



## Science Magazine Podcast Transcript, 8 February 2013

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### **Promo**

The following is an excerpt from the *Science* Podcast. To hear the whole show, visit [www.sciencemag.org](http://www.sciencemag.org) and click on “*Science* Podcast.”

### **Music**

#### **Interviewer – Sarah Crespi**

Finally today, David Grimm, online news editor for *Science*, is here to give us a rundown on some of the recent stories from our daily news site. So up first, Dave, we have a story on changing weather not due to climate change.

#### **Interviewee – David Grimm**

Changing weather due to irrigation, this story has to do with California’s Central Valley, which is an area almost twice the size of Massachusetts. And farmers there raise more than 200 different crops. It’s actually one of the largest irrigated regions in the world. Every year, several cubic kilometers of water are supplied to the Central Valley’s fields, and about 60% of it comes from river flow, the rest comes from wells. So there’s a lot of water being diverted into these fields. The thing is that not all this water actually nourishes the crops. A lot of it just evaporates. So the question of the study is, where does that water go, and how is it impacting local regions?

#### **Interviewer – Sarah Crespi**

So how do they test such an idea on such a large scale? I mean you’re talking about weather patterns from evaporated water.

#### **Interviewee – David Grimm**

Exactly. So usually when researchers have to sort of figure out what is happening with something as complicated as the weather, they turn to global climate models, which is what they did here. And they basically, they had a global climate model, they fed a lot of data into it in terms of how much water is being pumped into this region, where is the water going, how is it impacting weather patterns, and what they found was really interesting. They found that overall, the water being pumped into the California Central Valley boosts summer rainfall in areas like Wyoming, Utah, Colorado, Arizona, New Mexico, by 15% above average. And it actually boosts the runoff of the Colorado River by 28%, which could actually cause periodic flooding of the Colorado River. So this irrigation is actually having some pretty important impacts, and what’s more, it’s not just the water itself; the water vapor in the air, when it condenses, it releases a lot of heat. And then this hot air rises, it creates a low pressure at ground level, and this can actually increase storm activity in regions as far away as the Gulf of California and the Gulf of Mexico.

#### **Interviewer – Sarah Crespi**

So the evaporated water isn't just raining down, it's actually spawning new weather patterns altogether.

**Interviewee – David Grimm**

Exactly.

**Interviewer – Sarah Crespi**

Well, do the researchers think this is happening anywhere else? I mean, California is really big, as you said at the beginning.

**Interviewee – David Grimm**

Right, well, in fact there's other places of the world – India, China, the Great Plains – these are all areas where a lot of area is irrigated, and potentially could be having similar impacts on the weather systems in those parts of the world.

**Interviewer – Sarah Crespi**

Really interesting. Next up we have a story on how human intervention, you know, saving the whales, or saving the wolves, may not be enough to actually recover an ecosystem.

**Interviewee – David Grimm**

Well, Sarah, this is a really interesting story because, you know, we often think that if something's missing from an ecosystem, and the ecosystem is suffering as a result, all we have to do is add that thing back and everything will be hunky-dory. And the case in point here is Yellowstone National Park. A century ago, the wolves there were considered varmints, and they were practically exterminated. By the 1940s, in fact, they had almost completely vanished, and the ecosystem wasn't doing really well as a result. So in the mid-1990s, scientists started re-introducing wolves to the area. And this new study sort of looks at did that solve the problem; is the ecosystem back to where it should be? And it turns out it's not, really.

**Interviewer – Sarah Crespi**

So they have more wolves, but there are other things that are still missing?

**Interviewee – David Grimm**

Right, well, what happened was that the absence of the wolf caused this explosion in elk and bison. And so, first of all, you had this overpopulation of elk and bison, but actually that had an impact on willows. These elk and bison were munching a lot of willows, the willows were disappearing, and that in turn had an impact on the beavers. Beavers need willows. They eat the willows. They actually build their dams with the willows. And it turns out that willows also need the beavers. When the beavers build a dam, the water level rises, and that helps irrigate the willows, and everybody's happy. Well, it turns out taking the wolves out of this very complicated equation has made everybody unhappy.

**Interviewer – Sarah Crespi**

So what's the biggest impact that scientists are seeing today? What's missing in the park itself?

**Interviewee – David Grimm**

Well the scientists found that even re-introducing the wolves didn't solve the problem. They did some experiments where they actually built their own dams. They fenced off some of the willows, and they found out that the willows were still growing a lot shorter than they should be to be really viable. Even with the wolves back in to reduce the populations of elk and bison, the willows still aren't completely recovering.

**Interviewer – Sarah Crespi**

So the willows are stunted, and returning them to their former height and glory is going to be difficult. What is there that researchers can do?

**Interviewee – David Grimm**

Researchers say it's a pretty tough egg to crack. They say perhaps if Yellowstone got a very wet year, that would encourage willow growth. That, maybe combined with a year that saw a low level of elk browsing, would allow beavers to establish a foothold, and that would increase the water levels because they're building more dams. The willows start to recover, that helps the beavers, and you sort of have this cycle getting back to where things were originally before the wolves were exterminated. But a lot of stuff has to really happen right, for that to happen. But all this really shows is that these ecosystems are very, very complicated. It's not just a case where if you remove something and put that thing back in, all of a sudden you've solved the problem. This study really shows that it takes a lot more than just a simple re-introduction to save an ecosystem.

**Interviewer – Sarah Crespi**

Great! All right! So last up we have a story on the potential finding of empathy in birds. What's going on?

**Interviewee – David Grimm**

Well, Sarah, this is actually even a little bit more than empathy. It has to do with something that we've talked about a few times before on the Podcasts, this theory of mind. And what theory of mind is is, do I sort of know what you're thinking? So if you raise your hand to me, do I know that you're going to just high-five me, or do I think that you're going to slap me across the face? You know, it sounds kind of silly, but actually this is how we all get along. We don't necessarily read each other's minds, but we have a pretty good idea of each other's intentions, which is sort of a way, maybe a subtle form of mind reading. Now there's been a lot of controversy about whether other animals are able to do this or not. And this new study suggests Eurasian jays, which is a type of bird, are actually able to do this.

**Interviewer – Sarah Crespi**

And what made them think that Eurasian jays would be a good bird to study for this?

**Interviewee – David Grimm**

Well, jays are actually known as very intelligent birds. Scientists have shown previously that they can plan for the future, that they have sort of some conception of not just the current moment in time, but future moments. And so they thought this would be a good species to study to see if jays also had, maybe, this theory of mind. And the experiment they tried was actually kind of neat. It turns out that jays have pretty complicated courtship displays. And when the male jay – Eurasian jay in this case – is trying to woo a female, he actually feeds her during the courtship display. And he tries to feed her food that she likes. Well it turns out jays have a preference for certain foods. Given the choice, they prefer mealworm larvae, or wax moth larvae, but they can get sick of a food if they eat too much of it. So the scientists also knew that when the birds have been fed a lot of wax moth larvae, they tend to switch to the mealworms after a while because they just kind of get tired of the same food over and over again, kind of like we do. And so the researchers set up an experiment where the male could actually watch what the female was eating. So if the female was eating, for example, a lot of wax moth larvae, the male would start feeding her mealworm larvae, and vice versa. It was almost as if he was saying, look, I know you're probably getting sick of that. Here's a different kind of food.

**Interviewer – Sarah Crespi**

And so he doesn't give her – he doesn't eat, himself, or give her something that he wants, he gives her what he thinks she wants.

**Interviewee – David Grimm**

Exactly, and that's the key phrase here: he gives her what he thinks she wants, which is a suggestion that he's actually, in a way, getting inside of her head. He's saying I'm not just going to give you a bunch of food because I just guess that you're hungry. I'm actually thinking a little bit about what do you want, what you are getting sick of, do you want something different. And though it seems like a simple behavior, it's actually very complex, and it suggests perhaps a basic theory of mind that, again, is very rare in the animal kingdom.

**Interviewer – Sarah Crespi**

But it's really tricky to prove that something else has a mind, or what something else is thinking about, just judging from their behavior. So is there a way of testing this or teasing it out?

**Interviewee – David Grimm**

Well, it's a really good question, Sarah. And, again, there's a lot of speculation going on here. You know, we're almost trying to put ourselves in the minds of these birds, nevertheless, these birds trying to read each other's minds. So it's pretty complicated. This is really obviously hard to study. We can't ask these birds what they're thinking, or what they think other birds are thinking. So it's experiments like this, which at least sort of provide a hint of what might be going on, but we're really not at the point yet where we can actually say definitely that these birds have theory of mind.

**Interviewer – Sarah Crespi**

Really interesting. So what else is on the site this week, Dave?

**Interviewee – David Grimm**

Well, Sarah, we've got a story about how ants use noises to communicate – we usually don't think about ants being noisy – and also a story about how to make bubbles stronger. Hint: it involves zapping them with electricity. For *ScienceInsider*, our policy blog, we've got a story about Japan's controversial scientific whaling, also a story about how the fight over the federal deficit in the United States is impacting science. And finally for *ScienceLive*, our weekly chat on the hottest topics in science, this week's *ScienceLive* is about are we doing science correctly? Are things like peer-review and grants hurting science? Are they helping science? Are prizes helping science or hurting science? Are labs the right size? So are we doing research correctly? And next week, we're going to be at the AAAS meeting in Boston. We're going to be covering breaking news from the meeting. We're also going to be running our *ScienceLives* but with a twist: our *ScienceLives* will be video chats this time around, so be sure to check out the site. Some of the chats we're planning include a video chat on the future of physics, also a video chat on the down sides of human evolution. So check out the site for video, for Podcasts, and, of course, for breaking news from the meeting.

**Interviewer – Sarah Crespi**

Are you going to be in some of those videos, Dave?

**Interviewee – David Grimm**

I might. We'll see.

**Interviewer – Sarah Crespi**

All right, well, thanks a lot.

**Interviewee – David Grimm**

Thanks, Sarah.

**Interviewer – Sarah Crespi**

David Grimm is the editor for *Science's* online daily news site. You can check out the latest news and the policy blog, *ScienceInsider*, at [news.sciencemag.org](http://news.sciencemag.org), where you can also join a live chat, *ScienceLive*, on the hottest science topics every Thursday at 3 p.m. U.S. Eastern time.