

Hummingbirds – Jewels of the Sky!!!



<https://youtu.be/3JA11LloV7E>

Rufous Hummingbirds, Vancouver Island, BC

Online Workshops

Tuesdays at Noon

May 4 – May Garden Tips
May 11 – How to get a Ripe Tomato in the PNW!
May 18 – How to make a Lifetime Tomato Cage
May 25th – Vertical Gardening

Wednesdays at 6:00

May 5 – Raised Beds
May 12 – Irrigation
May 19 – Hydrangeas
May 26 – Pasture Management

Trivia While We Wait

- A hummingbird does not have which one of the five senses? (Sight, Hearing, Smell, Taste, Touch)
- True or False? A hummingbird weighs less than a Nickel?
- True or False? Hummingbirds are found native to every continent except Antarctica?



Thank you to the Washington State University Extension Office, and to the Cowlitz County Master Gardeners Foundation for supporting these programs!

We are going to talk about hummingbirds today, and as my day job is as a Biologist, I hope to bring a lot of little fun facts to you in my presentation.

Trivia Answers:

- No smell – They rely heavily on their eyesight
- True
- False – Only native to North and South America.

Hummingbirds – Trochillidae – A “New World” Family.

Hummingbird Species
Richness Map –
ArcGIS Online



Hummingbirds are found only in the Western Hemisphere, with over half the species living in the equatorial belt (within 10 degrees north and south of the equator). There are 338 known species of hummingbirds in the world today, primarily in South America. 23 of those live in North America, and only a small number of those are year-round residents.

Migration is triggered by daylength – tied to food sources. Daylength affects the presence or absence of flowers and insects, and so the range of some species of hummingbirds expands and contracts toward the poles with the seasons.

A flock of hummingbirds is called a bouquet, a glittering, or a hover.



Rufous



Broad Tailed



Ruby Throated



Anna's



Black-Chinned



Calliope



Costa's

Western Washington and Oregon

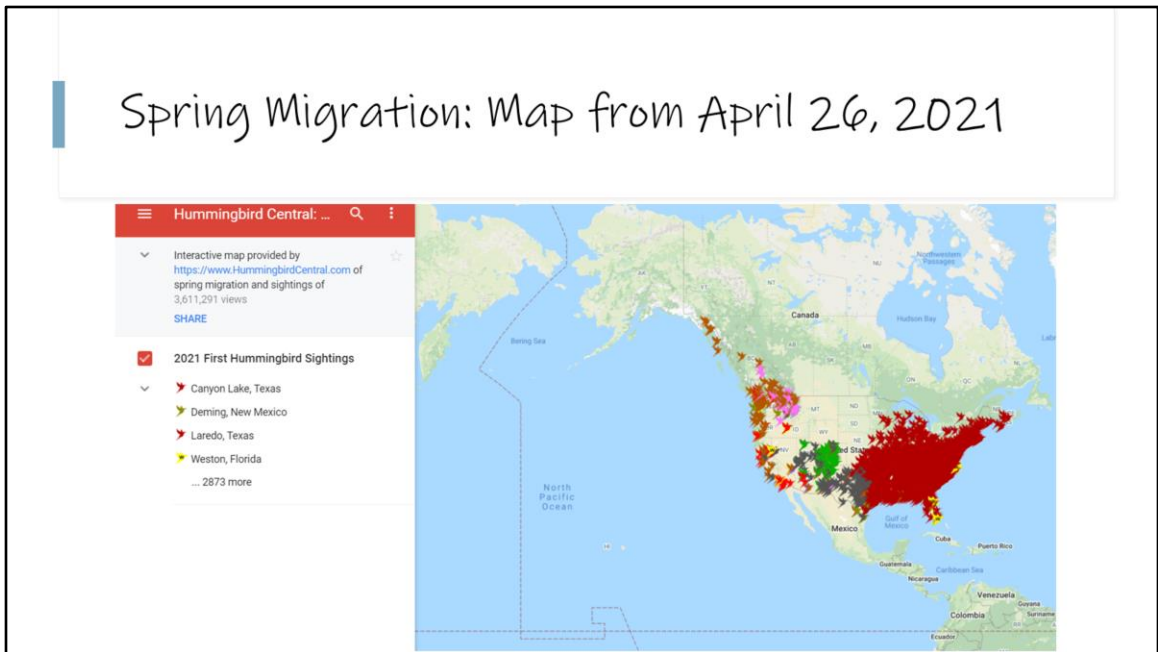
<https://www.birds.cornell.edu/home/>

Also documented in Washington State

There are 7 species documented in Washington State, with 3 commonly seen on the West side of the Cascades. Anna's hummingbird can be a year-round resident in our area and is often seen in Western Washington and Oregon during the winter.

For those non-year round resident species heading to North America for breeding season, the northward migration begins in mid-Winter, with the first birds seen in the US often in February, often in Texas. Migration is usually over by May when the females arrive, and mating begins.

Spring Migration: Map from April 26, 2021



For the northern migration, Males migrate first, choose and compete for a territory. Females arrive and choose the best territory with the most available resources, and will mate with the male that has claimed that territory. Because of this, Males try to get there as early as possible to claim the best territory, but they must be careful not to arrive before there is enough food available to keep them alive while they wait for the females.

When the females arrive they select a territory, and build a nest themselves. The males also do not take part in building the nest or raising the young. However, they do continue to defend their territories.

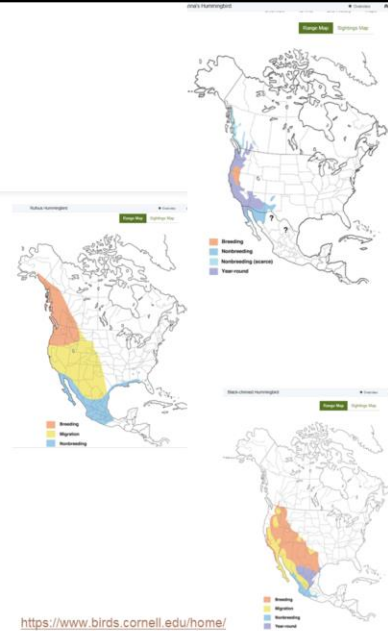
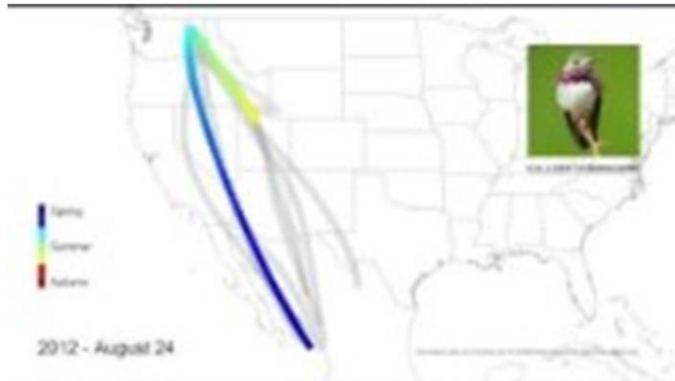
Nests are smaller than a half dollar (less than 3 inches across), and are made of plant down, moss, and spider silk.

Their nest holds 2 eggs that are the size of a jelly bean or coffee bean.

The first year of life is precarious, but if they survive life early life in the nest and the first migration, the average life span is 3-4 years.

- Fun Fact – The record is a broad tailed hummingbird that was banded in Colorado and recaptured in the same location 12 years later!

Fall Migration



Males leave for their southern migration first too, starting in August. When the males leave, they open up food resources in the rearing habitat for their young who stay back until September with the females.

Migration happens during the day when most flowers are producing nectar. They will feed heavily in the mornings and travel during mid-day. The birds fly low so they can see and stop at food supplies along the way and are experts at using tail winds to help them save energy. They will stop to refuel and rest in the evening.

Hummingbirds will fly alone during migration, along the same routes traveled earlier in their lives. Young hummingbirds must navigate without parental guidance, or previous flight experience. They fly around 20 miles a day, traveling from Central America as far as southern Alaska. They must gain 25-40% of their body weight prior to spring and fall migrations! Despite all this flying, Hummingbirds actually are only in flight 10% of the time once migration is over. The rest of the time is spent sitting, digesting, and in torpor (a sleep like state that conserves energy).

The Gauntlet



<https://birdwatchinghq.com/hummingbird-nests/>



<http://www.fotofeed.com/2009/07/25/cat-and-hummingbird/>



[Scieny Thoughts: Hummingbird nesting success improved by the presence of Hawks.](#)



[Springfield Plateau: Hummingbird Predator \(springfieldmn.blogspot.com\)](#)

Predators pose a threat while the young are still in the nest. Insects, rodents, other birds, and snakes are all examples of nest predators. Momma hummingbirds are also at risk during incubation of her eggs. To reduce the risk to her and her babies, she will camouflage the nest and build it on twiggy branches too small to support the weight of rodents and other birds.

The most common predator (for all birds) is domesticated cats. Other threats include: hawks, other birds such as blue jays and crows, snakes, bees, wasps, frogs, and fish(!).

even preying mantis will prey upon the eggs and nestlings but predation is not a major problem for hummingbirds once they fly – it can happen but it is much less likely.

Natural History of Hummingbirds

https://youtu.be/RtUQ_pz5wlo



Food – We all know that Hummingbirds drink the nectar from flowers. You can see here though, that they do not suck nectar, but lick it with a long forked tongue

Nectar, Tree Sap, Juice from broken fruits, and LOTS of insects. In fact insects make up the bulk of the diet.

They eat about half of their weight in sugar each day, over 5-8 feedings per hour.

Wing beat – the largest species (Giant Hummingbird) 10-15x per second, the smallest is also the fastest with about 80 beats per second. Common NA species are around 50 beats per second.

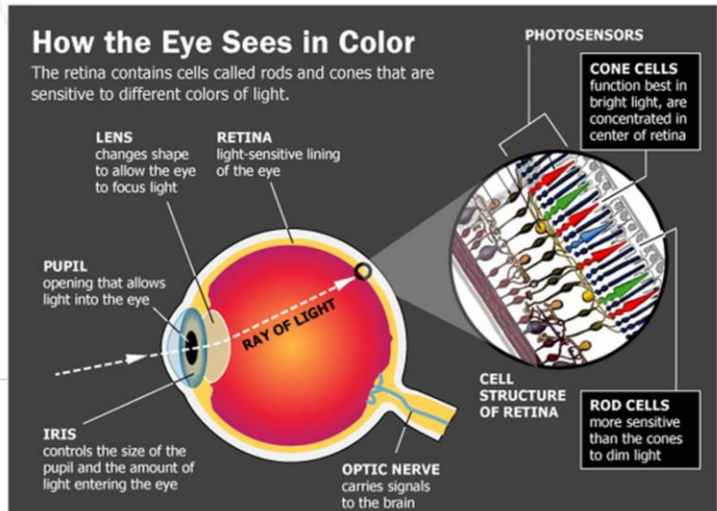
Flight speed – 30 mph on average, 60 mph in a dive Heart Beat – 1260 BMP, but it drops down to 50-180 per minute in torpor.

Breathing – 250 breaths per minute at rest – higher in flight

Their legs allow them to perch and move sideways, but they cannot walk. However, They are the only bird that can fly backwards, sustain a hovering position, and even fly upside down!

This is all interesting, but there are a couple of other unique tools these birds have that allow them to live this life...

Nature
speaks
in Color!



Hummingbirds, like humans, are very visual animals. Nature communicates with them in color!

Cones are special cells in the eye that detect (see) light.

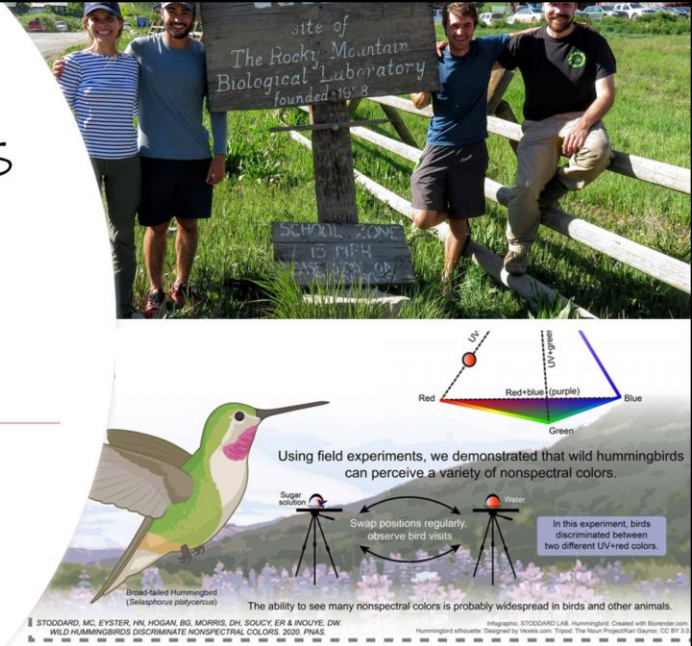
Light moves in waves, long waves and short waves

Humans have 3 different kinds of cones that detect long (Red), short (Blue), and medium (Green) wavelengths.

Spectral Colors are colors visible to humans that are found in the rainbow. Most colors are seen when one or more cones are activated to different degrees.

For example, when we see purple, the blue cones and red cones in our eyes are stimulated, but not the green cones.

Hummingbirds have Super-human Eyesight!



Hummingbirds rely on color to find food, attract mates, defend territories, evade predators, and navigate! For a while, scientists have suspected that Hummingbirds might be able to see UV colors., recent research shows that is true.

Hummingbirds have a 4th kind of cone sensitive to Ultraviolet or UV light – Tetrachromacy.

Hummingbirds see a broad range of colors called Non-spectral colors including Purple, UVpurple, UVRed, UVGreen and UVYellow (Caswell et al 2020) (Humans see only 1 non-spectral color – Purple.)

This discovery was made during a feeder experiment

- colored feeders were set out
 - some were painted with non-UV colors and filled with water
 - some were painted with the same colors and had a UV coating applied over them. These were filled with food.
- They looked identical to the human eye.

The birds learned to avoid the plain water feeders over time. After they learned this, the researchers changed the locations where the food feeders were to show that learned location was not the thing they were keying in on. The birds still never visited the water feeders. This showed that the birds

were finding the right feeders by visual cues, and because the unique thing about the nectar feeders was a UV coat, they concluded that hummingbirds can see UV light.

What Makes Hummingbirds "Jewels of the Sky?"



<https://youtu.be/Fc6Fgb-2ZfY>

If the ability to see UV light wavelengths weren't enough, these birds have another amazing feature. Hummingbirds see the colors of flowers by a different mechanism than they see the colors of their potential mates or competitors for mates!

Watch in the video – you can see how the red chin/breast of the birds turns black at a different angle. If that were a pigment, like what gives plants their colors, the bird would not change color like that. Instead, their feathers are actually colorless!! I gave a version of this talk last year about this time, but even amid a pandemic, Science happens. This feature was recently described for hummingbirds, in a 2020 publication in the Peer Reviewed Scientific Journal "Evolution". The authors published a robust study in 2020 on how this happens to give hummingbird feathers that beautiful iridescence!

They found that the structure and shape of the surface of the feathers bends light as it shines across the feather, altering the wavelength we see. Looking at those shapes from different angles gives different colors.

[Hummingbird Gorget: Jewels of the Sky | Audubon](#)

[Hummingbirds Owe Their Shimmer to Microscopic Pancake-Like Structures | Audubon](#)

[Hummingbirds' rainbow colors come from pancake-shaped structures in their](#)

[feathers \(phys.org\)](#)

Eliason et al 2020. Signal evolution and morphological complexity in hummingbirds. *Evolution* 74(2):447-458

What Makes Hummingbirds "Jewels of the Sky?"



<https://phys.org/news/2020-01-hummingbirds-rainbow-pancake-shaped-feathers>

<https://www.audubon.org/news/hummingbirds-owe-their-shimmer-microscopic-pancake-structures>

All birds' feathers are made of the same material as our hair and nails, and they look like tiny trees, with a trunk, branches, and leaves. The "leaves," called barbules, are made up of cells that contain pigment-producing organelles called melanosomes. We have melanosomes too — they give colors to our hair and skin. But pigment isn't the only way to get color. The shape and arrangement of melanosomes can influence the way light bounces off them, producing iridescent colors. "We call these iridescent colors '[structural colors](#)' because they depend on the shape of the surface of the structure.

- A good analogy would be like a soap bubble. If you just look at a little bit of soap, it's going to be colorless. But if you structure it the right way, if you spread it out really thin to form the shell of a bubble, you get those shimmering rainbow colors around the edges. It works the same way with melanosomes: with the right structure, you can turn something colorless into something really colorful. In mammals, the melanin isn't organized in any fancy way, but in birds, you get these layers of melanosomes, and when light bounces off the different layers, we see the iridescent bright colors. Even among birds, hummingbird melanosomes are special. Compare with a mallard duck. Ducks have melanosomes that are solid and log shaped.

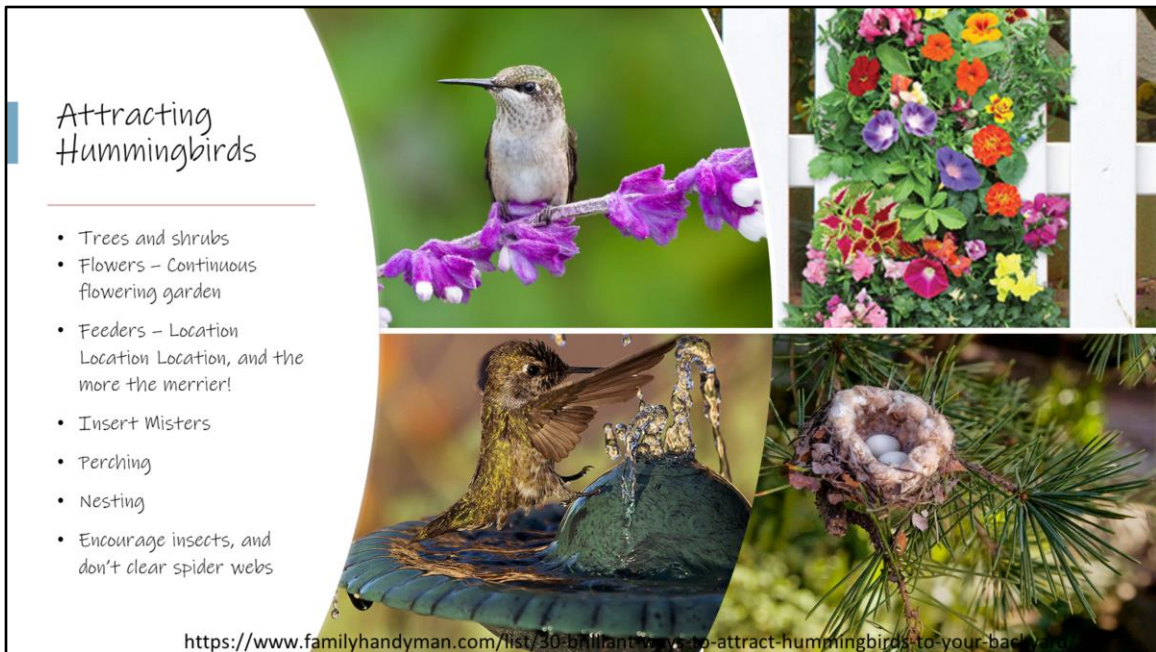
Hummingbirds have pancake shaped cells with lots of little air bubbles inside (think of the bubble analogy), and when they are stacked in different shapes and thicknesses, light has to move and bend over the surface of those feathers differently.

- Even more interesting is that the genes that tell the cells how thick they will be and the genes that tell the cells how to stack are separate, so the animals have the ability to mix and match these traits genetically, which is part of how each species got their unique appearances from other species. Its like being able to make more outfits out of 3 shirts and 3 pairs of pants than you can with 3 dresses.

Now that we know this, more questions come up... mainly, if it is possible to display a wide variety of colors, why are many hummingbirds green? Does this reflect historical events, predation, or female variation in preferences

[Hummingbirds' rainbow colors come from pancake-shaped structures in their feathers \(phys.org\)](#)

Eliason et al 2020. Signal evolution and morphological complexity in hummingbirds. *Evolution* 74(2):447-458



Build your garden to provide optimum habitat! This starts with an organic garden with trees and shrubs to provide the structure, fresh water and lots of insects to dine on.

Add Flowers – Highlight visual cues. Reds and Oranges are common but not the only. The birds are more interested in a sugar content of 10-25% in the nectar.

Red Hot Pokers, fox glove, Fuschia, and Flowering Tobacco have been popular in our gardens

Add Trees and Shrubs for perching, nesting, resting and hiding. They also provide wind breaks, protection from harsh weather, and predators.

Add water and Feeders - Not too close to window to reduce injury or death by impact. These birds are very territorial and will fight even their own reflection which often leads to injury.

- You can buy a UV sticker to make your window more visible to Hummingbirds and other animals that see in UV spectrum! Add surveyors tape around or to the feeder – these tapes reflect UV light! - <https://www.hummingbird-guide.com/window-hummingbird-decal-winda5.html>

Add perching - they spend around 80% of their time sitting on twigs, leaf stems, clotheslines, etc., between feeding forays and sorties against trespassing rivals.

Nests are made of lichens and spider silk. Don't clear your cobwebs!

— A Good Feeder

Start with Good Food!

Nectar Recipe:

1 part sugar to 5 parts water. Higher concentration is not better.

** Use GRANULATED sugar only.

- NOT honey
- NOT brown Sugar
- NOT artificial sweeteners
- NO colors/food dye

Boil the water, dissolve the sugar, cool.
Pour into the feeder and refrigerate extra

Offer fresh food - replace the nectar every 2 days or so, regardless of feeder size.

Clean your feeder every time you change the food.



What makes a good feeder?

Lets start with the food.

This little guy is very ill because he has been drinking from a feeder with the wrong nectar mix. This hummingbird is unable to retract her tongue, because fungal spores found in honey have bloomed on her tongue or in her gullet. She will die because she can no longer feed.

Use only granulated sugar at a 1:5 ratio. Your feeder should be filled with “nectar” made of 1 part sugar to 5 parts water – Use granulated sugar only, not brown sugar, honey or other sweeteners, and no food coloring.

Some people think the higher concentration works better because they see more birds at their feeders. However, this is happening because they become dehydrated when they drink a nectar with lower water content.. It’s a bad cycle. The more they drink, the more dehydrated they become, the thirstier they become. Higher sugar concentration is not better! Natural nectar is actually close to 1:5 but can go as high as 1:4. Anna’s hummingbirds, the most common hummingbirds we have here in western Washington and Oregon, are most attracted to flowers that have 1:5 or 1:6

ratio.

Build a hummingbird feeder!

Feeder -

- Small mason jar
- Red plastic folder or cross stitch mesh
- Twine or wire
- 1 cup sugar
- 4 cups water

Tools Needed - Pliers

Bonus - Ant Moat

- Mini Terra Cotta Pot (2" dia)
- Extra Wire
- Indoor/Outdoor Mounting Putty

Tools Needed - Screw driver and Pliers



Rebecca's
Bird Gardens

Other Characteristics of a good feeder:

Should have a perch to let them save energy while they are feeding

Should be easy to clean and cleaned often. Our wide mouthed shallow jars make cleaning easy! No nooks and crannies to get into to clean.

Bottle brushes are worth the investment cleaning. Keep it mold free!

Should be filled with "nectar" made of 1 part sugar to 5 parts water – Use granulated sugar only, not brown sugar, honey or other sweeteners, and no food coloring.

Resources

- Elason et al 2020. Signal evolution and morphological complexity in hummingbirds. *Evolution* 74(2):447-458
- <https://www.hummingbirdcentral.com/hummingbird-migration-spring-2021-map.htm>
- <http://www.hummingbirds.net/migration.html>
- Mary Caswell Stoddard, Harold N. Eyster, Benedict G. Hogan, Dylan H. Morris, Edward R. Soucy, David W. Inouye, 2020. Wild hummingbirds discriminate nonspectral colors. *Proceedings of the National Academy of Sciences* June 2020. <https://www.pnas.org/content/eariv/2020/06/09/1913977111>
- How Sight Works - <https://www.nei.nih.gov/learn-about-eye-health/healthy-vision/how-eyes-work>
- What if my colors are different from your colors - <https://sites.psu.edu/lowfa15/2015/09/15/what-if-my-colors-are-different-from-your-colors/>
- Kid Frontiers - How do we see colors? <https://kids.frontiersin.org/article/10.3389/frym.2013.00010>
- Images of N.A. Hummingbirds <https://www.thespruce.com/hummingbirds-of-north-america-4121900>
- Make a feeder - <https://morningchores.com/diy-hummingbird-feeder/>
- Make a moat for your feeder - https://empresofdirt.net/hummingbird-feeder-ant-moat/?utm_source=MadMimi&utm_medium=email&utm_content=New+at+Empress+of+Dirt&utm_campaign=20200530_m158602981_RSS+Feed+for+https%3A%2F%2Fwww.empresofdirt.net%2Ffeed%2F&utm_term=Ants+on+Your+Hummingbird+Feeder_3f+This+DIT+Moat+Will+Stop+Them
- Make food: <https://empresofdirt.net/hummingbird-sugar-water/>
- Make an Ant Moat: https://empresofdirt.net/hummingbird-feeder-ant-moat/?utm_source=MadMimi&utm_medium=email&utm_content=NE%2F9D%AA%EF%BB%8F+Empress+of+Dirt+NE%2F99%9B+Newsletter+164&utm_campaign=20200616_m15847739_NE%2F9D%AA%EF%BB%8F+Empress+of+Dirt+NE%2F99%9B+Newsletter+164&utm_term=You+can+buy+or+make+one
- <https://www.hummingbird-guide.com/window-hummingbird-decal-winda5.html>
- [Wild Birds Unlimited - Nature Shop \(tubu.com\)](http://WildBirdsUnlimited-Nature-Shop.tubu.com/)

