Dan Seed ([00:00](https://www.rev.com/transcript-editor/shared/RyrS6nhA3dqaiKPNr0cE0wDBaCeTPtS7IcmaVhHbGrB_rKYKf4VMQoyVncS3-t9kHjc_J2wO8zKQ_01e7ufW3uZWZ98?loadFrom=DocumentDeeplink&ts=0.33)):

Hello and welcome to Big Ideas, a podcast from Texas State University. I'm your host, Dan Seed from the School of Journalism and Mass Communication. It might seem a bit out of season for this topic, but the season we're heading into is now critical for one of the unmistakable aspects of summer fireflies and like the rest of the natural world. It seems these days fireflies are facing serious challenges and declines. We're joined by Ben Pfeiffer, who graduated from Texas State with his bachelor's in biology and is the founder of Firefly Conservation and Research, which could be found by visiting firefly.org. Ben is also a certified naturalist with the Texas Department of Parks and Wildlife. His expertise has been featured in media outlets such as the Washington Post, Texas Monthly Smithsonian Magazine, the CBS Morning news and others. Ben, welcome to the program. Glad to have you.

Ben Pfeiffer ([00:52](https://www.rev.com/transcript-editor/shared/D8cE06yC07msxFXiom7PqB6bg01H6AlE5sRjTi78ny9dbqjv4qjBpYc8RyEfdv4VKuleACci6-rDicW9-Sd0-cI7CwU?loadFrom=DocumentDeeplink&ts=52.83)):

Yeah, Dan, thanks for having me. It's great to be here.

Dan Seed ([00:55](https://www.rev.com/transcript-editor/shared/PpP_dtEww0atpJzcYDNNSfbfzCPC-3uJZ9VnhiJC2eHyP_bb9XyRyrTgwA1DdtWrlRtahBBcXPw3hRVeh-dBSpXMhIk?loadFrom=DocumentDeeplink&ts=55.44)):

Yeah. And so Ben, you're a sixth generation Texan. You grew up in the hill country. What are your first memories of falling in love with the outdoors?

Ben Pfeiffer ([01:03](https://www.rev.com/transcript-editor/shared/5KrbbBWRLIa_zd2uuqAdu23UuxjRgeLAxB_mK7bMxjMeXR8Vu6QboGlWcg0NQMTT5igOOOCcn_3FG_l00vHer_zA_Hs?loadFrom=DocumentDeeplink&ts=63.39)):

Well, I grew up in the hill country, but also in south Texas too. I just spent a lot of time in south Texas as a kid on my family's ranch. My grandfather was an attorney, but he also ran cattle, and so we just basically spent a lot of times outdoors as a kid. I also spent a lot of time outdoors. We had a green belt in the back of our house, and so it just kind of cultured a love for the native parts of Texas and just allowed me to get into know them a little bit better. And that fostered a love of biology that led to going to Texas State to work on a biology degree.

Dan Seed ([01:38](https://www.rev.com/transcript-editor/shared/Oi5OVjiPzyVJO6gDMK4XqfHmLdeUsh3TiWfuw6InoKn3_WbXqDMOe9CYRMxo6a5oYDBLdvBvawYWgTJWGD3EeAz4tt4?loadFrom=DocumentDeeplink&ts=98.28)):

And how did you become so interested in fireflies? We'll get into your research and all of that here in a minute, but what was that initial spark that made you go, these things are really cool?

Ben Pfeiffer ([01:49](https://www.rev.com/transcript-editor/shared/MT6jgEoIgA9Th1YX7kUs3ACuLXjy2SAC-cYSZopjIUmMO_S2Jju2XZWsJ33yjVhukqRI0kOWnoruiEwYOmxxsaPcfz8?loadFrom=DocumentDeeplink&ts=109.38)):

It was a chance, a kayak trip actually in Puerto Rico. I went to a bioluminescent lagoon when I was a teenager and I got a chance to kayak back there into one of the protected lagoons that has this organism called a dinoflagellate. And when you disturb the water, it glows. And that kind of initial exposure to bioluminescence really got my interest. And so I had a fascination of that. And it wasn't until years later that the firefly thing came about and I just had an opportunity to kind of explore that a little bit more. And then it just kind of went off from there

Dan Seed ([02:29](https://www.rev.com/transcript-editor/shared/7ZHYXWi4cAE0Y0hIcOw6MMaCCL8ZlHrzd82aWSwFEWKUuK4TzpaXEYphjjJ6kL3GAHh7o2WkCBOrs6bRTgoVrX8Fx3A?loadFrom=DocumentDeeplink&ts=149.04)):

To you. You kind of came to it maybe a little later in life. It wasn't some childhood thing where you're fascinated by them, but I have two kids and they're fascinated by fireflies. They look at them and it's almost like a magical thing to you makes them so interesting and magical. That's

Ben Pfeiffer ([02:47](https://www.rev.com/transcript-editor/shared/G4rqpv_aFcrEEmnmFOKqjh42NJHr63nM7psBZSmfuq3DDUIlIjDwbUJHv0jivmur9L0TWSbgV1RKva74M_d9NehHWCc?loadFrom=DocumentDeeplink&ts=167.82)):

A good question. I would say that when you're out in a habitat, for example, and you see four to five different species flashing at the same time with different flash patterns, even different colors, it's a magical experience. I love the evening in that twilight period, and it is just a really common serene period. That activity is just starting to pick up from the heat of the day, and it's just this kind of unfolding story that happens 15 minutes before dusk into the evening, and then as it progresses into late evening, you get everything from fireflies to animal sounds to just so many things going on. And so I just love that part. And that's kind of a magical part when I get out and do field research. I love to study habitats and get out in the field. And so that's kind of what it brings me there. And then also the amount of discovery, potentially finding something new and exploring stuff that hasn't been seen before.

Dan Seed ([03:45](https://www.rev.com/transcript-editor/shared/YG44_LSzBwq1Ru9N_MKcUn9UflMHOzNEwCjPO-JLUvLEaCgTsvoLx5qZMqlitqFHGu-St7PgKHACFdpsavoZnirq7gg?loadFrom=DocumentDeeplink&ts=225.01)):

So you mentioned four or five different species of fireflies, how many species are there? And talk a little bit about, you mentioned touched on it, the differences in their colors and what they do. Can you expand on that a little bit?

Ben Pfeiffer ([03:58](https://www.rev.com/transcript-editor/shared/zK10QKqtgk6M6feqSQV8XBzqPn7Hv1LDdI_EzE0SnSAO_vphd08A498vlibxdPi7oPZ-MtrwFC8z8FlvR4ybNsK_dtQ?loadFrom=DocumentDeeplink&ts=238.87)):

So to most people surprised Texas has about 40 species of fireflies.

Dan Seed ([04:04](https://www.rev.com/transcript-editor/shared/2FtTMLdG367IHrd1t1LpM-Fb5LYTzoNEwn3G5IcfE89Opju8S-i9sYC7JR6Vj0LNUYXloSGZBuNSYcjUJmBAH3Yn9kQ?loadFrom=DocumentDeeplink&ts=244.39)):

I'm surprised, I have to admit. Yeah, I thought a firefly was a firefly was a firefly.

Ben Pfeiffer ([04:10](https://www.rev.com/transcript-editor/shared/9SdAs48MZlyiC0bi2bnr-5b_nozTN4bZ6DCSrId9AuUq4MnUwBvUZaqfb5j0J_Z_3cnwA17Y1UCbzyOLIHwWphlsqZo?loadFrom=DocumentDeeplink&ts=250.03)):

Yeah, I know. And that's what most people thought. That's what I once thought. You see a firefly flashing, you assume it's just the same one that's flashing nearby. But the reality is is that we have some of the highest diversity in Texas compared to other states in the United States. And so it's a really great thing. And those include diurnal, fireflies and nighttime flying, and then also daytime species as well. So it's quite the abundance. And then you've got different genuses and families and those all have different characteristics. And Texas is such a diverse eco region, has many diverse eco regions. And so that has created some elements for speciation to occur and just lots of neat kind of cool habitat specific fireflies to occur that just occur in the hill country, for example. And so that's really cool.

Dan Seed ([04:55](https://www.rev.com/transcript-editor/shared/20_vinOBDfD6pcK-smR-Fp7J5eyRT683F8Wxti1vRnOdRk9yBExfNdj5EbvsEWMibf1KIsqQczsqMra_MVQjQwPwXV0?loadFrom=DocumentDeeplink&ts=295.87)):

So in our area where we are central Texas, the hill country in San Marcos, what are the most common kinds of fireflies that we see and what do they show at night? What makes them different or unique?

Ben Pfeiffer ([05:11](https://www.rev.com/transcript-editor/shared/IYZQZzr4T5KwjikJ2RG-3owGGjlfqsY9ghZsCaX-427JWZyj9V1S1BRtsYtfFh8HflEQ-1MQMN9QYRQ4v9bPCNvov5A?loadFrom=DocumentDeeplink&ts=311.14)):

So in the Edwards Plateau region, which would be defined of where we're at in San Marcos, New Braunfels area, we've got unique species that start here and then basically go north and west and east a bit to encompass about a 10 county range. And we've got some endemic species. We have fois esis, which is an endemic species that just occurs here in the hill country. It goes all the way to kind of Verde County and then a few counties upwards. You can see this firefly pretty regularly in pretty good habitats and it flashes every two seconds or so. And then we've got some of the other really cool species like Urus, bill Brown Eye, which is a firefly that will synchronize this flash in large groups and it has a double twinkle flash and it likes to fly along tree lines actually. And females will oftentimes congregate within ditches along a road, for example.

([06:09](https://www.rev.com/transcript-editor/shared/Zxzw_gKsQKcy_KH-tCDimjW2VRR6CSw1yv5I9sHSoxeVS9tDm1yJr-ttCVxtVdqV_QYcVq-MbtbFZBVxXcEklojrCSs?loadFrom=DocumentDeeplink&ts=369.2)):

It just is kind of their just ideal spot. And so those are really fun to watch because when you see a firefly, it's doing a twinkle flash, a double flash every one second. It is a really cool kind of experience to see that. So we have that. We also have, there's some rare species here. Got one species that I worked on with international conservation for union in nature that end up becoming listed as possibly endangered. It's a species that probably was a held over from a warmer climate thousands of years ago, and it's a pyro amino species that will flash kind of a bright amber color. So I'm doing research and constantly looking out for that. But we also have some small photo species, and these are fireflies that are about the size of a grain of rice. And so when I mentioned kind of four to five species, you might have fireflies of just different sizes in a habitat in a really good place and they can be speak kind of different sizes and different behaviors. Photo missis and photo granulators are ones that we will see here. And then there's one photo taxon common as well, and it's a small little firefly.

Dan Seed ([07:26](https://www.rev.com/transcript-editor/shared/14ixRpMR7dVg_8dlE0C4HLONUhfAnYh5SqCpGfPBhSoru25wviKkbpjpFMCprqd0AgtDtDeAg8krVEWj6gZgo8uOhNo?loadFrom=DocumentDeeplink&ts=446.33)):

So I am curious though, you mentioned the males and the females, and we see this in nature, like cardinals for example. It's the males that are the brighter colors, the females are more muted. Is it both males and females that produce the light or is it one or the other?

Ben Pfeiffer ([07:41](https://www.rev.com/transcript-editor/shared/xtS-4NGbDWmwl1qPSPoNPqsp2PNO0M1VjJ3A_gAItvYLaSx3OSOwAeIV2LvCV8tC4sO_7EwEPgByUybtePiiwLL4qis?loadFrom=DocumentDeeplink&ts=461.09)):

Both produce light. The females light signal is a little bit dimmer sometimes because they have smaller light organs and the males have two light organs in the abdominal segments and they both flash similar colors. There's slight differences. Females might be a little greener than males, for example, and sometimes they're completely in the yellow spectrum as well. So yeah, the flashes can differ and it's kind of in the yellowish greenish spectrum. Nanometer spectrum. That's relatively pretty weak actually for most cases. Yeah, some will kind of flash in the amber direction as well. I've seen all kind of flashes and variety of different colors here in Texas.

Dan Seed ([08:23](https://www.rev.com/transcript-editor/shared/3SwWJpBoU6CKNBJD5yS0myVEL9O9DRTIF4XIa3yt2lkh33zJH8c-93ywVVhRQ2LK4rgbnljNLVXHS1lXO5M4vwWhSqI?loadFrom=DocumentDeeplink&ts=503.18)):

Is it a mating deal or is it just something that they do on the regular?

Ben Pfeiffer ([08:27](https://www.rev.com/transcript-editor/shared/YYPSuGzrrZbbNu5NF7j985pN85WS9i5Yj4rq_EGsXwgsTnnhLMt1c7HtKmFMq7K85XH-oudQGndpfscO1PMwWpnpkGI?loadFrom=DocumentDeeplink&ts=507.26)):

Yeah, why do they flash, right, yes. What's this business of flashing in the first place? It's like are they just doing it for our entertainment or is it for actual real reason? It's a form of sexual selection. Essentially. Females are attuned to certain differences within male flash timing and male flash strength essentially. And so what the female's looking for is basically males that have longer flashes or faster flash rates. And there was research that was done on this to kind of look at that, and you can see that kind of reflected in the habitat when you go out and you will watch a female flash towards a male, and oftentimes she'll pick a bigger one that's got a bigger brighter flash or a longer flash. And so yeah, it's a quick form. They only live for a couple weeks and so they've got minimal time in order to find each other. And females are relatively choosy. They can sometimes there'd be tons of males flying around and they'll just sit there quietly and just until they see the right one that they're looking for. But yeah, it's kind of how they find each other.

Dan Seed ([09:32](https://www.rev.com/transcript-editor/shared/UkIwfCd5aLGmcTHezzDZbIFL-yEvjwIU5KFJyzdJlBLlamuutllbjYFMvKYYYHuq0-bZi1jWBethKCk_93lj54nMhqQ?loadFrom=DocumentDeeplink&ts=572.94)):

So it's one of my favorite parts of summer. Same with my kids to be outside. You look out the window and the fireflies turn on I guess so to speak. When we see them light up, what are we actually seeing?

Ben Pfeiffer ([09:44](https://www.rev.com/transcript-editor/shared/Fqyz8RCT3X7tGHQT8DQubb5pkLvE0xK0GA5kSFTyRIH1EShHgQXfEYBZly2t1gy4HdIh0iymzVatMRSBw06Flz78mO4?loadFrom=DocumentDeeplink&ts=584.07)):

What's actually what causes that reaction? It's two compounds, basically. It's luciferase and Lucifer and Luciferase is kind of an amino acid essentially, and Lucifer is an enzymatic catalyst that charges that molecule essentially. And what's happening is when fireflies breathe in oxygen, it basically powers that reaction essentially for that process to happen for the Luciferian molecule to kind of charge up within that amino acid. And then once it gets fully charged, it releases photons of light and the fireflies need to breathe in oxygen. And there's a combination of other chemicals that are in there as well, but you can kind of think of it like miniature lightning when they breathe in, it's this kind of miniature lightning storm that happens within their abdominal segments. This process repeats over and over as Luciferian charges up, and then it releases photons of light and it just starts all over constantly.

([10:41](https://www.rev.com/transcript-editor/shared/dpmIAN07My57kjr-fv8-PxREmJlssftNUnqy1Vl2Dg9H20ZHyvqPCm03QOZZRB9FiGMnsyBLw9WdPmPdAdOmkLw2868?loadFrom=DocumentDeeplink&ts=641.7)):

So they regulate the flashing based on their breathing, and that's kind of what you're seeing. And so a funny experiment you can do is you can actually take laughing gas and you can put it in a jar with fireflies, and what it'll do is it basically stops their ability to regulate them out of oxygen. So they just constantly absorb it, and so they just basically constantly glow. It's kind of a funny thing, and that proves that they're breathing in oxygen in order to power that reaction, but it's what it is. It's really what it boils down to.

Dan Seed ([11:14](https://www.rev.com/transcript-editor/shared/CZDJEjk_pxdDmWCmp8Lj_iPHfVPPABtPzOwmQ2qBrRQLXcQyxIlZM5VUCVaB48SNEe-3HIvSLrYnRyvqjtohTjwk9Tk?loadFrom=DocumentDeeplink&ts=674.25)):

That's interesting. Again, we're joined by Ben Pfeiffer, Texas State alum and the founder of Firefly Conservation and Research. So Ben Firefly conservation and research came about in 2009, and what I've read is that it began with a New Year's resolution. Most people are focused on losing weight, exercising, eating healthy, and you're out here thinking about fireflies. How did you land on that as your resolution and the drive at that time to start this group?

Ben Pfeiffer ([11:41](https://www.rev.com/transcript-editor/shared/3tP5xg6kwD-vsE23FzBjits03ylzRhAeeHE2j7Ha-zkNxxrlwGLnidZEcUKjtBZkfNey3BUjSsgV1rR1rxjaSJc_9A4?loadFrom=DocumentDeeplink&ts=701.34)):

Yeah, it's kind of a funny story. Around Thanksgiving time in the previous year in 2008, I had heard this brief report, this little clip about firefly decline that somebody had mentioned mean, but it was a seconds of a clip and somebody just kind of casually mentioned it, and I thought that was really interesting and I wanted to kind of explore that more. And then I had bought the domain firefly.org at an expiring domain auction, and my background is in web development and SEO, and so I have lots of experience on the web. I just had this scenario of, well, I got this domain, I'm interested in this. And I called in a few favors and I said, well, what if I can get this thing done by January 1st? And sure enough, it got done within a couple months, which usually never happens in web development and usually takes months and months and months, and then just launched this little website. And the design was really cool and I worked really hard on the writing for it as well and exploring the issues, and it just kind of took off from there. And that led to just this burning desire. I had to kind of know what species diversity was here in Texas and start asking a lot of questions people really hadn't asked before. And that led to the website and the growth from it from there,

Dan Seed ([12:58](https://www.rev.com/transcript-editor/shared/tqHMs1sdLT_9tO1m8MUjOl07sbCubDJUa83I65JRkrh0mXaT6oIr5iCMsVFgmKdcocmUivXxgMxXM77xG5O7Z6XnYss?loadFrom=DocumentDeeplink&ts=778.69)):

What were some of those questions that you had that you hadn't seen in research or other discussions that piqued your interest?

Ben Pfeiffer ([13:06](https://www.rev.com/transcript-editor/shared/ziaCqY5idbHa4wQIJiVvGq5p8ZS_zQ7ibXuTzU8oKJSvmMAaxUX_bT1XOqEPzfyHWl00Ad_1UNqXiqkeGyT-r792TYM?loadFrom=DocumentDeeplink&ts=786.1)):

Well, I wanted to know what was the species diversity here in Texas. Nobody had really done a tally essentially. There were some unofficial kind of ones and insect collections, but nobody had really done kind of an official tally. And so I started with actually mapping out the state and looking by the tribe level for Lamper day, which is the family that fireflies are in, and taking it a notch down and looking by county. And I developed this map basically of Texas that was color coded based on that county and the species diversity in each county. So you can look at a county like Comal or Hayes County and say, oh, well there's four different colors. And so it's just a nice visual representation of that. And then you've got to start diving into scientific literature and being really kind of serious about that to understand it.

([13:53](https://www.rev.com/transcript-editor/shared/rE9Z6cpdtZM5B-FyE8o3fltORKpEkGaCwpWd_1_918sWvZRPezIaaebH8as9Hlxh2BAV9yul7oxiDGtPtbzQ-ITDms4?loadFrom=DocumentDeeplink&ts=833.29)):

So some of this literature was written in the 1890s, for example, some of these entomologists or naturalists would come through Texas right after the settlers came and you're reading their reports and their descriptions of fireflies in such a language that's very hard to understand. So it is like you had to go back and learn new vocabulary in order to understand how they talked about fireflies, but even other insects because a language that people don't really speak unless you're really, this is kind of your job or your research focus. So it was kind of diving in that, and I had some really great people at Texas a and m and a couple others that were encouraging me and teaching me, and I learned a lot from them, and then that serves kind of a base for my knowledge going forward. So I got a really credible, almost like a master's level education in entomology and how I should approach it from a really credible way as opposed to just a kind of casual way of, we might look at this, but my experience with biology at Texas State helped with that a lot in terms of helping to do credible work and research to help advance the knowledge that we have here at fireflies in Texas.

Dan Seed ([15:08](https://www.rev.com/transcript-editor/shared/N9Y0583AAJqVBMtwERt5-d_jVko7HNXlfr5FxmEFp0s_7cG2jN_IBr9mv6VbHl3OGRswxyowBM8Yj-poMvH7S5bc57A?loadFrom=DocumentDeeplink&ts=908.66)):

Is studying fireflies rare? Are you one of a kind, or are there large groups

Ben Pfeiffer ([15:14](https://www.rev.com/transcript-editor/shared/-UPSoio6ilMGNbFqyCYnyqWPyIwozLUTWEJfufe-g13Jh_vBc9pWhKcIlhnCFMSlo_EFTmGAsFckbORi0TNdiBZ_dw0?loadFrom=DocumentDeeplink&ts=914.9)):

Of people? No, not one of a kind. I will say there's probably a handful, 12 people or so in the United States that kind of study fireflies. Right.

Dan Seed ([15:22](https://www.rev.com/transcript-editor/shared/TlNVHVxdLKVVN2gDs2RqxHS6-4qgZXU6H2-HVwVFCi0RrX4-XLrK4e79Hsl2k18fP6YAZx5G_WzAM76C1UjcGkY953A?loadFrom=DocumentDeeplink&ts=922)):

So it's rare.

Ben Pfeiffer ([15:23](https://www.rev.com/transcript-editor/shared/_iLOnT_uAcMMi4OnkddL1KqSSfKctCT9O9OHIkwdNO-bCwmCVBNeLazLXJDskxUtCj6EgNHeOaAhdalT4mHfDt9jPJg?loadFrom=DocumentDeeplink&ts=923.12)):

Yeah. Yeah, and so it is just a hard thing to study because as an entomologist you have to study the flash pattern, but also the morphology of the insect and sometimes entomologists or biologists, they just have to study the morphology of it, and when you add the flash pattern component, it just adds a whole level of complexity. One, it attracted me to that, but also it makes it a lot more difficult. And so my point being is that it can be a kind of difficult thing to get into. It just takes a lot of time and years and you've got to get out in habitats too to learn it. You can't necessarily read about really, and I love the habitat fieldworks part, and you got to get out at night too, man. People don't realize that there's things that go on at night. I've had poachers that have come by on sites that I've studied that I've hidden behind in a bush because I'm afraid I'm going to get shot if I jump out too quickly, I'm going to look like a deer or something. There's snakes and all sorts of things that pop out at night. I mean, my common companions in a firefly habitat are armadillos and owls, and so it's not uncommon for an armadillo to come out and run underneath my legs and an owl to be perched in a tree overhead, trying to catch a bat or something like that. So you got to be comfortable with the nighttime essentially. And that takes time too for people.

Dan Seed ([16:45](https://www.rev.com/transcript-editor/shared/3pJIqhN3ieyoXlC_rQxAzU47GIWLs_UQpVyUdp7QmfOEwuD3J4MnSeZFUj8UsKUz-CjwW0lh0sVv13vnn7wrfOApqnY?loadFrom=DocumentDeeplink&ts=1005.26)):

Yeah, those are things I never thought of because we've all gone out in our backyard and captured fireflies or looked at them. So being in nature like that definitely provides that different element to it. And as I talked about in the intro, one of the reasons that we're having you on this time of year versus the typical spring summertime of year is because so much of our ecosystem here in Texas, this is the stretch of the year that we're heading into, that's so important and it's so important for fireflies because it gets cool and wet. Why do these factors matter so much for a spring summer crop, so to speak, of fireflies?

Ben Pfeiffer ([17:23](https://www.rev.com/transcript-editor/shared/jKb-ksng3CCx8ILYD3NW-IofusHk5Lbv5FTrDScrARY-lIqMQSzQkpa92aZgda-0wISc1-O01X9AlT9MBFDG7uDuR3g?loadFrom=DocumentDeeplink&ts=1043.48)):

Dan, you hit the nail on the head in terms of kind of honing in on that. December's an important time in the lifecycle of a firefly. They spend most of their time in the larval state, and that state can last for a year, two years, sometimes longer just depending upon the conditions. And during December in Texas, sometimes we'll get kind of seasonal rains essentially, and those are preparing to hibernate in a way, and they're in a growth stage that they're months away from pupation five, six months and December. This time period right now is just really helpful for them before it gets too cold to just eat as much as possible. So they're growing and they're in a stage where it's really helpful. So if you get, in my experience in my research, if you get a really good seasonable wet winter that's mild for example, that produces a really good firefly year and it can actually be a two year period if you've got really good winter previous, and so that can help too.

([18:32](https://www.rev.com/transcript-editor/shared/hXMEFIpgnYmYvYnwOZ8EdhfcO0qmohcmXVAVamblqXAamFeKAFsyBqBSzJH8SzIUbuR-uS2fd2rPSwAaGauZSf7Y5XA?loadFrom=DocumentDeeplink&ts=1112.04)):

One final thing that's really curious that most people don't know about is that we actually have two seasons of fireflies in Texas, so we have one in the spring and then one in the fall. And the one in the fall, females will lay eggs in say, October, November. So you've just got kind of multiple stages and generations that are occurring in a habitat. So you can have really early small larva and then you can have ones that are halfway mature and that just kind of will translate into the next year when the spring hits and it warms up and it causes them to pupate and become adult.

Dan Seed ([19:05](https://www.rev.com/transcript-editor/shared/e5RhH-de7BbuPANnXm11Y1n9o4kSy6TBUaW1vMCjpgL9VLQZ7FSXvEbxEx2iqQril5PUqr0ogGwMrimBG7gZklQ69-w?loadFrom=DocumentDeeplink&ts=1145.4)):

You touched on this, and I alluded to it in the introduction as well, that fireflies like a lot of parts of our ecosystem are being threatened. I would imagine the drought, the extreme temperatures, all of that would be a factor.

Ben Pfeiffer ([19:18](https://www.rev.com/transcript-editor/shared/4cCIkHIqQxj9ZAa31A_d1pCpNuONgVlyAdhqaLqcnLh2IJCBRM1FRokIp16_yTPThwR58pNYzVOGdszm7IVqwwHBlug?loadFrom=DocumentDeeplink&ts=1158.69)):

There's a lot of factors at play and yeah, drought can definitely influence firefly populations quite a bit. They're really dependent upon moisture. There's a lot of factors that go in. Habitat degradation is a big one, and habitat loss especially really if you come down, you'd ask any firefly researcher, one of the main reasons why our fireflies are disappearing, they're going to point to habitat loss. Really. It's unfortunate that we live in an area that is really beautiful but also is experienced one of the largest disappearances of native habitat in the state. It is being replaced by subdivisions and development, and a lot of times those areas are cleared to the bedrock level. It's not uncommon for a new subdivision to go into an area that probably supported fireflies and other things, and the developers basically raise the ground to the limestone and start fresh, and it's such, I mean this is why they're disappearing is because of the loss of habitat.

([20:21](https://www.rev.com/transcript-editor/shared/sImNIDD-gLpzQjtfzrb8qWuUza2PfquXB3sn3XNXvnDLYyV-lyYAgWpUyykfxQLPAgpUcE4Z880RIQpsIbF5pcckUnw?loadFrom=DocumentDeeplink&ts=1221.36)):

Other factors that are in play are light pollution in some degree, and then as well as some pesticide usage and environmental contamination essentially is what a lot in some other places of the world. Ecotourism an issue, stuff like that. There's a variety of factors that go into it. Think about it like this. Before the settlers came to Texas, the springs here were rather vigorous is a good way to put it. There's a lot more wet seeps and small springs that were common in this area, especially along the Balcones escarpment where we're at right here that runs along 35. And as the aquifer got pumped, basically a lot of those small seep wet springs disappeared. Well, in Wimberley is a great example of this. There was some reporting this year regarding how low that was and how they weren't maintaining the flows and stuff back in the 1870s, that was a geyser. It was so much water that came out of that. It was like a dome essentially. It wasn't a still pond. So that's just kind of a great example, a visual example of decline of the aquifer or water tables.

Dan Seed ([21:36](https://www.rev.com/transcript-editor/shared/E0PWeTtJvNPsxvdTrzo5HmR6PsxuQk2tNJeMmv29-_aWG6P7ke78R6blD4U9N0VUFclT5WUGeuU_AEBuKi-WyiAQNvA?loadFrom=DocumentDeeplink&ts=1296.64)):

So I noticed, and I had this conversation with my wife this summer, and this is from my own backyard in South Austin, established neighborhood, low light pollution, not a whole lot of growth happening around where we are, and obviously this isn't a large sample size, but that this spring and early summer, late spring, I suppose it really was like June, the fireflies in past years were abundant and this year they were virtually non-existent. Why might that be? I mean I know that you can't diagnose, but would the freezes that we've had the last few winters impact that along with the warmer temperatures earlier

Ben Pfeiffer ([22:15](https://www.rev.com/transcript-editor/shared/t17uYs0ENvxF4v6DybkdsuiVCBRbdaMsoMZmSBsGZCkj1XiW5IwQQOSpE6h0b-FynF5cehuTBkm-aRg3uCgMVuqZ5bI?loadFrom=DocumentDeeplink&ts=1335.58)):

From the way that I looked at it and I was out in the field a bunch earlier this year, we had a relatively mild spring and it was a really pleasant spring and then that led to kind of an immediate quick change to really high temperatures. There was a pretty rapid trail off of Firefly that you saw afterwards. To answer your question about the freezes, that is a great question. It is one that I kind of wanted to know about when I got out. The freezes did impact fireflies quite a bit. One of the advantages of being a firefly researcher is I kind of have historical memory of past firefly seasons, and I can go back to that and go, man, 2016 was an incredible year. That was once in a 20 year period that we had fireflies and that trailed off into 2017. It was being good and 2018 as well.

([23:08](https://www.rev.com/transcript-editor/shared/UXPhijNcXfnhipGNflxhn75RD5XgX0p7KZbmYCA9HKUhfIM1ERHxgQH8gghJppEwjqBwWQqjkFBf02pGi9Ky09P1fqU?loadFrom=DocumentDeeplink&ts=1388.2)):

Yeah, this year with the freezes in the last two ones, it froze so hard that it killed probably a lot of larvae in the ground in the mud that otherwise would've survived a more temperate winter. So that definitely impacted it. Fireflies are relatively tough in the larva state though, so they can survive quite a bit, whether it's floods, even some drought and stuff like that. But you are still going to have some loss really when it comes down to is the food that fireflies need to eat also get killed off. So if the snails and the slugs and the worms and little small insects and stuff like that, if those disappear, then the firefly larva don't have much to eat. So that also got impacted. So you kind of have to look at it that way. Yeah, this summer was real brutal. I'm anticipating that next year it's going to be probably a poor year for fireflies just because of how hot it's been and the seasons that we've had. But maybe we'll get back to a more tempered period where we'll get more rains and that will help recover them. But they're still there. You might not have seen as many in your backyard, but they're still there and they're still doing their thing and they're just waiting for that, right environmental time, so it got too hot, they disappeared, and they're just waiting for great good humidity, moisture, and ideal conditions to come out again.

Dan Seed ([24:33](https://www.rev.com/transcript-editor/shared/igig6lTgExhnSRubGfHkR57NVQhgUjYBRpuH5AN8XtwSaODBjzoMvbVdTgfJ3Iui1hOWARccDHvLPDL9rfMjqVocbLM?loadFrom=DocumentDeeplink&ts=1473.8)):

Are there things that we can do as homeowners to attract them certain plants? Again, this is the time of year when people we're moving into winter and spring and people start thinking about what they're going to do with their yard. Are there things that we can do to create a more conducive habitat?

Ben Pfeiffer ([24:49](https://www.rev.com/transcript-editor/shared/xrIHtvHxMUHcvd5BkNIbyA_AxHccABJqI02DQCRGOX8g0JFzXMUB1z_kkL13ebNtOHWlUdRjWxUwgNlnyPY_BtI30JM?loadFrom=DocumentDeeplink&ts=1489.79)):

I have some of this on my website and I'll be posting some more stuff I just wrote really soon or recently. One of the things they can do is if they want to help encourage fireflies is in your own land or in your own yard, think about the property and what it's going to do for males, females, and larva. So you kind of have to back it up and say, well, I want fireflies. What do I got to do? But kind of back it up and go, alright, well if I'm going to provide habitat, and this was kind the process I developed to kind of talk about it, was what do we need to provide for females, males, and larva? And they need a diversity of plants and a diversity of different plant heights and species. And so some fireflies like to over winter and clumps of grass, for example, others like trees.

([25:39](https://www.rev.com/transcript-editor/shared/U0Tl5CSIqclK-x7t7QqYM4-YwbVTMMlL7wEGODV54y1hQ0-aHM6SWtUX3EuBw0ljgGkAKgHzYmZpUfkgh2--_oJgBzI?loadFrom=DocumentDeeplink&ts=1539.56)):

So I would take a critical look at your yard and go, how diverse is my yard for native species? And if it comes up lacking where you lack good amount of native species or they have been removed for whatever reason, look at ways that you can go to a local nursery and start introducing local grasses and local plants that are going to help retain more soil moisture in your property. Fireflies need that moisture to survive. So these choices are going to lead to a buildup of a habitat that could potentially support fireflies. People always ask me, they're like, Ben, can I buy fireflies? Can I go out and is there a website? Can I get on Amazon or Etsy and order a hundred to come deliver to my door? And unfortunately the answer is no. There's no firefly egg delivery that I know of yet.

([26:27](https://www.rev.com/transcript-editor/shared/UPw9tCNZml_UKRngxU0S161RurBCTwRdj_VCdc5tV0DPT1EM4vo-uFBX8xNhHwA9RLkn6M3cQyp4kJcF-yuKD3FMJ0Y?loadFrom=DocumentDeeplink&ts=1587.8)):

But the best thing you can do is provide the habitat for them to migrate to you and fireflies will migrate over time from one area like a habitat to another, and you just got to provide the conditions form. It's similar to monarchs and other pollinator species, for example, like you provide the flowers or the host plant for example, and they will come. And so it's same with fireflies. I would say if you're a rural land manager, you have much larger acreage to consider, and so your considerations are a little bit different somewhat. You want to locate your water sources and try to figure out the condition of those riparian areas. For example, if you have any, what are the state that they're in? Is there a lot of erosion going on or plant communities like solid? Is there overgrazing by cattle or ungulates or goats?

([27:22](https://www.rev.com/transcript-editor/shared/XfpMv5eo0uUhzPa5M27S0z_j_FPR9gaAGbjLxeMy882TiWv6u02aoyJ2Dw0bH_9pMXOde4RQiGJDRBGeGDYD40NEJSI?loadFrom=DocumentDeeplink&ts=1642.68)):

For example? Goats are one of the top enemies of fireflies because they consume basically all vegetation and they'll do pretty good job to remove fireflies from a yard if you got 'em. So take a consideration of how your land's being used in ways that are probably not great for it. The places that do encourage fireflies are ones that prioritize the health of the land in diverse plant communities. A bunch of different considerations. Look at light pollution as well see where your lights are shining. There's actual credible scientific studies that show that the light interferes with males being able to see females. And if you've got some bright LED lights, for example that are shining, then probably consider changing those to a more amber colored light and something like the 2,700 kelvin range or something like that. You want to avoid the really bright 5,000 kelvin LED lights because that basically interferes with the firefly seeing each other.

([28:21](https://www.rev.com/transcript-editor/shared/rjlDRDrjOCb82kqsP6voNZQ6B---2jyzxu1MiJ5ESSs46pFCFg8EVXKavCSs6pY9P--S3jXTZ8qJxjSJl-gB0Lo6uig?loadFrom=DocumentDeeplink&ts=1701.63)):

You can advocate for policies within your local area and city government for better nighttime lighting. For example, one of the latest things that I've seen is these new street lamps that are showing blue light. And with all the studies that have gone on about the horribleness of blue light for keeping us up at night, the city's decided that, well, we're just going to install street lamps in the streets to give you even more blue light. And it's just like absolutely mindbogglingly stupid fought the streetlight thing because they will broadcast light in all directions. And then we went from mercury vapor to LED lights and the LED lights were horrible. Those were so bright and glaring, and then now they're going to this blue UV light and I'm just like, who are these idiots that are making these decisions? Ask your community to change out lights and put downward focusing lights and amber colored lights that are safe for all different insects and humans. So those are a couple of things that I would do advocate for light pollution policies to help address that stuff.

Dan Seed ([29:29](https://www.rev.com/transcript-editor/shared/ATqZbxqogvOAKo2cmIyPFhDFOAeLK4VOnnCFzat9H4V30PRx20iW6uAwN8Obt7a5j1y5OYTIKjLKefPetwpie07pZqU?loadFrom=DocumentDeeplink&ts=1769.46)):

So getting down to brass tacks and knowing that there's a decline and that there's environmental factors, there's human factors at play here. Is there a danger or risk of fireflies becoming endangered or even extinct on the continent in Texas in particular? I mean, is that even on the horizon or is this something that may be a reality or not really?

Ben Pfeiffer ([29:55](https://www.rev.com/transcript-editor/shared/TGtmM_PxUQh8lXe9cTmnpNLund3dWwrpmuB3IH7qUtlCjvwc91HTTKlRPwciyG3Y7tDGXzdUCvVAN8F84P8nBdKwu74?loadFrom=DocumentDeeplink&ts=1795.87)):

It is a reality and work that Xerxes organization and the international for conservation for their union in nature did species risk assessments and I was responsible for the Texas species through the work. It came out that at least two of them right now, one's endangered and one's threatened. The one that's endangered, the only one that's seen it essentially, but it hadn't really been seen since the forties and it's a species called pyro amino V. And then in west Texas, there's a species out there that is also potentially threatened because it's kind of isolated out there and it's really dependent upon kind wet arroyos and streams out there. So that one, those two, we've given 'em common names. Those are ones that we have. The Amber Comet, for example, is the one here in the hill country and then the one in west Texas as well.

([30:52](https://www.rev.com/transcript-editor/shared/oYWFCwsmHf7HXqzVjYDcnRlX2FrjV0LVj-wNK5npxjxO32iF82LvS4MyXNYulhE7LXd0TK7COjnmzorkBLrpIAXhyhE?loadFrom=DocumentDeeplink&ts=1852.72)):

We've got the Sky Island fireflies what it's called, and those are cool, but there's also other ones. I've been on a hunt for a species called Fois Immaculata that hadn't been seen since the twenties essentially, and I've done multiple field surveys and have yet to see it. It's very difficult one to find. It could be extinct, we don't know. There's a firefly that occurred up in near Monahans sand dunes, and we only have two specimen records for it, and it is a male and female, so they were a mating pair and I revealed that. And so it meant that, okay, well they were here. They weren't just a migrant from Mexico that flew over the border and they're a complete unique genus, the firefly called Aspo, and that hasn't been seen since the seventies and multiple surveys have been done out there. And part of that is probably the disappearance of just wet areas in the sand dunes that have disappeared and provided not great habitat. It could still be there. We don't know. Some of these things are holdovers from relic periods of a warmer temper climate that are just now disappearing from threats essentially. And so yeah, we've likely had some things here in Texas that have disappeared. We just don't know about even. There's just a lack of data really for a lot of it.

Dan Seed ([32:10](https://www.rev.com/transcript-editor/shared/F81vt8rzyBJxNgOOQQIOtavockKfurav-i8-XgAfAXz2k4hs0cT3uo6Kj7Em2MweXtork_PrZXxYLZFfoKOjedrFcC4?loadFrom=DocumentDeeplink&ts=1930.78)):

Yeah, it's really sad to hear that we may not even know what's here and what's gone and what's disappearing or already has disappeared, and of course they're so elusive, I would imagine that it's difficult to figure that out as you've mentioned. So we are hard up against our time here. So I do want to ask you one last question. Your group, your website, when people go there, what can they expect and what all do you provide?

Ben Pfeiffer ([32:37](https://www.rev.com/transcript-editor/shared/cMrjsMyIt7asbyMVYuciMsQUErqSTM5vXJhM6TkQLMjGFVMWm1GQDG5UE1mkLDd4gg3ovx60maC0HG_id8NmyiDIn4A?loadFrom=DocumentDeeplink&ts=1957.27)):

When people go to firefly.org, there'll be some helpful information for them wanting to learn about firefly disappearance and ways that they can help and there is good resources on there and just some really fun information, everything from different names for fireflies to how to think about habitat and ways to help them. There's also information on the Habitat certification program, so last year I launched the first of its kind certification program for your habitat, and what it's going to do is it allows you to buy a sign and then try to self-directed way to certify your property by accomplishing four different things and by doing those, you're helping to encourage fireflies to your property. And what the sign will do is it'll certify your yard and it will also tell other people that this is a valuable place for fireflies and it'll alert them to help them protect it.

([33:30](https://www.rev.com/transcript-editor/shared/x5KHwxPQc_KIE7LQLOujX5xORbGAmlRwJLYFkJHnSANw_EYoRZuN1oL2vAVkMK6cA4WilrGJ7zXmI1GyyPRzZVlkej0?loadFrom=DocumentDeeplink&ts=2010.39)):

Essentially. One of the reasons why this is so great is people only see fireflies at night, and a lot of people visit properties during the day and may not know that there's fireflies there. So if there's a sign to tell 'em that, well, this is a firefly habitat, then they're going to help protect that. So yeah, definitely check out the Habitat certification program. There's information on my speaking engagements and when I speak, I do a great big public event in Cibolo every year at Crescent Bend State Park or Crescent Bend Natural area. That's really great for all ages and types of people.

Dan Seed ([34:03](https://www.rev.com/transcript-editor/shared/EPYmmKEwl87-BOJsPUE_3SGMdSaNhAaylga0uzqdz-IB0Xjm70wWUGh506ZQbOx5IaoyD9klOsp03dkOnADgJfRdNEY?loadFrom=DocumentDeeplink&ts=2043.89)):

Great stuff. Thanks Ben Pfeiffer, thank you so much for joining us.

Ben Pfeiffer ([34:07](https://www.rev.com/transcript-editor/shared/wFKKus39RLH_9eoORzLvHSVKFbBshInKu-IKw4a9ZFJx83xBBHhXWXTHqweQZkqPcAYyMXIjVQG3ajlUjjKYGniqb3E?loadFrom=DocumentDeeplink&ts=2047.58)):

Thanks Dan for having me.

Dan Seed ([34:08](https://www.rev.com/transcript-editor/shared/IlUcHcB4fqiPtVUVkkio9p7bT3PIGgJYIdDc1whRd_XyxyTgXILWXbCUkY6kRLgpICiU1uQp_0z4AJ4lrf0CsZBuDX4?loadFrom=DocumentDeeplink&ts=2048.9)):

And thank you all for the privilege of your time and for downloading this episode and joining us this year. We'll be back in 2024, our fifth, hard to believe, fifth season of big ideas, and we hope that you'll be there then for my executive producer, the man that you don't ever hear from. Jamie Blaschke. Thank you very much for joining us for another season and until then, our next season, starting in January, stay well and stay informed.