



After the Fact | [The Grand Canyon National Park Turns 100](#)

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TRANSCRIPT

Dan LeDuc, host: In 1903, President Theodore Roosevelt stood on the south rim of the Grand Canyon and spoke about the awe he felt as he gazed out on this unique American landscape. "It is beyond comparison—beyond description; absolutely unparalleled," he said. "You cannot improve on it. But what you can do is keep it for your children, your children's children, and all who come after you, as the one great sight which every American should see."

[Transition music fades in.]

Mindy Riesenber, director of marketing and communications, Grand Canyon Conservancy: The Grand Canyon receives 6.25 million visitors a year, and they come from all over the world. As far as China and Germany and Korea and Mexico, and then all over the United States. And you hear, when you walk along the rim, all these different languages being spoken, which I absolutely love. You know, it's a really wonderful way to commune with other people from other places in an environment that is just striking.

Dan LeDuc: That's Mindy Riesenber of Grand Canyon Conservancy, the nonprofit partner of the Grand Canyon National Park. The organization educates visitors on the natural and cultural history of the region and helps preserve this iconic landscape, which is the traditional home to at least 11 American Indian tribes. The first time she visited, Mindy was 4 years old.

Mindy Riesenber: I know that we stopped at Desert View Watchtower on the east side of the south rim, and I remember standing outside of the watchtower with my barbecue potato chips and chocolate milk. I couldn't even put into words, at that time, what it was that I was seeing. All I know is that it was beautiful, and vivid, and I remember the colors. And we had crayons in the back of our station wagon, and when we went back into the car, we colored what we saw. And it was just kind of this mishmash of those beautiful, warm canyon colors. I wish I still had that now, but it was something that stuck with me, and I'll never forget it.

Dan LeDuc: And she didn't. She's now helping to plan activities to celebrate the Grand Canyon's 100th year as a national park. It was 1919 when President Woodrow Wilson signed the legislation designating the park—so 1919 is our data point for this episode of "After the Fact," a date marking the national affirmation of



Roosevelt's vision of the Grand Canyon as a special place to be preserved for future generations. I'm your host, Dan LeDuc, and I talked with Wayne Ranney, a geologist who's spent years exploring and writing about the canyon. He was in Flagstaff, Arizona, when we spoke.

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Dan LeDuc: Tell us about the Grand Canyon. Because so many Americans, obviously, spend so much time thinking about it, have visited there. It remains in people's consciousness. It's this vast place. And while we're celebrating the hundredth birthday of it as a national park, as a geological phenomena, it's much, much older. But there's even sort of some question about how old, right?

Wayne Ranney, geologist: Well, that's true. That's the quintessential question: What is the age of the Grand Canyon? How old is the Grand Canyon? And back in the 1940s, a geologist named Chester Longwell wrote a scientific paper called "How Old Is the Colorado River?" because the river is responsible for carving the canyon. And through a series of that and follow-up studies, it was determined that the Grand Canyon is 6 million years old.

And the fact of the matter is, is that it's starting to look like, to geologists, that some parts of the Grand Canyon are older than others, but the river that connected the various parts is only 6 million years old.

Dan LeDuc: So how far back are some of these parts? How old could they be?

Wayne Ranney: They're probably no more than 70 million years or 60 million years old. But if you think about—that's still a factor of 10 greater than 6 million years. And there's one section out in the western part of the Grand Canyon that parallels an old fault line, and there's some deposits inside the Grand Canyon that can be shown to be between 50 and 70 million years old. And that tells us that that small part of the Grand Canyon is at least that old.

Dan LeDuc: So talk to us about how the Colorado River formed the canyon. I mean, it's very hard to grasp that amount of time passing and water flowing over rock and soil, but can you describe it a little more about how it came to be?

Wayne Ranney: Well, it's a little bit involved, but I can tell you some of the high points. It's probably true that the water in the river actually did very little of the cutting. But the water moves huge boulders during these large floods that have probably not gone through the canyon since human beings have been here for the last 10 or 12,000 years. I'm talking more about large floods from the Ice Age when the glaciers in the Rocky Mountains would recede.



And when this huge volume of water begins to move, it picks up all of the boulders and the cobbles that sit on the bedrock beneath the river. And these agents, these boulders and cobbles, they start to move, and they physically pound the bedrock channel. And it's probably during these rare episodic floods that the canyon actually gets deeper, and for a lot of the time when it's there, it's just sitting there.

And, in fact, today in many parts of the river channel, there's 75 feet of sand and gravel that sits on the bedrock, and so the water can't even cut down into the bedrock to carve the canyon deeper. I think we're living in times when the canyon just sits there. So it's the movement of these big boulders.

Dan LeDuc: So we can be pretty precise about the 6 million, but in world history, that's a long time. How does a geologist sort of arrive at that number? What are the clues that take you there?

Wayne Ranney: Well, the biggest clues come from the far end of the Grand Canyon, which we call the mouth of the Grand Canyon. And spectacularly, you go down the river for 277 miles and you turn the corner and you're instantaneously out of the Grand Canyon. And this is where a large fault that became active about 14 million years ago just down dropped the area near Las Vegas.

And all the rocks of the Grand Canyon were tilted and deformed and down dropped, and this basin filled with sediment. And those sediments that fill in that basin at the mouth of the Grand Canyon do not contain any evidence for rocks from within the Grand Canyon. And further studies then showed that that gravel that sits at the mouth of the Grand Canyon actually came from the opposite direction off of a local mountain.

So the fact that there's no gravel in that deposit and the youngest layer in that deposit is 6 million years, we know that the river was not exiting at that place prior to 6 million years ago. It's very ingenious work that geologists do to sort of figure out—you look at pieces of gravel, you look at sand and silt, and a lot of times you can determine from which direction it came, and it turns out that this deposit at the mouth of the canyon did not come from the canyon.

Dan LeDuc: Well, I've always thought that the Grand Canyon almost seems like climbing a mountain in reverse, right? You're going down, but you're traveling through all these ecosystems. Could you take us on a virtual hike here for a moment and work our way down for us?

Wayne Ranney: Sure. I've led thousands of people on hundreds of guided hikes down there. And if we were to head down the South Kaibab Trail, a trail



constructed by the Park Service in the 1920s, you'd start down in a beautiful pinon, juniper, and ponderosa forest. Many visitors to Arizona are surprised when they find the Grand Canyon located in a green, mature forest, but at 7,000 feet in elevation, you're sure to find that.

And the trail is steep; it's only seven miles down to the river, and as you go on down, you move from the whitish layers at the top into more of these red layers, and your boots will get a thin layer of red dust on them. And by the time you get halfway down, you meet this 500-foot sheer wall of red wall limestone, rock that's about 340 million years old, and it forms this sheer cliff right in the middle of the canyon. And switchbacks had to be blasted into that layer.

And by the time you get through the red wall, you're definitely in the desert, and you can see yuccas growing by the trail, prickly pear cactus, lizards darting about on the rocks. And you get to the lip of a place called the Tipoff, five miles from the top, and then you descend into the inner gorge.

And this is the most recent part of the Grand Canyon to be carved by the river. It's 1,000 feet straight down from the lip at the Tipoff down to the river—and again, switchbacks had to be blasted in—and you go through the very oldest rocks in the American Southwest—the Vishnu schist and the Zoroaster granite—and you finally come to the river, where the Kaibab Suspension Bridge is built. And in the summertime, the cicadas are chirping, and you get to beautiful Bright Angel Creek and soak your feet in there. And it's just such a wonderful journey.

Dan LeDuc: You have, I'm sure, overnighted down at the floor many times. What's that experience like to wake up down there?

Wayne Ranney: Well, first of all, before you go to sleep, you've got a canopy of stars like you cannot believe. And I've had people ask me, what is that light up there? And they didn't even know about the Milky Way. And then when you wake up in the morning, it's just so beautiful. You hear the stream running and the cottonwood trees with their leaves trembling in the light breeze. You're probably getting ready for a little daily exploration. Maybe you're going to walk up into Phantom Creek, where there's some beautiful waterfalls, or maybe walk on the Clear Creek Trail that the Civilian Conservation Corps built in 1935 and get some fantastic views, back to the Kaibab Trail where you walk down.

Dan LeDuc: It's such a unique landscape, to the point where it's actually been used for other purposes, right? The astronauts have trained there because they need to be exposed to different conditions.

Wayne Ranney: Well, that's an interesting story about the Apollo astronauts training there. It's a little-known story but will probably be heard more about this



year because it's also the 50th anniversary of the first Apollo moon landing. But a famous geologist from Flagstaff named Gene Shoemaker—once he found out that the United States was committed to going to the moon, he insisted that there had to be a scientific component.

And just sending test pilots up there and landing on the moon and taking a few pictures wasn't good enough. And so he became involved, and every astronaut that walked on the moon did an overnight hike down to Phantom Ranch just so they could look at rocks. Even though they wouldn't see rocks like they were seeing on the Kaibab Trail, it was a way to get them to think about geology.

The oldest rock that the Earth has ever given us—it's just been found out in the last few weeks—is a rock from Earth that came back from the moon. And when the Earth and the moon first collided to create our moon, some of the Earth material went with the moon out there, and the Apollo 14 astronauts collected this sample back in the early 1970s. And it's just been discovered that that rock contains a fragment of the Earth's crust. It's over 4 billion years old.

Dan LeDuc: Wow. So, I mean, somebody was very prescient in having astronauts train at the Grand Canyon.

Wayne Ranney: Exactly.

Dan LeDuc: Why does this place mean so much to Americans? It is this iconic landscape. Why does it mean so much?

Wayne Ranney: That's a good question. And I think the reason is because that's the quintessential American landscape. We do have some great lands in this country, but there's only one Grand Canyon, and the textures and the colors that are in it throughout all times of the day and all times of the season, they tug at something inside of us emotionally. And I think people associate the Grand Canyon with the United States, and so it, in a way, is our national landscape.

Dan LeDuc: Well, we look at the canyon that's at least 6 million years old, now let's look in the other direction. What's the future of the Grand Canyon?

Wayne Ranney: Well, that's a great question, Dan. And geologically, the Colorado River is going to continue to do its work to deepen the canyon, but I wonder if your question maybe speaks also to the future of the Grand Canyon as a national park. And there's been some recent, what people at the Grand Canyon would call threats to it—large developments that want to be built on the skirts of the national park boundary. And I think these pressures in the future are going to continue.



You know, our population is increasing; it's easier to travel internationally. So I think as a society, we have some tough questions ahead for us on how this park is going to be managed, and hopefully, we'll be smart enough and have the right information to make the right decision.

[Transition music fades in.]

Dan LeDuc: The park faces some challenges these days, not least is the tab for more than \$329 million in repairs waiting to be made to ensure that people will continue to safely visit this special place.

You can learn more about those repairs needed at the Grand Canyon National Park as well as the deferred maintenance at all your favorite national parks on our website, [pewtrusts.org/after the fact](http://pewtrusts.org/after-the-fact). And while you're there, you can also view images of the iconic Grand Canyon.

[Closing "After the Fact" theme music plays.]

For The Pew Charitable Trusts, I'm Dan LeDuc, and this is "After the Fact."