# The Natural Laboratory Podcast Transcript: An Underground Answer to Greenhouse Gasses

## Introduction

This is the Natural Laboratory, a podcast exploring science for Bay Area National Parks. I'm Daniel Strain.

[footsteps through grass]

The grass is crisp and yellow on John Wick and Peggy Rathmann's ranch in Nicasio, California, a short drive east from Point Reyes National Seashore. I'm following Becca Ryals, a graduate student at the University of California, Berkeley. As we pass a group of lazy cows, European oats, bunch grasses, and thistles poke my ankles. But today, we're more interested in what's going on below our feet.

## Becca Ryals Interview

[augering and digging sounds]

*Becca Ryals:* Nice to feel the fresh air, to dig around in the soil. It's a lot of manual labor involved here, but it's always really fun.

*Daniel Strain:* Ryals torques what looks like a giant corkscrew almost four feet into the ground. Below the surface, the dirt teems with roots, bugs and micro-organisms. This eclectic community could become California's ally in efforts to slow climate change, she says.

*BR:* A lot of the carbon has actually been lost from soil across the world. So, this is one way where we can just take advantage of natural processes that happen, plants growing and putting some carbon from the atmosphere into the soil.

*DS:* Carbon dioxide flows in and out of wild meadows and rangelands across California. But due to overgrazing and development, many grassy regions have become run-down, absorbing less and less of the gas. The owners of this ranch learned years ago just how easily the balance could tip, Ryals says. When Wick and Rathmann first bought the property, feral cows from a previous owner had stripped the land bare.

*BR:* And they originally thought, "Oh, cows are bad for ecosystems. Let's remove them. Let's get rid of those cows." But they soon found out that grazing is an integral part of that ecosystem. And what they found when they removed the cows was an invasion of coyote bush, these woody plants that you see on the landscape here.

*DS:* The ranch now hosts a healthy mix of grasses and some bushes, thanks to the cows I passed earlier. They're unofficial partners in the Marin Carbon Project, a coalition of university, government, and non-profit groups. Whendee Silver, Ryals' advisor at UC Berkeley, heads the team. Together, the organizations are exploring how they can encourage the growth of resilient grass communities that store more carbon for longer.

[shovel hitting a rock]

## Becca Ryals Interview (continued)

*BR:* Oh, no—a rock. I'm really good at finding the rocks.

*DS (ON SITE):* It's the experience.

*BR:* Too good, yeah.

*DS:* This ordinary-looking dirt is buzzing with the ebb and flow of carbon, Ryals says. To grow deep, the roots we see chew up sugars. Plants make those sugars from the carbon in carbon dioxide and the energy in sunlight. When grasses die, microbes in the soil gobble down their roots, carbon molecules and all. Over months or even years, these underground bacteria exhale some of what they eat back into the air. Grasslands make such potent carbon sinks because they have so much going on under the surface, says ecosystem scientist Whendee Silver.

## Whendee Silver Interview

*Whendee Silver:* And that's because grasses and grasslands and rangelands tend to occur in places where there's more water loss from ecosystems—evapotranspiration—than water coming in—rainfall. And so by living in this chronically dry environment, the plants make a living by putting lots of their energy belowground into roots to hunt for water and nutrients.

*DS:* To super-charge this carbon-holding potential, Silver and her team laced tennis court-sized plots of land with thin layers of organic compost. She says that grass grows 50 percent better with this shot of nutrients. And based on her initial calculations, these small changes could add up. If half the rangelands in California sucked down one more ton of carbon dioxide per hectare each year, the gains could offset the state's commercial energy use.

*WS:* Is it worthwhile doing? Yeah, I would say it's worthwhile doing, if it works. And our preliminary results suggest that this is likely to work.

*DS:* But happy grasses aren't just good for carbon storage, Silver says. Taller blades mean more food for livestock and, in turn, better payouts for ranchers.

*WS:* Many of these approaches are common sense techniques that other ranchers have applied in the past. What we're doing now is taking what ranchers would say are their best management practices and looking at what the impacts are on soil carbon storage but also on greenhouse gas emissions.

## Conclusion

[rustling noise and an unidentified female asking, "What depth are you at?"]

*DS:* Back in Nicasio, Ryals says that before the summer lull, she had no trouble spotting the plants that dined on compost.

*BR:* In the winter, when the rains are here, and the grass is growing, as you're driving up to the plots, you can actually see rectangles of greener plots. And those are the plots where we've added compost.

*DS:* Those rectangles hint at the potential lying in wait in grasslands across California. As climate change progresses, Ryals and Silver hope to find out what the green ground below their boots can do.

For the Pacific Coast Science and Learning Center, I'm Daniel Strain.