Ask-a-Biologist Vol 048 (Guest: Emil McCain)

Is There a Jaguar in My Backyard?

Could these shy cats be living in Southern Arizona? Dr. Biology learns about these amazing animals from wildlife biologist Emil McCain. The two talk about the Borderlands Jaguar Detection Project and how two long-time hunters became the biggest fans and supporters for Jaguar habitat.

Transcript

Dr. Biology: This is "Ask a Biologist", a program about the living world and I'm Dr. Biology.

Now, I love riddles, so let's try one today. What in one form has four legs, runs very, very fast and roars, and yet in another form has four wheels, goes very fast and some say also roars? Let me give you just a moment: roaring, wheels, legs.

What could it be? Well, it turns out it's a jaguar. That furry feline that we know as the jaguar is also the name of a really fancy, really sleek car.

Today we get to talk about not the car, but we do get to talk about the really cool furry animal. To do this, we have wildlife biologist, Emil McCain, in our studio today. He's with the Borderlands Jaguar Detection Project which is really pretty cool.

I've been doing some reading about it. They use these remote cameras to capture these jaguars in the wild, and it's really been an important project because we really didn't think we had any jaguars still living in Arizona. We thought they might be coming up and visiting, but we didn't think they're actually living here.

Let's find out if these jaguars are living in our back yard. While we're doing it, we can learn about wildlife biology from our guest, Emil McCain. Thank you for joining me here today.

Emil McCain: Thank you, Dr. Biology. That's right. We do have jaguars in our back yard in Arizona. Most of us speak of jaguars and think about the tropical rain forests of Central and South America. But, in fact, the jaguar resides in the Desert Mountains here in southern Arizona.

Dr. Biology: For a long time scientists really thought there weren't any jaguars around here. If there were, they were just visiting. How did you find out that there are some jaguars around here?

Emil: Two amazing gentlemen, professional hunter, Jack Childs and hunter, Werner Glen, photographed jaguars in 1996 and came forward with those photographs. When I say these were amazing gentlemen, it's because they were hunters.

For example, Werner Glen is the picturesque Marlboro man. He is a cowboy, six and a half feet tall, the weathered face, the button down shirt, the cowboy hat. And they were out hunting cats.

What they found was not what they expected. They thought they were hunting mountain lions which is legal, and it was their profession at the time. They found a jaguar that captured their

imagination, and the beauty and the majesty of that animal turned them towards the conservation of that animal so that their children and grandchildren can see that animal in the wild.

Dr. Biology: Now, the jaguar is a pretty impressive cat. One of the things I noticed when I was doing my research and I knew you were coming here to ASU to give a talk, there are jaguars and there are leopards. They both have spots. How can you tell the difference between a jaguar and a leopard?

Emil: That's a very good question. The two are very closely related. They are members of the same genus, panthera. The leopard is the old world cat, old world meaning Africa and Asia, and the jaguar is the new world cat. The similarities are such that many people will confuse them, even side by side, but a jaguar has a different type of spot pattern.

A jaguar has what we call a rosette, and it will be small semi circles of spots that are surrounding one single solid spot. Actually, it could be more than one single solid spot, and a leopard has a similar rosette without a spot in the middle. It's a very subtle difference.

When you look at some of the photographs, you see that a leopard has no spot in the middle, and a jaguar will have spots in the middle of their rosettes.

Dr. Biology: Yeah. Even with the pictures side by side, they do look really, really similar. Are there any other characteristics that are different? Are they the same size?

Emil: Jaguars tend to be larger than leopards. The jaguar is the largest cat in the Western Hemisphere and the third largest cat in the world. The only cats that are bigger than the jaguar are the African lion and the tiger.

Dr. Biology: Wow. Do jaguars roar like a lion or a tiger?

Emil: That's correct. The jaguar is what they call a roaring cat. It has a bone in its throat called the hyoid bone, and when that bone is fused the animal can roar. When that bone is not fused, such as in the mountain lion or the bobcat, the animal cannot roar. So, the jaguar is the only roaring cat that we have here in North America.

Dr. Biology: Alright. Let's talk about the Borderlands Jaguar Detection Project. It starts off with these two classic cowboys.

Emil: Western hunters out in the wilds of southern Arizona hunting, enjoying their pastime, and they came across something that was so beautiful and so wild that they put their rifles down, picked up their cameras, took photographs. Then, they came home and said, "What can we do to help this animal?"

That was in 1996, and here we are. Both gentlemen are still very dedicated to the conservation of this species. Jack Childs started the Borderlands Jaguar Detection Project.

What that is, is a study designed to detect jaguars in the borderlands of southern Arizona, and use that information to help the agencies plan conservation strategies to help this animal return to its home in the southwest.

Dr Biology: So, to detect it you just get a whole bunch of people, and you send them out hunting for jaguars, right?

Emil: No, we're using very interesting technology called camera traps. These camera traps are designed to stay out in the forest or in the desert for extended periods of time. They have a heat and motion sensor. So, when you aim a camera trap across a canyon bottom or a trail through the mountains, anything that passes by that camera triggers its sensor and takes its own picture.

We're using this technology to learn about species that we as humans don't get to see every day: nocturnal species, species that are very elusive and just out during the night time and may be very shy. We can't actually go see them, but through the use of these camera traps we can learn a lot about them.

Another method we use is traditional tracking skills. We learn to follow the footprints and scat, another sign left behind by these animals. We can read that sign and learn a lot about what they're doing, where they're going, what they're eating?

And that type of information can be compiled to help us plan how we can help save the right places that these cats need to survive.

Dr. Biology: So you're not only a wildlife biologist, but you're an animal tracker. When did you start to learn how to track animals?

Emil: I grew up on a ranch in rural Colorado. We had a huge wilderness area right outside my back door. So I would set out, from the house, with my backpack and my binoculars, and I would look for animal tracks. And I taught myself to identify different species, and I taught myself to follow the tracks.

Sometimes I would get to see the animals, but more often I would just get led on a journey that would teach me something about what that animal was doing. And I remember, I would come home and I would tell my father the stories of what I saw, and he would ask me, "Well, why do you think that animal was doing that?"

And it became a real pastime and a real interesting activity, for both of us, and that passion, that interest in those animals led me to become a wildlife biologist.

Dr. Biology: Well, tell me, when you're doing some tracking, obviously there are footprints or paw prints. What else is there that goes into tracking an animal?

Emil: Tracking an animal, really, involves looking at the entire landscape at many different levels. You look at likely travel corridors through a very large area. Within those travel corridors, you can look at areas that an animal might be likely to visit.

Just looking at the ground, you don't always see a clear footprint. You don't get your picture-perfect track every time. Many times it's just a rock that's been moved ever so slightly, or you might see some leaves that have been crushed. And you can start to try to interpret those. All of those clues can be combined to tell you a story about what happened there.

Dr. Biology: I read something about you that you've had some close encounter with some branches, because you spend so much of your time looking down at the ground that you miss the branches.

Emil: That's correct. And I'm very notorious for just looking at the ground while I walk. I'm also notorious for hiking very quickly. Sometimes I run smack into a tree [laughs] when I'm not paying attention.

Dr. Biology: OK. So that's the hazards of tracking in the wild, versus those people that walk around with their cell phones or their BlackBerries, with their head buried in a screen, and they walk into walls.

Emil: That's correct.

Dr. Biology: All right. Well, let's get back to these cameras, because the cameras seem to me that we're using some really cool, modern technology to help find out about this mysterious cat. I mean, just the word "jaguar" alone is just very cool. So, how many cameras do you need to do this?

Emil: We started with just six cameras. We very quickly realized that was not enough. Now we have 50 cameras, and again, we realize that is not enough. We've realized that the more you look, the more you're going to find. This whole story has been unfolding. Around every corner, there is a new mystery. And literally, we are finding things that we never imagined.

Dr. Biology: OK. So, 50 cameras. How many pictures have you taken?

Emil: I've taken well over 20, 000 photographs of native wildlife species in southern Arizona.

Dr. Biology: Oh. OK. Now you're leading me into my next question. How many pictures of jaguars have you been able to capture?

Emil: We have taken 83 photographs of jaguars.

Dr. Biology: 83 photographs of jaguars. OK. What are the other animals that you're also capturing?

Emil: There are about 24 other species of wildlife that frequent the mountain ranges here in the southwest. Some of the most common species are the white-tailed deer, the javelina. The gray fox seems to really enjoy being on film. They often trot by the cameras carrying their rabbit or their pack-rat prey very proudly. We've also found wild turkeys, possums.

There's a very interesting species called a white-nosed coati, and this is a relative of the raccoon, but it is a tropical relative, and they live in very large family groups. And they almost behave, believe it or not, like a northern monkey. They travel in these large groups, and they're very curious animals.

They're very smart, and so they're always investigating everything. They need to turn over every rock and look in every hole in a log, and they're really quite entertaining little critters.

Dr. Biology: Well, if you've captured all these pictures - in particular, let's get back to the jaguar. How many jaguars do we have in our backyard?

Emil: We have photographed two, and possibly three, different jaguars on our study. And the way that we know that we have two or three individuals, is by comparing the spot patterns on the coats of those jaguars.

Now, we all know that our own fingerprints can be used to identify each and every one of us. Everybody's fingerprint is unique. Well, the spot pattern of a jaguar is the same way.

And we can use the photographs to look at the spot patterns on those animals and know if one photograph represents the same individual as another photograph. So we have been able to identify two adult males, and possibly a third individual.

Dr. Biology: So, do these jaguars have any names?

Emil: They do. I have named the jaguars that we have photographed on our study Macho A and Macho B.

Dr. Biology: [laughs]

Emil: Now, you laugh, Dr. Biology, at the word "macho." We have very strong interpretations of the word "macho" in our culture, but in fact, it's a Spanish word for the word male. So the name Macho A simply means "male A." And Macho B is "male B." Macho B has earned quite a reputation for himself.

We have photographed him more than any other jaguar, and some people have said that he is the most photographed wild jaguar in existence today.

Dr. Biology: Hmm. I wonder if he knows it.

Emil: I think he likes being on camera.

Dr. Biology: Do you? Speaking of liking to be on camera, is there a concern about these cameras out in the wild? I'm assuming that they have a flash that goes off, this sudden burst of light. Is that bothering these animals?

Emil: I had that very same concern in the beginning. I thought, "That's kind of rude, to shine a bright light in the eyes of an animal, especially a nocturnal animal that needs its good night vision to travel the rough country." But what I have found is that the flash is so quick and so quiet that the animals don't really seem to respond.

The reason I believe that is I have now photographed female mountain lions, with their kittens, that will actually lie down and play in front of a camera for up to three of four hours at a time. We have one sequence of a female, that's actually nursing her kittens in front of a camera trap.

If an animal was disturbed by the camera traps, it would be the most sensitive, at the point when a female has young. These sequences really show me that they don't seem to mind the flash. I

think, probably, the flash is so fast, it's almost like lightning going off in the distance, and they just don't seem to be bothered.

Dr. Biology: So, does that mean, if 50 cameras aren't enough, that you're out looking to put more cameras out?

Emil: That's correct. I spend a good portion of my time trying to raise funds and raise interest in this project so that I can purchase more cameras and get more help out in the field.

Dr. Biology: All right. One of the more popular questions that's sent in to Ask-a-Biologist is, "What's it like to be a biologist? And in particular, what's it like to be a wildlife biologist?" So can you give us just, oh, a typical day, or just a blended typical day, of your life as a wildlife biologist?

Emil: Sure. A typical day, I might be camping out in a wild place. I might wake up early with the birds. I might go for a long hike into a remote canyon somewhere, to check a trail camera and do a track survey. I might stop at a good river wash to look for tracks.

And then, when I record my data and I have my notebook full of field notes, I might return back to my office, sit down with the computer, and enter everything into my database to keep track of what I did and what I have observed.

And then, I might read up on interesting science projects that other biologists have done in other places, and think about how that might relate to my work and how I might learn from somebody else's experiences.

Dr. Biology: Now, are you being able to use some of the newer technologies, say as simple as Google Earth, yet?

Emil: Yes. Google Earth is wonderful; also, some of the other programs that we can use with different layers of data. And we can, actually incorporate something like Google Earth, which gives us the landscape, but then we can also incorporate information about the vegetation types or the soil type.

And those kinds of things can all be added together, and we can begin to put together some patterns and look at where we might go next.

Dr. Biology: So, you've got this really back-to-nature part of your job. I don't even want to call it a job, because it sounds like you love it so much it can't be a job. But then you have a very technical side.

Emil: That's correct.

Dr. Biology: Tell me, how do those blend?

Emil: That's a good question. [laughs] I believe that a critical aspect of modern biology, modern science, is observing that natural world. And I believe that the best biologists were those that spent the most time out in wild settings.

I feel that it is critical, to understand exactly what is going on in the field, to be able to apply the modern techniques properly. We have scores of new computer programs and new modeling software, but if you don't put good information into those programs, you need to question the results. So I put an emphasis on both aspects of modern biology.

Dr. Biology: Right. It's the old adage: garbage in, garbage out.

Emil: That's correct.

Dr. Biology: So we're talking about jaguars. And they really are just great, big pussycats. I see similar traits in my own house cat. He loves to go up to a particular chair, take his paws and claws; it seems like, to this particular piece of furniture. What's he doing? Is he sharpening his claws?

Emil: That's a great question. And the answer is no. He's not sharpening his claws. He is scent-marking. Believe it or not, a cat has scent glands between his toes. And what he is doing is using his claws to rough up the surface of your chair, or in some cases a cat would use that on a tree or a log. They would rough up the surface so that those scent molecules can be absorbed into the wood.

This is a form of communication between cats. Cats in general, with the exception of African lions, are a solitary species. That means they spend the majority of their life alone, and fairly widely distributed. So the only way they can, ever actually communicate with each other is through leaving a scent mark throughout the landscape.

This is a very interesting topic that biologists are exploring in more depth right now, but we really don't know a whole lot about it.

What we do know is that there are several different forms of scent marking. You see your cat scratching on your furniture. When your cat comes and rubs its cheek against your pant leg that is also a type of scent marking. They have a scent gland on their cheek.

A cat will also scent-mark in the form of urine spraying. This is a way that they can leave their chemical signature throughout the landscape. It's usually placed in a very strategic location. I call them "kitty bulletin boards."

Dr. Biology: [laughs]

Emil: And that's a place where other cats will come to check and see who has been passing through the neighborhood. We believe that cats can tell a great deal of information about each other simply through their scents. So they might be able to tell if the last cat that came through was a male or a female. They might know a little bit about its sexual status, maybe its state of health.

And it's, really one of the main ways that cats can communicate with one another, without having to actually have physical interactions. We believe that it will limit a lot of violent interactions between cats, and may help potential breeding partners find each other during the right times to have a successful mating.

Dr. Biology: What is the range, by the way, of a jaguar? How big of an area does a jaguar need to live?

Emil: The range of an animal is determined by the amount of resources available to support that animal. So, if the resources are very rich and diverse they may not need as large of, what we would call, a home range or territory. Here in Arizona in the Sonoran Desert it appears that jaguars need quite a large home range.

Macho B, who is our infamous jaguar, he requires an area roughly the size of Rocky Mountain National Park if you are familiar with that. This is an area of 525 square miles, so it's quite a large space. It's evident that the food resources or water resources or breeding resources are not as densely distributed as they would be in, say, a tropical rain forest.

Dr. Biology: On "Ask a Biologist" and I think this is going to be one of the fun ones for sure, we ask three questions of our scientists. The first you've talked about, but I wanted to know if you really knew exactly when you were going to be a scientist or a biologist. Do you really remember the 'ah ha' moment?

Emil: I don't recall the moment that told me that I was going to be a scientist or a biologist, but I remember the moment that I knew I wanted to help jaguar conservation. I was not one of the hunters that saw a cat in the wild in Arizona.

I was an under graduate student studying on a field project in Costa Rica, and I had the opportunity to study either sea turtles or jaguars. I took the jaguars, and the day before I was to go off into the rain forest with a Costa Rican biologist and spend two months studying this animal, I was taken to the local zoo by my host family.

Of course, we went straight to the jaguar exhibit. There were, maybe, 50 or 75 people gathered around this cage. Everybody was banging on the cage with sticks and whistling and trying to get the jaguar's attention. I thought it was quite a depressing scene.

Amidst all that, the jaguar which was lying at the far end of the enclosure, lifted his head, looked me straight in the eye and got up on its feet without breaking eye contact, walked straight to me. We sat there face to face for five minutes, maybe, while we had drawn quite a crowd, and we never lost eye contact.

I took that as a sign that I needed to really help the species. This poor, old, unhealthy jaguar was stuck in a very sad situation, and I think he was asking me to help his kind and work toward conservation of the species.

Dr. Biology: Wow. Alright. I'm not going to take you away from the jaguars, really.

Emil: OK.

Dr. Biology: But, this next question is going to challenge you. I'm going to take all your science and all your biology, anything to do with that away from you.

Emil: OK.

Dr. Biology: If you have to pick a different career or something - hobby- that you would do if I took that away from you? What would you be, or what would you do?

Emil: I would probably be a teacher. I would be a teacher only because I really enjoy the natural curiosity in children and, again, this does relate back to the natural world. I believe that every one of us is fascinated by natural processes, and I believe very strongly in fostering that curiosity.

Dr. Biology: Well, we need more teachers, but, again, I'm going to leave you with the jaguars.

One last question. What advice would you have for someone who wants to become and I'm not going to say biologist, I'm going to say a wildlife biologist?

Emil: The best advice I can offer is to spend as much time as you can outside, making those observations on your own, maybe, forming some small hypotheses. What a hypothesis is you gather some information, you make an observation and you try to guess what that might mean.

Then, you might try to gather some more information that might help you either support that hypothesis or disprove that hypothesis. That's the beginnings of becoming a wildlife biologist.

The second thing I would very strongly suggest is trying to become involved with some sort of research, whether it's a citizen science type of organization or whether you can volunteer for your local wildlife agency or state parks or something like that. Getting out there, interacting with professionals in the field is very important.

Finally and most critically important is a good education.

Dr. Biology: Right. It does help. I have to agree because you can go out there and collect all the data you want, but usually it comes back to doing things like math, things that may not sound fun in the classroom. But when it helps you answer a question or figure out how something is working, it's magical.

Emil: That's right. Math is an integral part of all science. Math is extremely important, also, abilities to communicate well, reading and writing. If you're planning on making a change in the world, you have to be able to express your ideas.

Dr. Biology: Right. If we don't publish, no one knows what's going on. We won't be able to save the jaguar.

Emil: That's correct and an important aspect, also, in that in publishing your ideas, in presenting your hypotheses and the data that you've collected that might help support those hypotheses. You have to be ready to discuss those interpretations of your research and be willing to view, and entertain alternative interpretations of those results.

Dr. Biology: Well, I want to thank you, wildlife biologist, Emil McCain, for joining us on "Ask a Biologist" and being able to tell us a little bit more about the jaguar that is in our back yard.

Emil: Thank you, Dr. Biology. It's been a pleasure to be here.

Dr. Biology: Before I let you go, is there a website for the Borderlands Jaguar Detection Project?

Emil: Yes, there is. It is www.borderjag.org.

Dr. Biology: Very good. You've been listening to "Ask a Biologist", and my guest has been Emil McCain from the Borderlands Jaguar Detection Project.

The "Ask a Biologist" podcast is produced on the campus of Arizona State University, and is recorded in the Grassroots Studio housed in the School of Life Sciences which is an academic unit of the College of Liberal Arts and Sciences.

Remember, even though our program is not broadcast live, you can still send us your questions about biology using our companion website. The address is askabiologist.asu.edu, or you can just Google the words, ask a biologist.

I'm Dr. Biology.