds.net)
- Boston University (http://www.bu.edu/)
- Bahamas National Trust (http://www.bnt.bs/)
- Juan Fernández Island Conservancy (http://www.oikonos.org/projects/firecrown.htm)

Rendering & Posing Tips

Motion Blurring for Hummingbird Wings

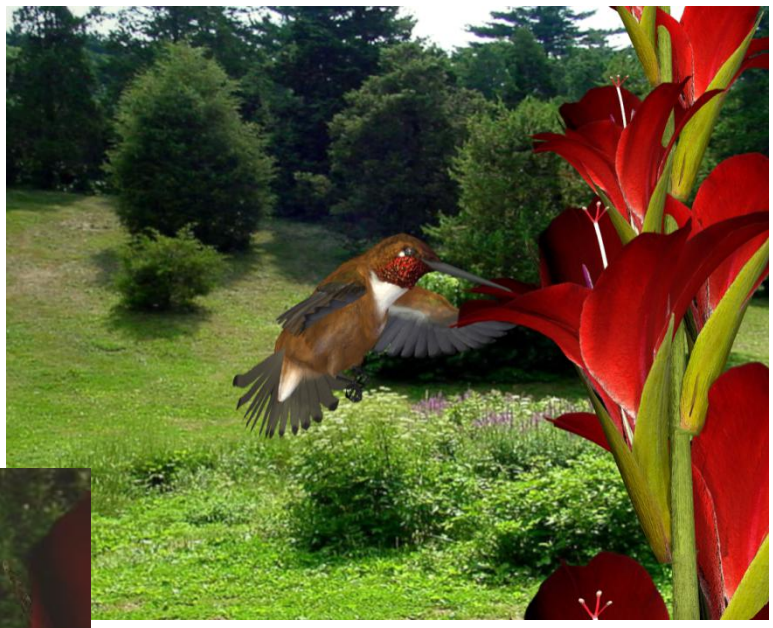
As we all know, it's rare when a bird sits still. In photography, we can capture birds in flight and provided the exposure and f-stop are set correctly, even freeze them in time. We accept this moment captured in time because it is a photograph, and photographs don't lie.

As for non-photographic art, traditional or digital, the bird frozen in time just doesn't look quite right, so the viewer assumes the artist has made a mistake-- because we all know, artists do, in fact, lie...

So, here are the secrets to making a bird in flight believable.

There are two approaches for creating the wing blur hummingbirds make. The first way, and most obvious, is to blur them with post work using smudge tools or motion blur filters. The second way and much easier is to let your 3D application do it using animation (even on a still image). The tutorial included in this manual will provide a step-by-step procedure to do both.

Post work Motion Blur



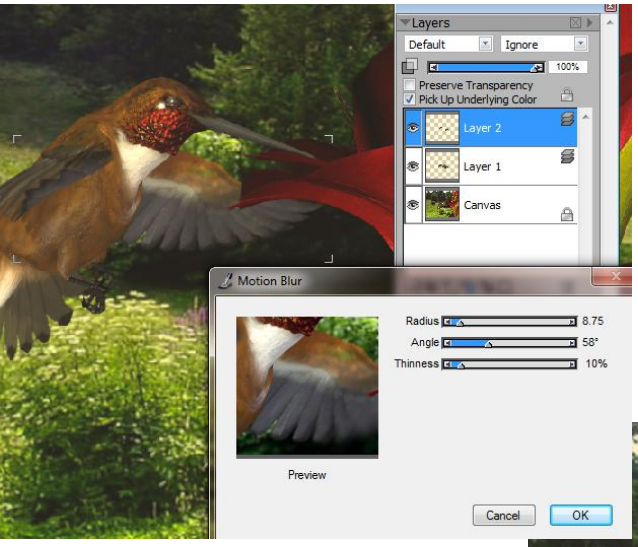
1. Load the picture into your favorite 2D art program. *(For the tutorial, we're using Corel Painter, but Photoshop or Paintshop Pro will work)*

2. Using the freeform SELECT tool, outline the wing area, Copy and Paste it directly over the existing wings and a new layer.

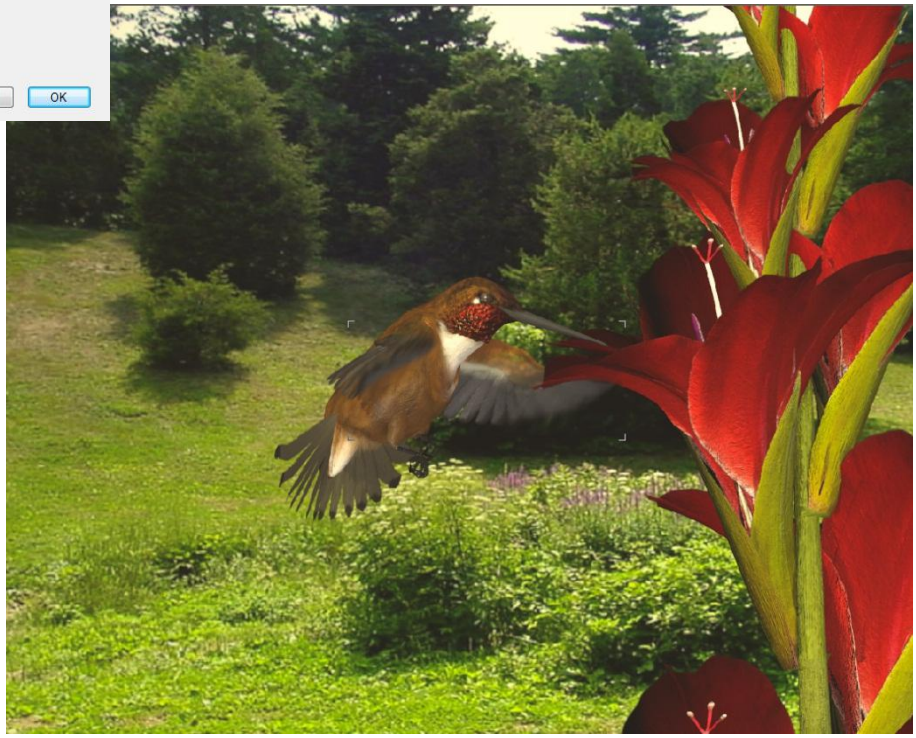
3. Select Motion Blur. It's found under Focus in Painter (or Blur in Paintshop Pro or Filters->Blur->MotionBlur in Photoshop).

4. Set the amount of blur, the angle and thinness (in Painter). Since we've outline the whole wing, we're barely going to blur it with a setting of 1.58. I've also adjusted the angle to be more in-line with the feather movement.

5. Now freeform SELECT the wing again on the wing layer, but this time only select the outer extremities of the wing. Now Motion Blur it again-- that's why we went easy the first time!



6. You could depending on the result you want repeat the process again with just the wing tips...



Using Motion Blur in Poser

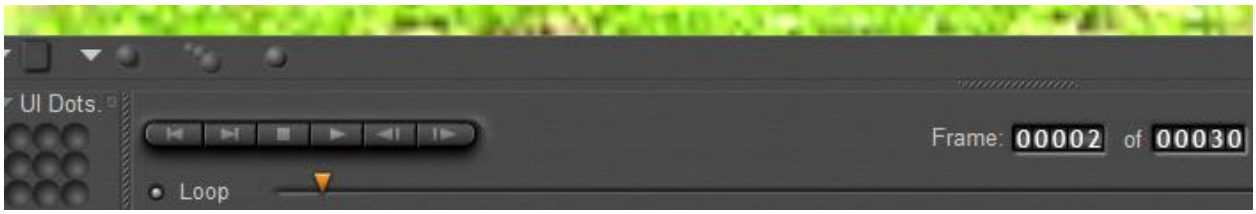
This tutorial will work with any version of Poser or can be adapted to Vue. DAZ Studio does not currently have motion blur capabilities.

1. Load the Hummingbird Base Model and select a species MAT/MOR preset (for this tutorial I'm using the Rufous hummingbird, but any species will work).

2. Create your scene with the hummingbird in flight using a prebuilt pose or adjusting it manually. Go ahead and do everything you normally would do before the final render (tweaking poses, adjusting lights, etc)

3. Now that your scene is set, you will need to decide how much wing blur you want. First, the way we are going to create wing blur is by slightly animating the wings; the more movement you create, the more blur you will get.

4. I'll use a couple different settings and show how much blur you can expect from certain types of wing movements. To show maximum blurring effects, we'll first move the **Animation slider to Frame 2.**



5. Select the Left Wing, add or subtract about 30 from **UpDown** in the Parameter Dials. Do the same with the Right Wing. **Make sure you do not move any other dials or items in the scene or they will blur too**.

6. Go back to **Frame 1 on the Animation slider**. In Render settings, check the Motion Blur Box and render. As you can see from my example to the right or from your render, the wings are so blurred they almost don't exist. While most hummingbirds beat their wings 40-90 times a second, we don't need that type of movement to create a still image --- in fact, doing the 30 point movement up and down over the

normal 30 frames a second animation will give you a believeable animated hummingbird (though it's only going 15 wingbeats a second).

7. For a still image, I'd suggest only making 2-3 point moves up or down. In Frame 1, Copy the Left Wings settings (CTRL+C). Select the Frame 2 and copy the settings (CTRL+V). Now add or subtract 2 or 3 from the **UpDown Dial** in the Parameter Dials. Do the same with the Right Wing. **Make sure you do not move any other dials or items in the scene or they will blur too**.

8. Go back to **Frame 1 on the Animation slider**. In Render settings, check the Motion Blur Box and render. Remember still image motion blur always looks to the next animation frame. If you render on frame 2, the render engine will compare frame 3 with frame 2 for blur information. Since we did nothing to frame 3, there won't be any blur and that's why we need to return to Frame 1 before rendering.

9. You can experiment with moving the tail or moving the entire bird. Just remember a little movement goes a long way in a still motion blur image. One thing I often do is just slightly move the wing parts (+/- 1) and then move the feather controller parts more significantly (+/- 8). This make the wing tips blur significantly but the actual wing much less.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