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# Emmett Evanoff
# August 11, 2020

Interview conducted by Vincent Santucci
Transcribed by Teresa Bergen
Edited by Molly Williams

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Harpers Ferry Center
P.O. Box 50
Harpers Ferry, WV 25425
HFC_Archivist@nps.gov

Narrator: Emmett Evanoff
Interviewer: Vincent Santucci
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# Transcript

[START OF INTERVIEW]

Santucci: All right. I'm going to go ahead with an opening statement and then begin with questions. Thank you.

Evanoff: Okay.

Santucci: Today is Tuesday, August 11, 2020. My name is Vince Santucci. I'm the senior paleontologist for the National Park Service Paleontology Program. Today we are conducting an interview with geologist/paleontologist Emmett Evanoff, a professor of geology at the University of Northern Colorado. Emmett's career has involved a number of projects involving Cenozoic stratigraphy and sedimentology in National Park Service areas, largely in the Great Plains and Rocky Mountain regions. The interview is being conducted by telephone from Emmett's home in Colorado. And I'm at my home in Gettysburg, Pennsylvania. So thank you, Emmett, for your time. I really appreciate it.

Evanoff: Sure.

Santucci: Excellent. So the first question, it's probably the easiest one. When and where were you born?

Evanoff: I was actually born in California.

Santucci: Okay. And growing up, before you went to college, were there any experiences that got you interested in geology or paleontology?

Evanoff: Yes. Actually two different things. When I was twelve, went up to Douglas, Wyoming and found my first oreodont skull and got hooked on paleontology at that point. And then starting in 1970, actually fifty years ago today, or this year, I worked for John Hanley, who was doing his PhD at the University of Wyoming. And we went out to southeast or southwest Wyoming, looking at the Green River Formation. John was working on freshwater mollusks of the Green River Formation out there. I worked for him for three summers and then went back to the Smithsonian to see John. And then got started, so I worked a long time with John and got interested in basically terrestrial mollusks, both freshwater and land snails, at that point. And that's what I was going to be working on. So those two things is where I got started.

2:21

Santucci: Interesting. So you knew John Hanley. That's great. So John went on to work for the USGS for a little while. Is that correct?

Evanoff: Yep. And I was his field assistant in ’75, ’76, ’77, ’78. Yeah, ’78, yeah. Those four years.

Santucci: And unfortunately John passed away early.

Evanoff: Right. Yeah. He died in 1986. He was just about forty years old and passed away in 1986.

Santucci: And I don't know if you’re aware of this, but when we were looking at some of John Hanley’s collections out of Arches National Park, that we actually found some gastropods that he had identified as being associated with Green River Formation. And it was right in the middle of the park indicating the potential that perhaps there may have been an Eocene/Green River Lake that overlied the Salt Valley anticline before its collapse.

Evanoff: Yep. I’m aware of that. Yep.

Santucci: Excellent. That really changed a little bit to interpretation of the geology of Arches National Park when I brought that up to the Utah Geologic Survey mappers.

Evanoff: Yes. Yes. Yep.

Santucci: So you made your way through high school. Where did you do your undergraduate work?

Evanoff: University of Wyoming.

04:04

Santucci: Okay. And did you know you were going to go into geology at that time?

Evanoff: Yeah. I’m one of those unusual persons who knew exactly what I wanted to do at twelve and fourteen. And I went straight through—very few people do that—all the way through my PhD. So I was in Laramie until 1974 to 1978, and then ’78 I came down to CU Boulder, University of Colorado, Boulder. I was there actually until I finished my PhD in 1990. And then I actually taught for, let’s see, another fourteen years as an adjunct professor at CU. Then I shifted over to the University of Northern Colorado in 2004. Yeah, that was it. So.

Santucci: So your undergraduate, your bachelor’s degree was at the University of Wyoming. Were there any geologists or paleontologists that you had opportunity to work with as an undergraduate?

Evanoff: Oh, yes. My mentor was Don Boyd, Donald Boyd, at the University of Wyoming. Unfortunately, he just passed away about four months ago.

Santucci: Sorry.

Evanoff: But Don was a wonderful mentor. He was also John Hanley’s mentor, also. And Don was a wonderful person. But I also worked with some other geologists there quite a bit. Don

Blackstone. Nip Mears, Brainerd Mears, and all. Those are two others that I worked pretty closely with on various geology stuff. And Don, of course, was paleontology.

Santucci: Did you begin your interest in Cenozoic stratigraphy and sedimentology during your undergraduate years or did that come later?

Evanoff: No, that came with working with John Hanley. Yeah. Mainly working with John because we worked the Wasatch and the Green River Formation. Looking at the mollusks of those two units. And then I worked with John on the Willwood, the Fort Union, let's see, where else, Green River. I think those are the major three that I actually worked with John. So I actually started out working on Paleocene and Eocene rocks. Early Eocene rocks with John. But when I got to CU, I actually decided to do a Pleistocene mollusk master's looking at snails over by Meeker, Colorado on the Pleistocene deposits on there just to get familiar with more of the modern mollusks. And then got interested in, then was looking for a project to go back into the tertiary. I was ready to get back into the tertiary rocks for my PhD.

07:05

Santucci: Okay. And your dissertation project was?

Evanoff: Oh, actually on the land snails of the White River Formation around Douglas, Wyoming. And that's an actually interesting story. I finished in '83. And wanted to work on land snails. So the first thing that I thought was maybe going up to the John Day region. Went up to the monument up there, but of course didn't, I think that was before Ted Fremd was there in '83. And so I went up to John Day and saw the rocks, and then went down to some of the BLM areas around, oh, to the south of there. And we did find some mollusks while I was out there. But that was in early June. And in late June, Ken Carpenter and I just took a road trip through Wyoming. And we just happened to stop in Douglas where I found my oreodont. And we started looking around, I realized there were land snails all over the place in the deposit up there. And it's one of the richest land snail deposits of both Chadronian age or late Eocene age all the way up through the Orellan. A tremendous fauna of land snails. So that's where I worked. And of course it was a lot closer to CU. And a lot more mollusks there than I saw in the John Day in Oregon.

Santucci: So with your focus on the mollusks, was it biostratigraphic, paleo-environmental, or both?

Evanoff: Yeah, both. Yeah. Mainly, and also because I really got interested in land snails, because that's what I was working with in the Pleistocene. And not too many work land snails, fossil land snails. And I got interested in the land snails. And I think I had several thousand specimens, and almost all of them were land snails from Douglas. And I think only four or five were aquatics. And they were pretty generic. You know, *Elimia* and *Planorbis* and things. But I was really interested in land snails. Haven't published that one yet except for a generality. But anyway, the land snail was an interesting project with that.

And I mainly did it because of working with John. And he was my mentor. But of course he died in '86 and then I finished up the whole project in 1990 and all. So, and then working with that.

Santucci: Did you have to work out the taxonomy?

Evanoff: Yeah.

Santucci: And taxonomic descriptions?

Evanoff: Yeah. Most everything, yeah, almost everything was new. Yeah, almost everything was new. Not much had been, it turned out there was a lot of interesting, the Chadronian snails, for instance, had Mexican affinities. Things like the Humboldtianids and the Urocoptids and things like that, and *Ashmunella* which now lives in New Mexico and Mexico and Texas and that area. And that was in the Chadronian. But when you get into the Orellan, you start getting an abundance of very small snails. And you also start getting things that are now found in California and the Pacific Northwest. So things are shifting as you go across in the Chadronian or late Eocene into the Oligocene. So that was a kind of interesting project. Gives us some idea of paleoclimates and how some of it changes across. Probably an increase in cooling and drying actually by seeing that.

10:43

Santucci: Very good. As part of your dissertation, all of your localities were non-national park sites, I assume?

Evanoff: Yeah. They were on private land up there.

Santucci: Okay. All right. Did you do a postdoc or what was your first step out of graduate school?

Evanoff: Well, actually the first thing I did after that, of course I was teaching but not every semester. And I ended up, the first thing I did was actually doing a consulting job with BP, who was putting out a big project on looking at fluvial architecture. So the first summer, September of ’90, 1990, went back to Douglas and did a small alluvial architecture study of the channel complexes in the Douglas area. And then they liked that a lot and they said well, you can go anywhere you want. So the next place I went to was actually the Bridger Formation in southwest Wyoming. And found a nice area and did about two or three more years working for BP. And that turned into a project that started in ’91. And basically the last big year was ’97 on that one. Ninety-seven, I’ve been doing on and off some work in the Bridger, also. And that was interesting because that led to Paul Murphy doing his master’s and PhD in the Bridger and some other students doing various projects on that. So that was good.

And it’s kind of interesting because the Bridger has these widespread marker beds. Many, many marker beds. Some of them are ashes. Some of them are lacustrine beds. And they go for miles, because you have this [unclear] infilling of the down drop in Green River Basin and you had widespread, it’s almost layer cake geology. There’s almost nothing in there.

But that sort of got me thinking about when I went to the White River in Badlands, to look for widespread marker beds. Lo and behold I did find several of those in there. But my eye got trained to look for widespread markers in the beds that most people hadn’t noticed in the Badlands before that. Anyway, I’m kind of jumping ahead a bit.

Santucci: No, that's great. Thank you.

Evanoff: Yeah. But the Bridger gave me a different viewpoint. And of course, the neat thing is that the Bridger is about the same age, in other words, age span, about six million years, the Bridger. And the White River is six million years. But the Bridger is like 600 meters thick, whereas the White River is much, much thinner than that. So it's a much more condensed section in the White River than it is in the Bridger. So.

13:40

Santucci: Very good. So, let's see. What was the first project that you were involved in within a national park unit?

Evanoff: Well, it's one that's continuing. But the first thing I started working with Dan Chure at Dinosaur National Monument, looking at some mollusks there by the Dinosaur quarry. And in fact, I've had them for a while and I need to finish that project up. But I've just been doing some work with Rebecca Hunt-Foster and getting some identifications and some of the materials back to her. But the idea was to look at the aquatic snails, kind of make an evaluation in more of a paleo-ecologic and a stratigraphic, detailed look at the mollusk localities. And I've been sitting on that for a long time but probably will get back into it because I have been recently working on those snails again. So that was the first thing, and that actually started in 1992.

Santucci: Was that in conjunction with the Morrison Extinct Ecosystem Project?

Evanoff: I actually didn't work on that project, but I was involved with all the people who were working on that, like Chure and the Petersons and Christine Turner and Fred Peterson. And met a lot of friends, like Sue Ann Bilbey and Ken Carpenter and a whole bunch of people like that. So yeah, that was part of it. And also in 1992 was a big year because that's when I did the field camp, CU museum field camp up at Florissant and we mapped the Florissant Formation. Found vertebrate localities up there and did some detailed sections and everything like that in Florissant as well. I was interested in Florissant to see if we could find vertebrates to get a better age relation with the Whit River. And also to learn about the stratigraphy and everything like that there at Florissant.

Santucci: Very good. Just to wrap up with Dinosaur National Monument, anything else you wanted to share about that work?

Evanoff: Well, that one there, I don't consider myself as much a paleontologist as a stratigrapher nowadays. But I will be working on some of the mollusks on that. And I have a fairly extensive collection of mollusks that I made that need to be worked up. And then I'll take them over to Dinosaur National Monument and let Rebecca get them into their collections and things like that. But they're kind of interesting because the diversity is extremely low. I mean, there's only like four or five taxa or maybe six taxa, so low diversity. But I'm curious. I got big enough samples that we can do relative abundancies and things like that. So that needs to be worked up. And kind of interesting questions is like how's that in relationship to some of the microvertebrate sites and things like that. So that's something that can still be worked out.

I do have some very detailed sections through, it's the middle part of the Brushy Basin above the clay change is where most of these mollusk localities are. Basically, the highest level's about the level of the quarry. So it's a fairly limited distribution. But I have to get back into the information. I did a lot of mapping and I did a lot of section measuring and stuff way back in the '90s. And then have these collections that I need to get back to the Park Service. And I'll do that, maybe starting this years. So, anyway.

17:31

Santucci: Excellent. Do you believe there's any new species within that collection?

Evanoff: Well, I saw one in their stuff. There are some new, there's something that I can't identify and I haven't seen it in the literature from Morrison mollusk, a very high-spire—unfortunately, they're just juvenile whorls. But very unusual kind of very highly turreted something or other that's in there. And I may or may not be able to identify it. But at least I recognize it as being something new there. But most of it was actually things that you can at least pigeonhole into PC Yen's 1952 Morrison mollusk volume.

The one thing about it is, that he gave a lot of modern, a lot of the taxa that are modern genera, I'm not sure that's a good way to go. I'm beginning to be a believer in some of these older things, if they superficially look like some of the modern stuff, it doesn't necessarily mean they area. So I might have some generic changes on some of those taxa. So.

Santucci: Great. Thank you. Did you say it was 1992 that you began the field camp at Florissant?

Evanoff: Yeah. We only did one Florissant field camp in the summer of '92. Yeah.

Santucci: And how did that come—

Evanoff: Oh, that was great, because we found the vertebrate localities that Jaelyn Eberle and Herb worked on later. And it was the last day of the field and Ken Doy and I were out and we found this wonderful vertebrate locality that we had already found brontothere tooth fragments and stuff in the park. And also, I'm trying to remember what else. Maybe some oreodont material, based on size of the bones and stuff. But basically later Jaelyn and her students came in and did a lot of screen washing at the micro site that we found. Which also included horse and, they did report an oreodon reported from Florissant. We didn't find much except for maybe one bone. But we did get brontothere, no, actually we had two sites with brontothere. It turns out there's three sites with brontothere now at Florissant. And then just a little higher from the brontothere site was the micro site that later was written up by Jaelyn Eberle and her students. Yeah. But that was our main goal there at Florissant, looking for vertebrates.

But we did things like, for instance, did plane table mapping of the stumps right there by the visitor center. And you can basically see a land surface where all the stumps were before they got buried by the second lake deposit. They got basically got, they probably got blown down by some sort of blast and then got completely buried by the lake coming through there. And they actually rest upon fluvial deposits that are not unlike the White River or the Antero Formation. We did a nice map of that and saw that it was all basically one level where all those stumps are

and got the geometry of that surface and everything. Then also, of course, correlated from some sites we saw Gregory's work. And then just various outcrops. And then we went through, all the students and I mapped, which has been published by Herb Meyer did a surficial geologic map of the monument also. So that wasn't too bad for about three, four weeks of field work in 1992.

21:07

Santucci: Was this an undergraduate group of students?

Evanoff: It was mostly graduates.

Santucci: Graduates?

Evanoff: It was mostly graduates, yeah. I don't know if we had, I'm trying to remember who was there. I think we had some undergraduates, yeah. But most of it was graduates. Yeah. And the CU field camp's usually graduate student, but not always. We get a lot of them in the Bridger the following years. The next few years we started doing field camps in the Bridger. So.

Santucci: Was Herb Meyer there at the time, '92?

Evanoff: No. No. Nope. I was working with Maggie Johnson, who was head ranger and stuff. And she wasn't a scientist, but she was really helpful and became a very dear friend of mine. Maggie Johnson, who later was superintendent of Capulin and ended up at Promontory Point in Utah. But unfortunately she died of breast cancer, which was real sad.

Santucci: Yes. Excellent.

Evanoff: Maggie was actually, she wasn't a scientist, but she really appreciated it. And she was always very supportive of me, so that was really nice. And Herb came a couple of years later as paleontologist, and of course he's done fantastic work there. His student projects and all the research that he's supported has been really great.

Santucci: And can you recount the discovery of the mammalian locality at Florissant?

Evanoff: (laughs) The big, slobbering dog locality, as we called it. (Santucci laughs) It's right down the north side of the park. You almost walk the fence line and you go up to it and there's some white units below the lake shale. And it's below the level of the stump. And we were up there, and it was Ken Doy and I, and it was the last day in the field. And Ken was a graduate student who was actually helping me out with the plane table mapping. Just for the heck of it, it was Paul Murphy's areas of mapping. And he didn't find it. But Ken and I were out there and we found the horse. And we started finding microvertebrates and things like that. And while we were there, two big, loud, slobbering dogs came up barking at us from the neighbor up there and stuff like that. So that's why we called it that name. For our, at CU, that's what we call it. But that was the name of the locality that we had. And like I say, later Jaelyn Eberle came in and did a much more detailed study with micros with a variety of rodents and other teeny weenies. So it was kind of neat.

Santucci: Very good. And you say—

Evanoff: I gave Paul Murphy a very hard time. I told him he got a 'D' in the class because he didn't find that locality. (Santucci laughs) But of course he didn't. (laughs)

Santucci: How many weeks were you there? Did you say?

Evanoff: Oh, gosh. That's ancient history. I think it was a four or five-week field camp if I remember. Maybe six. But I don't think it was that long. I don't think it was that long. But either four or five weeks.

Santucci: Did you camp on the monument?

Evanoff: No, no. There was a, one of the people who worked there, and I can't remember her name, had a house. And then they had an old house, which was their original place up there by Florissant. It was just east of Florissant. Really funky place with all this old, wonderful furniture and all their glassware that was Depression glass. Which we didn't touch. You know, because that stuff kind of, it was cheap stuff done in the '30s, but of course now it's collector items. She was very nice, and I can't remember her name. I could look it up in my notes. But she basically, we stayed at this lovely cabin that had enough room for everybody. So that worked out really well. Had a nice stove and everything.

25:07

Santucci: Had running water?

Evanoff: Oh, yeah. Running water. Toilet. Nice cook place and stuff. We all had breakfast and dinners and stuff like that there. Had an interesting thing. Peter Mandatalio—who was from Brazil—was up and he liked his coffee very strong. And at that time, we had a French press. And Peter says, "Let me make the coffee." So what he would so is in the morning we'd boil the water. Then he'd put a whole bunch of coffee in. And then he'd do this French press and hold it up to the sunlight. And if he could see light through it, he added more coffee. Now I'm a black coffee drinker, so I had to take this stuff and do about a half a cup and then add water to it. (laughs) Because man – because he was one of those who put a lot of milk and sugar. Kind of like Starbucks, you know?

Santucci: Yes.

Evanoff: But it was really funny. But Peter Mandatalio was with us, and that was fun.

Santucci: Great. And so that was the beginning of a more long-term relationship with Florissant Fossil Beds. Is that correct?

Evanoff: Yep. Yep.

Santucci: We might as well just stick with Florissant and tell the whole story then, if you don't mind.

Evanoff: Well, there's not much more to tell. I mean, we did do a couple more things. I did one other thing with Debbie Hanneman and Chuck Wideman so that the results were very

inconclusive because we probably should have gotten more data. But we actually did some shallow seismic work, trying to figure out what the geometry of the paleovalley. But if I recall right, I don't think it was very, not very telling of what had happened with the paleovalley complex up there. We did a couple of seismic lines through there, shallow seismic. And one of them, I don't think we went far enough across the valley. And the other one was kind of parallel to one of the side arms. And I wasn't ever really happy with how that ended up. So we did that with Chuck Wideman. That was like two or three years after. You know, '95, '96, somewhere in there. Maybe '95.

And then, I haven't done an awful lot since then. I mean, Herb's taken over so much, there hasn't been much for me to do there. Except for I do have to write up, I've got one paper out on the overall stratigraphy of it. But I want to put together some of the, get together all of the detailed sections that we did. We did some very high-resolution stratigraphy of several of the spots. So I'd like to get those things out. Just as a reference for people to use it in the future. That would include also the Claire Quarry [commercial quarry SE of the monument], which is out of the monument. We also had a section down by the old railroad track east of Florissant, just east of Florissant. Which is probably near the base of the paleovalley complex. So.

27:58

Santucci: So currently, the Florissant Formation doesn't have a type section. Any plans for describing and formally naming—

Evanoff: Yeah. What it is, it has to be a composite because there's no place where you get everything all together. But we can piece together a section with probably one, two, three, four different sections for being quote unquote "the types." But there's a lot of reference sections that we should put in. Like for instance, the outcrops to the south where Kate Gregory did her work on plants, things like that. And Kate was there just before we were. She had worked just a little bit before that doing her Florissant, she worked on a very limited part of the section which actually has lots and lots of leaves in it. Which is also a highly volcanic, there's a lot of evidence of vulcanism at that time, and there's very strange anomaly of the pollen that Doug Nichols worked out on that, right through that interval. And then she also did that wonderful work on the tree rings of the stumps and things at Florissant. And Kate was there before we were, and then we came back, we went in and did our stuff. And then Herb came in and took over from there and has done fantastic work since then.

Santucci: And so all but one section of the Florissant is within the monument?

Evanoff: Yeah. Basically. Basically, the way I look at it, there's three levels of lake. Really, there's only two levels of lake. But three levels of lake if you consider the cap rock dividing two of the lakes. And so you have a basal lake that's up there by Florissant. And then you get into a paleo complex. And then you get into, then you have the big stumps. And then the lake came back in. and that lake is very unusual because it's got almost no aquatic critters in it. No snails, very few snails. And very few fish, if any. And then you get the cap rock coming in, and then you get more mollusk in the upper part and very pumice-rich beds in the upper part. And then the whole thing is covered by pumice beds that are coming in from somewhere. Still haven't figured out where with that.

30:22

Santucci: Would you potentially designate several members?

Evanoff: No, I wouldn't, but I do say that there are several, they're not really member status. But you know, it's fairly straightforward. You can follow that sequence just about everywhere. The northwest-most does not have the cap rock in it, though. So the upper lake and the middle lake basically merged together into one big lake complex. For at least sedimentation up there in the northwest part of the monument. So.

Santucci: Okay. Any final thoughts about Florissant?

Evanoff: No, not that I can think of.

Santucci: Okay. The Park Service brought you on to provide some assistance at Scottsbluff National Monument. Can you tell us about that?

Evanoff: Well, basically they wanted a mapping project to know more about the distribution of their units. So I made a surficial geologic map of the monument. I mean, all the really fossiliferous stuff is pretty well known. Of course, everything there is Orellan or Whitneyan in age. So in the White River, there's no Chadronian at all. So there's no real true late Eocene. It's all Oligocene age rocks. And again, I subdivided it by lithologies into the Orella with the mudstones at based and then the soapstones of the Whitney. And then of course you have the two big Whitney ashes there. You've got actually one, two other ashes down below. There's a black ash that ties in with Douglas near the base. Then there's the blue ash in the upper part of the Orellan. And that one's pretty widespread, even though I'm not sure where that one falls in. And then you have, of course you have the Gering, that's the type Gering. Of course Darton's photographs and where he talked about it, or Gering, as you might call it. We call it Gering.

And then the Arikareean beds there that has been called Monroe Quick/Harrison, I'm not sure what that age of those rocks are. We need to find more vertebrates in the upper part, the upper beds, to really nail it. And it turns out we did find that there are some bone beds associated with some of the lower Aeolian deposits there. And then there are some vertebrates that I've heard of, but I haven't seen, higher up into it. And so one can do, one future thing could be done on there is of course a paleo survey of the lower Orellan age, Orellan member fauna is mudstones down there. And there's actually quite a bit of fauna in there. That's where most of the fossils will come out of Scottsbluff. And then also the upper, then there are some things in the coal slide that could be looked at. And then finally way at the top, we really need a better handle on what the age of the quote unquote "Monroe Creek Harrison beds" are. I'm beginning to suspect that those are really Harrison beds up high, since the Monroe, type Monroe Creek is actually a paleovalley fill according to Bob Hunt. So these widespread, sandy, Aeolian fluvial mix things looks like Harrison to me. Which would be the Harrison bed. So anyway, those are some of the things that need to be done there. And I got a nice long section through the whole thing and everything like that.

One of the things I'm still kind of toying with is looking at the geometry of the thickness of the Gering relative to the volcanic ashes. Because I think you can actually come out with a paleovalley complex that's thicker to the north and somewhat thinner to the south. But I haven't

finished getting all the sections done on that. So one should go through and measure the Gering in various places, including the type locality, which is a bear to get to. But anyway, and then look in those variations in thickness and map out the Gering paleovalley complex.

34:45

Santucci: There are apparently some early accounts by pioneers coming across the Oregon Trail reporting on seeing fossils in the area. Do you know anything about those stories?

Evanoff: Oh, yeah. And actually, we found some very interesting things. Because as you know, I do repeat photos. So we went out and got a whole bunch of N.H. Darton's photographs of the Scottsbluff area from the USGS. And we found one locality. And you realize that they had to put the Oregon Trail to the south of the butte. Of course, the army built the one that went over Mitchell Pass there. And then there was another one that went Robidoux Pass the next valley over. That's where the main 1849 to eighteen fifty-something trail was, was actually much farther to the south. Then the army put in their route through Mitchell Pass, which is still there with that. And then Darton came in and took photographs. And they couldn't do it on the north side, because they had a huge Badland complex in the area. They couldn't get through the valley. And nowadays you look at it and you go, well, why's that? I mean, you can take a wagon down here and around and up.

So I looked at the Darton photos and they were taken in 1889, before, no, 1898, I think it's 1898 is when the Darton photos were taken. And we found the site, and here's this huge Badland gulley that's there going up on the north end of the big promontory there at Badlands. And nowadays, it's completely filled in. And what happened was, in 1903 they built the Gering ditch. And they made the Gering ditch and it blocked the drainage. And what has happened is, over the years, that entire upper part from the Gering ditch has been filled in with sediments. Totally. All the way up to near the top of the ditch. And there was even a lake there that was called Turtle Lake or something like that by the locals. Which was a little pond. But then that's been filled in completely. And nowadays you could take a four-wheel drive and actually drive all the way across and get onto the Oregon Trail on that north end of the butte. But of course that was a major, major Badlands complex. Probably had much more fossiliferous rock exposed back in the days of Marsh and all the way up through Darton and everything until they built the Gering Canal. You know, the water aqueduct. So that's an interesting little part of it that's part of my work. So.

But yeah, there was. There was a bunch of stuff. And Marsh was in there yeah, I think about 1869, 1870, somewhere in there. And various other people were in there. And you can still get actually quite a bit of fossils in that northeast corner of the monument.

We did a quick survey through there, just looking at it and stuff. And we did a little bit of collecting on that and we're getting those specialists back to, most of them have been back to, already to Scottsbluff. And we prepped out some of the specimens of Scottsbluff. My wife, Kathy Brill, has been doing the prep work. We'll finish with that and we'll be taking those fossils up to Scottsbluff here probably in the next month or so. So, that will be good.

38:21

Santucci: Anything in particularly of interest from the vertebrate fossils?

Evanoff: Well, of course there's a lot of oreodonts. The bone's pretty punky. It's pretty soft. But let's see, what have we gotten out of there? We got a cat. I'm not sure which one it is, perhaps nimravid. We've got oreodonts, rabbits. I'm trying to think. Of course turtles, or at least tortoises. It's your typical Orellan fauna and stuff. But it would be interesting to go in and take a look at some of those units.

We haven't done a systematic, it could be done, especially with Park Service. We could do a Scenic or Poleslide project type of detail. In other words, a high-resolution, detailed survey of that area and get that into the, and I've talked to Ellen Starck about that at some point. Maybe we'll go down there and take maybe even a class or something like that to it. So, we'll see.

Santucci: Great. Wanted to go back to your earlier discussion. Are there stratigraphic type sections at Scottsbluff?

Evanoff: Yeah, at Gering. Gering's definitely there. But there's not much else that is a type specimen. The reason is, Darton never really said there was a type section. But when you look at it, it's Gering because of the time of Gering there. And then the second thing is that he took a photograph of the north promontory of that and said, "This is the Gering." So that is the type section.

And like I say, getting a section through there, it's almost vertical until you have to go up a very steep embankment on the side. But doable. But it's going to be interesting to do that one. (laughs) And actually along the best exposures are right along the trail. And we've got a section through there, and Jim Swinehart's got a section through there that's very good. And that's where most people, you know the Saddle Horn Trail there, right along there is probably the best place to see the Gering and then the overlying Harrison. So if anything's going to be a tight section, that should be it because it's more accessible with the nose up there.

40:44

Santucci: Great. Anything else for Scottsbluff?

Evanoff: Not that I can think of. Just some things. I did a little work at Agate looking at, they were going to put in some phone poles. And I mainly did it as an email. But I've got to write that up a little bit, looking at, as you go in from the Cook Ranch, in other words, the entrance road, as soon as you get to the monument, just before you get to the trail there, the Damonelix Trail, there's a little area there where the phone poles go across. And they had to replace some phone poles, so they asked me to go out there and look at it. And what's interesting, those phone poles are actually on Aeolian dunes. And these are Quaternary dunes, not—I mean, they have the dune form and everything. They're low, vegetated. They're stabilized dune. But that hasn't been mapped in the monument yet before I went out there. And so I'll probably put that together as a little map and get that report to Agate, also. Just on that. There was nothing on Fossil, there were bones out there, but they were all from hawks sitting on top of the phone poles dropping bones down below them and stuff like that. So there wasn't much, there's nothing that you couldn't say wasn't modern in that area.

But there are Aeolian dunes that have not been mapped in Agate that occur right there. And as I say, I'd like to do is go look at the Stenomylus Quarry. Because I've heard it being called fluvial. I've also heard it called Aeolian. And there may be both out there, and I'd like to look at a little bit more of the details of the sedimentology of the Stenomylus Quarry there. Because a lot of the stuff in the Harrison is Aeolian. And it would be just interesting to see what's happening. And also in the Anderson Ranch above that, has Aeolian bits, too.

Santucci: Thank you.

Evanoff: So, that's kind of interesting. Yeah.

42:53

Santucci: Yeah, definitely. Other than Badlands National Park, any other National Park Service units that you've done some work?

Evanoff: Did a little mapping at Chimney Rock. I've got to finish that one up, too, but we did some basic surficial geologic map of Chimney Rock, which is a national historic site. That was kind of fun. It's, you know, it's fairly simplistic. You can relate everything that's in the chimney to the stratigraphy on the bluffs to the south of it. So should be able to work that one out, including what units go with what and everything. And we did measure a section up to that, also. So I've got a section and the geologic map of Chimney Rock.

Santucci: Any fossils?

Evanoff: I don't think they've got it finished up, but as long as I'm teaching, I spend most of my time teaching. So I need to get all these things done.

Santucci: Sure. Okay. Any fossils at Chimney Rock?

Evanoff: Not that I noticed. But we weren't looking very hard. Not an awful lot. I think I remember some bone chips or something like that. But nothing came out, really stuck out at you, as I recall it. Yeah.

Santucci: Just by chance, had you done any work in Fossil Basin, Wyoming, in the Green River Formation?

Evanoff: Nope.

Santucci: No?

Evanoff: It's a nice place. And boy, that visitor center is incredible. Really an incredible visitor center. I hadn't seen it until a year ago last May we did a UNC field trip up there in May. And boy, that was some visitor center. I was pretty impressed.

Santucci: Yeah. It is. Thank you.

Evanoff: Yeah. But no, I haven't. I was out there with John Hanley in 1971 because he knew the Ulrich's. And so we did go up to the quarry, the Ulrich's 'quarry, back in '71. But that's the only thing that I've ever done in that area. And we weren't looking at mollusks, it was mainly John was, Wally Ulrich's TA. And so Wally invited us up to take a look at the quarries up there.

Santucci: Very good.

Evanoff: But that was a long time ago.

Santucci: Sure. (laughs)

Evanoff: Yeah. Many years ago.

Santucci: How did you get involved with Badlands National Park?

Evanoff: Rachel called me up. We'd done a field trip in 1996 together in which, GSA field trip that started in Badlands and went down to Toadstool and then was going to end up at Douglas. And unfortunately, in the middle of the trip, we had a major blizzard, so we never got to Toadstool. And then everything at Douglas was covered with snow, but we did it anyway. So I got to know, well, I got to know Rachel when she was at Fossil Butte. And then she went to Badlands and we did this field trip. And then in 1997, was it seven? Yeah, 1997, Rachel invited me up in September to do a paleo survey along the loop road. And of course I didn't know anything about the stratigraphy there. But we did find some things, like, for instance, what units were fossiliferous, what weren't. We did see the first fossils underneath what later became the Saddle Pass marker. We also figured out that the "disappointment limestones" [informal unit in the upper Scenic Member east of McGinty Pass and roughly at the level of the Heck Table marker farther to the west that is called "disappointment" because the lack of fossils], which is above that, didn't have much in it. And a lot of the roads build on the "disappointment limestones", there's not a lot of problems about fossil research there. But we looked at everything along the loop road. That's my first. I did kind of a strip map a little bit of the geology that we saw along there.

And then got interested in what happened '98. So '97 was out, '98 I went out to preview some stuff. I think I went up in '99, too. Not for very long, like a couple, a week or two. And then starting in 2000 was the beginning of the scenic project, which I was a part of. Which included, Rachel, of course was the coordinator. And then it included me doing the stratigraphy, Dennis Terry doing soils and then another paleo survey with Carrie Herbel and South Dakota School of Mine Students. And that went over 2000, 2001, 2002. That turned to be, for me, an incredibly, at first kind of a problem, because you started out in the Conata, Hay Butte area. And I found that Hay Butte marker, I noticed that the Hay Butte marker was [going through?] 47:41 and took a little later to find the saddle pass. But the major, big, lower marker bed through there and started mapping that and seeing what was going on with that. And worked around Hay Butte and then, at least the west side of Hay Butte and the north side, and then into the south side, and then all the way over to Conata Basin. That was in 2000.

And then 2001, we started out on north Hay Butte. And about the third day into that, third or fourth day into that project, that's when Dennis Terry about died from heat exhaustion. He was in, they hiked into the north Hay Butte area, which is a two-hour hike in there. And Dennis

wasn't at the time drinking Gatorade and not enough water. And he got heat exhaustion. So they got him back. It took them four hours to get back. And then he went in there. And Rachel said, "Okay, we've got to be closer to the road." So we jumped from there all the way over to Old Chamberlain Pass, which is by Scenic.

Well, I got out there and I knew where I was in the stratigraphy at Hay Butte. I had no idea where I was in the stratigraphy at Chamberlain Pass. So I made some guesses and stuff. But what it meant, is that I had to stay on through the rest of the summer and into the fall and map the Hay Butte from basically Sage Creek Pass, on the south end of Hay Butte, all the way around, over, across, and then finally over to Chamberlain Pass. And it turned out it was a lot higher in the sequence than I thought it was, because it turns out, when you're in the Conata Basin area, you're on an old Chadron high. So the Hay Butte's right on top of the lower brown mudstones. But when you go out to Chamberlain Pass, you have almost thirty meters or a hundred foot of section below the Hay Butte marker. Because you're in an old paleovalley complex.

But that worked out. And then I started noticing the saddle paths and started mapping that. And then we went all the way from Sheep Mountain table basically all the way across. And I basically mapped the entire wall. I've walked the whole length of the wall. It's about fifty miles' worth of wall. And mapped out the Hay Butte and the saddle paths and of course later the Poleslide. And then, and all with that. But it was all in the Scenic project.

Then the next following year was the Poleslide project, which turns out it was only in lower Poleslide. But what it was is the, everything from the beginning of the silt stones, which is the base of Poleslide, up through the white layer, which turns out is the Cedar Pass white layer, which is not the Rockyford ash, I can show that now. But anyway, it's the lower part. And that includes the boundary between the Orellan and the Whitneyan, which is about two-thirds up the section there, from the Scenic up into the white ash, or it's not even an ash, but the white layer, the Cedar Pass white layer. And the true Whitneyan starts in the lower part.

And now I'm beginning to think that the whole section there that's right there at Cedar Pass is actually Poleslide, equivalent to what's at Sheep Mountain Table. So what's been called Scenic above that white layer isn't really equivalent to the type Scenic at all within that. But that's because I went from butte to butte to butte to butte all the way across the monument and I got some pretty good evidence that the Cedar Pass white layers at the base of the middle Poleslide at Sheep Mountain Table. So there's three parts to the Poleslide at Sheep Mountain Table, a lower, a middle and an upper. And the Cedar Pass white layer is basically at the base of the middle part of the Poleslide at Sheep Mountain Table. I thought it's interesting because all the work that had been done, especially by, well, Ed Welsh knows quite a bit about it and he's been very interested. Turns out there's a whole scattering of Arikareean taxes that are coming in at different levels at that point. So the question is, what is, where is the Arikaree and where's the Whitneyan boundary? It's never been well-defined, anyway. And some of us are beginning to think that maybe the Arikaree, which is sometimes called the Beringian should be considered part of the White River sequence and maybe should be included as part of the Whitneyan land mammal age. And get it out of the type Arikaree in which, by the time you're in the Monroe Creek, you do have migrations of outside tax, and it is becoming a distinct fauna. But everything that's unique about the Beringian is actually taxa-derived from preexisting White River taxa. There's no

immigration of that. And it doesn't look like there's a single horizon that comes in that they define the lowest-most Arikaree and the highest-most Whitneyan. So, anyway.

And I've talked to Bob Hunt about this and also to Bob Emry. And they wouldn't mind that, I don't think, too much, if we can document it well. But it needs to be documented.

Of course, the best section for figuring out where the Whitneyan and Orellan or Whitneyan and Arikareean boundary would be down in the Palmer Unit of Badlands. But being in the Pine Ridge Indian Reservation, it's a real pain to get a permit to get in there to work on it. But if they're anywhere, you're really going to find that that's the place to do it.

So, I don't know. What do you think? (Santucci laughs)

I didn't say about the Poleside. Yeah, the Poleside then started in 2003, [200]4, and [200]5. It was only on the eastern side. We only went from Doors Window overlook to the, basically the Castle, which is the fossil trail. And we didn't hit the whole thing all the way. We had so many fossils. But that was interesting. Because compared to the Orellan, the lower Whitney is layer cake. It's just one through twelve, one through twelve units. It got kind of boring for the stratigraphy. I mean, it got to the point where it was easy to tell. And that includes all the way across to what I call the Wanless Buttes, which are over by McGinty Pass. Then it changes when you go into the part of the west, by old Chamberlain Pass and then when you get over finally to the good section on Sheep Mountain Table, you've got fluvial complexes over there that you don't have on the eastern side. So it looks a little different over there. But we went through that and that one is kind of interesting because it was so limited.

What the technique was, that the paleo people would go out early in the morning and start flagging site. You know, individual bone sites. And then Terry Easter and I, my field assistant, we measured in every one of those sites to the nearest tenth of a meter. And after three years, we had over twenty-four hundred sites. Some of them were in-situ, some of them were float, a lot of them were float. And then we ant hills, and all these sites, about twenty-four, twenty-five hundred of them, are all tied into the nearest tenth of a meter in the sections. And by graphic correlation, you can put it all into a standard section of forty-nine meters, which is basically from the top of the Scenic to the base of the Cedar Pass white layer. And it crosses the Orellan/Whitneyan boundary. And with that resolution, you're talking about equivalent to what a marine system is in the way of biostratigraphy. And that needs to be written up and worked on and get that into it. So that's still some work that has to be done there, too. But it was really kind of fun doing that.

So, and then I got interested in taking the Poleslide farther to the west to try to figure out what this thing was over at Sheep Mountain Table. So I got more sections to go across. And then actually right now I've got about 150 sections, some of them very short, some of them very long, a lot of them in between, that I've got in Badlands National Park. So that's been kind of fun.

And of course you know about our repeat photo. I got in touch with Hal Wanless, who is Harold Wanless' son. Harold Wanless started in 1920 going out to Badlands, and he was a photographer, as well as a geologist and paleontologist. And he took, I don't know, quite a few pictures of the Badlands. And right now, we've located about, I want to say about forty or fifty in

site. And then located the sites, get their GPS, you know, coordinates and everything like that. And then retake the photograph to see what has happened to the Badlands over the past, basically over the past one hundred years.

And it's really interesting, because there's not as much erosion on the slopes as one might imagine. The ridge crests have changed. Some places, a lot. Most places, not that much. But what's really interesting is that in 1920, and maybe going back to the 1850s, Badlands was going underneath an erosional, at the base. So the streams were eroding the base of the Badlands and stuff, and lots of fossil localities and stuff there. And then what's happened since 1920 is that there's been aggregation. And so the stuff is now filling in at the base of the Badlands, possibly with less grazing. But also maybe because drier and storms don't push all the sediment through. There may be several different things to that. But looking at it, it's been very fascinating looking at the changes.

And also finding them. We did find like three new localities, or photo sites this summer when I was up there. And I've got a couple more I've got to find. But that project's about done. I'm going to put a nice book having a comparison photo thing, and then Wanless' description of what he saw and then what we see today. And the differences. So that will be kind of fun. So that's been another project in Badlands that's been fun. My wife and I have been doing a lot of that. That's been fun. Kathy Brill and I. So that's been fun.

58:40

Santucci: So a couple of years ago, you had asked for some help to try to locate the field notes of a fellow named Bradford Meek.

Evanoff: Yeah.

Santucci: And so, how did that information contribute to the work that you've been doing?

Evanoff: Well, we've been going out and also Meek's field sketchbook is at the New York State Library in Albany, New York. And part of the, when he came out with Hayden in 1853, they were working for James Hall. So they're in the James Hall collection. And I found his notebook and photographs and things of the sketches that he made in 1853, which he talks about in his journal. So we've been out there. And one of the sites, we can actually get a GPS location of where he probably made the sketch. Now what's interesting is the other sketches that we're finding, he either did them really quick or, if he took a little time, he actually merged a bunch of the stuff in the areas that he worked at so it's not a photographic image of what he saw. That wasn't part of it. He drew a lot of different things together and put them together into these sketches if he had a little time. And so, we have found locations of two of them and possibly, I've got some ideas for about three others that are in there. And again, some of these things are actually composites of various features in an area. They're not a photographic—I mean, at the time, they didn't have photographs. And so the concept of doing a photographic realism like, say, a W.H. Holmes sketch or something like that was not actually what Meek was trying to do. He was trying to get an idea.

Now there was also a guy by the name of Desha Don who went out with Evans and was actually a very good artist, a French artist. But he, again, he put a lot of different things together

in one little areas. So that's quite different than what we have today. So, anyway. So, yeah, we did it. And what I need to do is I'm going to finish up. I've been transcribing the Meek journals. And especially I need to figure out the geology. Because I want to get out there, because I've done sections exactly where Meek worked. And I want to see what he saw in relation to where I worked. And I've done the same with some of Morris Skinner's stuff that you sent me. A long time ago, I had a couple of sections. But I'd like to see whatever else you might have. And also, Morris Skinner's stuff, I've done that. And Morris was just great. I knew exactly where he was in the section at Cedar Pass, for instance. And lo and behold, he put the Whitneyan/Orellan boundary at exactly the same place that I would have put it independently. I mean, Morris was just good. And I haven't seen a section by Morris that I didn't agree on. You know that kind of stuff. Morris Skinner worked in the '30s, and then later days in the Badlands. So, anyway, that's been kind of fun.

But no, we did find some of the sites that Meek did. And we also know that some of the campsites are probably very close to, one of these campsites is probably very close to where the Sage Creek Campground is. And then Joe Hartman and I have been going back and forth arguing about where Pinos Springs was, which is north of the park. Warren is the first person to quote unquote "map" the area, and I think he got the wrong place when he came through in 1855. But all the descriptions from Culbertson and Meek and Hayden, all three of them agree on the same thing. And I've got an idea of where that is, and that's north of Wall. And then also we found the spring that was used at the campsite on Bear Creek. You know where the Bear Creek spring is, where they camped, which is one of the major—of course, you couldn't drink the waters out of the streams much. If you did, you had alkaline dysentery. So you had to find these old springs. So there was one called Ash Grove down on the Indian reservation where Evans camped. But Meek and Hayden camped there, and also did Culbertson at the Bear Creek spring. And we know where that is now, and that's still there. So that's kind of fun. All those things.

And then we also used the journals of Warren who came through in 1855. And then there was another guy by the name of Todd, who was one of the cousins of Mary Todd Lincoln. One of her cousins came through with Harney in 1855 also and gave a different perspective. Apparently what happened is when Harney's troops came up in 1855, there was probably about 500 of them. And they hit the Badlands and they really collected the hell out of it. They were just ripping stuff out as they went through. In fact, so much that when Hayden, he was out in 1855, earlier in the year. He didn't get back till 1866 after the Civil War, and he was complaining that the fossil beds were not as fossiliferous as he had remembered them. And probably because of Harney's troops coming through and taking all the skulls and turtles and everything else out of the place. So, that's an interesting little tidbit.

And one of the things we've been doing that's not related with the park, it's actually on the Buffalo Gap Grasslands, is figuring out where Culbertson made his collections in 1850. He came out, Thaddeus Culbertson came out in 1850. Spent one day in May out in the Badlands collecting, but he was no collector, and then left. And from what he says, I think he collected in the areas on the buttes just south of Scenic. There's a couple of buttes that are out there in that. So that's the oldest actual known, where we can actually say okay, he was working on this area and he was collecting in the lower brown mudstones of the Scenic Member. And that's the type locality of *Agriochoerus, Mesohippus* and one other thing. Oh, *Hyracodon*. *Hyracodon* is out of there, too. So that's the type locality for those. So it's kind of fun to put those things together.

1:05:46

Santucci: And so there's really no idea where Alexander Culbertson collected the *Palaeotherium* specimen he sent to Prout.

Evanoff: Hmm. Hard to say. Could be actually several places. No, we don't know exactly where that was. Though if you look at it, it had to be along the rock somewhere, but we don't know exactly where it was. And the *Palaeotherium* bed, the turtle and oreodonts were probably down closer to the White River, but I'm not sure of that. The old maps that Evans had of the *Palaeotherium* beds had it a little bit farther to the south of Sheep Mountain Table. And maybe that's where he got it, but who knows? We don't know for certain.

Santucci: Interesting. And you know the connection with Spencer Baird, right?

Evanoff: Yep. Yep. Sure do. Yeah, Culbertson was going to collect for Baird, who hadn't quite gotten to the Smithsonian yet. And Baird's the one who sent, wanted him to go out there. Thaddeus Culbertson was more interested in the Native Americans and the zoology and botany along the Missouri than he was for collecting fossils. But Baird wanted him to get some fossils. So they went out for one day and collected a bunch of stuff and brought it back. And like I say, that was type material for an oreodont, a horse and a running rhino. So, that was pretty neat. And Bob Emry's written up the rhino part. But he didn't have an exact site. But reading the journals and stuff, I can make a good argument that it was in the buttes just south of—[inaudible] 1:07:45 was in them. But remember, it's the closest outcrop to Scenic and Scenic came in about 1907. So it's been about a hundred and, you know, over a hundred years of people probably going out there and collecting and stuff like that over time. At one time, nobody cared. So it probably got picked pretty clean, you know, it was much more fossiliferous when Culbertson was there. But you can still find things, including, we found a nice skull of *Merycoidodon culbertsoni* there, a beautiful one right there in the type where Culbertson worked, so that was kind of fun.

Santucci: And Spencer Baird, when he communicated with Thaddeus Culbertson, he was at Dickinson College at the time, in Pennsylvania.

Evanoff: Yep. Yep. And then by the time he got back, wasn't he at the Smithsonian?

Santucci: Yes. Yeah.

Evanoff: And that was right during the transition. Because he did publish the first draft of Culbertson's journal that next winter after Culbertson died. And then, of course, that other fellow who's a McDonald or, wrote it up in the 1950s as a book. And that was very good.

Santucci: Yeah, it's all a very interesting story.

Evanoff: Yeah, it's good stuff. I'd like to get you out there, Vince.

Santucci: Yeah, I definitely would like to.

Evanoff: Let's do a history trip. Let's do a history trip. And then also tell me what you did up in the Scenic, or the Sharps. I'd like to know more about your Sharps work. So.

Santucci: Yeah, I would definitely like to do that.

Evanoff: We'll try to get you out there.

Santucci: Thank you.

Evanoff: Might get Briethaupt up there, too, since he's interested in history.

Santucci: Sure. Well, thanks.

Evanoff: Yeah.

1:09:35

Santucci: Any other thoughts or items on your bucket list as it relates to the White River Badlands?

Evanoff: Hmm. Well, been thinking about it. I'd like to try some of the mapping I do, and finish some of the mapping I'm working with. And then they're thinking about for the park actually starting to put for the north unit paleo resources maps. In other words, where the more fossiliferous horizons are. So if they put in new roads and stuff, they can try to avoid the fossil beds. With that, of course, helping Ellen and, Ellen with their paleo surveys. I did some work with them this summer when they go out and do some of their—they're much more limited paleo surveys, but they have it into a sense of looking at, let's take a look and see what the faunas do from bottom to top, then take Badlands and see if you can test Don Prothero's biostratigraphy. Does it work? Does it not? What levels do you get the changes in the oreodonts and the *Leptomeryx* and all the other things. Especially in the Orellan and Whitneyan. Figure out this problem with the Arikarean versus Whitneyan stuff. We need to get that taken care of. You could also look at the faunas, there are ratios of fossil from the base to the top and look at a variety of things and see if there's changes in the faunas.

Like for instance, I've done some work because I got interested in it in looking at what's the ratios of oreodonts to horses. For instance, in the Scenic. Well, the uppermost Scenic, at least on the east side of the park, has 50/50 oreodonts and horses, okay? You go into the Poleslide and there's ten oreodonts for every horse. So there's a major change there in the relative abundance of the two major groups and stuff. And then we look at some other changes as you go up. Not only for the biostratigraphy but also maybe looking at paleoenvironments. So, stuff like that.

And then, of course, tie in Dennis' paleo soils work, my stratigraphy, sedimentology work. You put these all together into it. So maybe the next volume of the White River book that Rachel and Dennis and myself and Greg McDonald put together, maybe we can include some more information on stuff like that. So.

Santucci: Very good.

Evanoff: So, anyway. So I'm hoping to work with Ellen and Wayne and all the other people. They've got actually a very good crew up there. And I hope they continue using it and then actually expand beyond even what Rachel did. I mean, Rachel did fine, but I think there's going

to be more of an emphasis on the science as well as the fossil management part there with Ellen being there. So. Okay? Ellen Starck. Yeah.

1:12:39

Santucci: Sure. A couple other questions. So you're familiar with the White River catfish that Lance Grande has prepared?

Evanoff: Yeah.

Santucci: And he's actually working on publishing on it now.

Evanoff: Right.

Santucci: So the paleo-interpretation of that, would that be a lacustrine unit within the White River, do you think?

Evanoff: Sure. But I don't know where it's from. I'm not sure I know where it's from. But I was thinking about it. There's about – let me think about it. One, two, three, there's about five or six horizons in the Brule that actually have lacustrine beds in them. And that's another thing somebody could look at sometime is looking at the faunas across there. And actually from the Chadron, atop of the Chadron you've got some lacustrine beds. And then the lowest ones actually are a lake deposit up in the middle, lower Poleslide just near Doors / Windows [trail head], there's another lacustrine bed up there. And then there are several different horizons. And I'm going to graph that up and send that up to Ellen and stuff. Eventually I guess my big bucket list also is to write up a big, eventually I need to write up about the stratigraphy of the White River in the north unit of Badlands National Park. So that combines the stuff from the Scenic project, Poleslide project, and then all the work I've done since then. So anyway, that's the, since I started in '97, learned a lot more about that. So.

Santucci: In your field work, have you ever encountered any terrestrial trace fossils at Badlands?

Evanoff: Yeah. Well, I know where to look for them. And we have found them on, we've seen some nice rhino tracks just off the park along Quinn Road. There are some pretty good, they look a lot like the Toadstool tracks. But I know a couple channels that could be looked at in the park that we haven't actually got out and walked over to look to see if we got them, but they should be there. So yeah, it's possible.

1:15:06

Santucci: There's a section near Norbeck Ridge that has some really interesting invertebrate burrows. Pretty intensively concentrated on a couple of blocks that are down dropped from above, on the ridge.

Evanoff: Mm hmm. Yeah, I guess I haven't seen those exactly. I've probably walked by them, but only at the end of the day, when I was really tired. Yeah, that would be neat to see.

Santucci: Yeah. I'll look for the photos and send those to you.

Evanoff: Okay. It sounds good. Yeah, and if you've got any Morris, stuff by Morris, anything by Morris, I'd appreciate.

Santucci: Absolutely.

Evanoff: I've seen one section there. My copy is not very good. It's kind of hard to read in places. So, yeah, if you've got anything more by Morris, that would be good.

Santucci: Okay. And just one very different question, in the time that you worked in the Badlands, did you have any encounters with individuals that were involved with unauthorized collecting, or did you see any evidence of unauthorized collecting?

Evanoff: One time—yeah, two different things, three different things. I've seen a turtle that was partially dug out and then they abandoned it. And it was way over by the north end of Sheep Mountain Table. We walked out one time south just to the east of Sheep Mountain Table on the flats and found a very hard wattle of paleo bond and nobody at Badlands works with paleo bond. That was one thing. And then, oh, when I was first working with Rachel one time we went out and here was this arrow made out of stones. And I asked Rachel what that was, and she said, "Oh, that's for me." And what it was – was somebody had put a stone circle around a rhino skull. Didn't try to collect it.

The other, okay, I haven't seen a lot of evidence for it, that I know of. Oh, there are a couple of weird things. Like for instance, on the north side of Hay Butte. John Clark worked in that area way back when, probably over fifty years ago. And he made a survey of all the fossils in the area. And he made field identifications. And then he took all the specimens and threw them all together. So there's probably a six or seven foot wide cone of fossils, six or seven feet wide, going up to a little cone. And it's a whole bunch of fossils from the area all just piled into this cone. And when Rachel first saw it, the look on her face was priceless. (laughter) As you could imagine. Let's see, what else? No, I can't think of, I'm trying to think of what else—you know I can't think of—trying to think what else would be—

Oh, the one thing that was very telling is when we did the Poleslide project. Kelly did a survey there, that little bowl where the fossil trail is. And she found four sites. Four occurrences of bone, all of them in-situ. Okay? In that basin. The next valley over to the, just to the east of that, they had 120 sites, all of them micro sites. Then you went across the road, away from where most people, and in that same area, we had about 300 sites. So it's very interesting to see what the impact of visitors are on the fossil resources. And actually, a few years later, they tore up the old boardwalk and they found lots of fossils underneath the boardwalk. But that's because nobody could see them or get to them. So you know, it's interesting. Probably the vast majority of people do not collect fossils when they go to Badlands. But the say 1 or 2% that do, they can make a big impact on the thing over time.

So we notice that a lot in the Castle Trail, for instance. Along the Castle Trail for the first fifty yards or so, forget if you're finding any fossil. You get beyond that, you start picking up more fossils. And if you go all in what should be fossiliferous unit, you get far enough away from it and it's pretty rich. So you know, there are some big changes that occur. Anyway.

So, people do have an impact. There's no doubt about it. And that's kind of an important thing to think about if you're going to put in a trail. Because if you really want to save the—I mean, they put the fossil trail there because it was very fossiliferous, right? Well, there's not a lot in there now. So. That was kind of interesting.

Santucci: Yeah. Absolutely. Another very different question. So, you brought up John Clark. In 1986, right at the time that Don Prothero was doing his paleo mag work, and right after Retallack's work on paleosols, John Clark, who had worked at the park for a short time in his retirement, he wasn't convinced about Retallack's work or Prothero's work. And so, anyway, I had Prothero over for dinner and a couple other paleontologists. And I got a call that John Clark was at the park and wanted to meet. So we brought him over for dinner. And it was an interesting dinner with having John Clark there and Don Prothero, very different personality types, discussing the White River Badlands.

Evanoff: Yep. Yep. I'm sure that must have been, I'd like to have been a fly on the wall on that one. That would have been interesting.

Santucci: (laughs) Yeah. Well, Clark also—

Evanoff: One time I had Don up, Don usually stays with us when he's in Denver and stuff. And it's always good to – Don's a dear friend but he's still a – now a late middle-age man in a hurry. One time he got in early and I'd seen Priscilla McKenna earlier in the day. And I asked Priscilla, "Do you want to talk to Don?"

She said, "Oh, yeah, yeah. He's a good friend."

So I took Don and Priscilla. And Priscilla liked to talk, and Don liked to talk. And I was sitting in the room and the two of them are talking at the same time but not on the same subject. (laughter) And I just sat there and kind of grinned at them and looked at them. Because Priscilla was saying one thing and Don was talking about something else, and they were doing it at the same time. (laughter)

Santucci: I can see that.

Evanoff: Well, anyway. Don's always been either a young man in a hurry, or now, you know, an older man in a hurry. And not exactly always the most careful field worker. I have worked with him at Flagstaff Rim and a couple of other places. And Don always just blows through things. And then, and Greg Retallack did an interesting thing because he didn't have any idea. He did a one-liner. That's a stratigraphic section that's just one stratigraphic section. And he did it in incredible detail. But he had no idea that he was on top of a Chadron high. So in other words, he's in a section of the Badlands that is probably the most condensed section in the entire park. Because it was right on the Conata Ridge, right there at the head of that Conata Basin and stuff. So if he would have gone a few miles either side of it, for instance. And he didn't recognize the Hay Butte marker because it sits on top of the brown mudstones there. If he'd gone to the north or south, he would have had thirty more meters of section within his sections and stuff like that to actually look at. So, that doesn't bother him. Greg basically did one section and went through and told this wonderful story and everything like that. But it's one section. It's not a—most of us who like stratigraphy, we don't do just one section. You know what I mean?

Santucci: Yeah.

Evanoff: So, he missed some stuff. So he worked on the most condensed section. But Greg didn't care. It was no big deal. But I guess if you're going to look at soils, look at a condensed section, you know. That's great.

1:23:58

Santucci: So when I was going through some park records at Badlands, there was some notes in there by some of the old-timers. I don't know if these names even mean anything to you. But the name Ray Lemley?

Evanoff: No. Don't know him.

Santucci: So he was around, I guess, back in the '40s and '50s or so. But there was a note he reported about a locality where he found some logs of petrified wood in the White River Badlands. And of course most people, including John Clark, said, "Oh, well, there's no plant fossils in the Badlands outside of—"

Evanoff: That's not true.

Santucci: "—outside of hackberry seeds". And then of course Retallack brings up the whole idea of these rhizomes and root traces. So, we actually spent two days and went back and relocated this site that Lemley had reported on that we found these petrified logs. So I just wanted to ask your opinion—

Evanoff: Where were they in the park?

Santucci: I think it was near Deer Haven.

Evanoff: Oh, okay. Yeah, I haven't seen them. But around the corner on the other side of Hay Butte, over there by the Brian Maebius site, there's stump localities there.

Santucci: Good. Okay.

Evanoff: There are stumps. And there's also stumps north of the castle. There's at least one stump that I know of north of the castle. So, yeah, there are some. And also, what's interesting, there's a basal gravel. And I've been studying those basal gravels. They're very unusual because they're made up almost all of quartz, chert, quartzite. There's silica-rich chert at the base of the White River. And if you get into the paleovalley complexes, and these things get concentrated there, you actually get Florissant-type wood in them.

Santucci: Interesting.

Evanoff: You do get Florissant type wood in those basal paleovalley complexes at the base of the White River.

Santucci: Well that's what I wanted to ask you. If you had an impression that there was petrified wood and stumps in the Badlands. And it sounds like you have documented—

Evanoff: Oh, yeah. They're not a lot. But yeah, they're out there.

Santucci: Very good.

Evanoff: And if I see them, I mark them. But I still haven't been in the area at the headwater of the east fork of Sage Creek. I haven't mapped in there much. And there's a few other places I haven't mapped completely and stuff. They could be around. But I could tell you at least two stump localities in the park.

And also, Hatcher talked about them, also. He had, six miles north of the mouth of Corn Creek, he said that there was a whole bunch of wood up there. And I'm not even sure that's in the park. It may be actually in the grasslands on the north side of the park. But I haven't been out there to look for it. So, yeah. There could be. Yeah, there's some wood and stuff like that out there. Nice thing would be if we could find some leaves. Emry found leaves at Flagstaff rim in the clastic dikes. Which was kind of wild.

Santucci: Yes.

Evanoff: And I've seen those. And they're definitely leaves in the clastic dikes.

Santucci: Very good. Any concluding remarks in terms of what's on your bucket list of things left to do? Or have we touched upon that pretty well?

Evanoff: A lot of writing. (laughs) I've got to do a lot of writing and get stuff done. You know, get that out. That's probably the biggest thing. But, no. I've been going back to Badlands quite a bit. I want to try to help Ellen and everybody out up there. So we'll see what happens.

Santucci: Yeah. It's a really great team that they have their. And I'm happy for Ellen. And of course Ed is a tremendous resource there.

Evanoff: Mm hmm. And Wayne is enthusiastic, I must admit. So I think working with them and stuff, I guess they enjoyed us coming up this year. We were there a couple of weeks ago. Just before Sturgis. And they had a ball up there. It was a lot of fun. So, hopefully do more fun things there.

And I'm kind of looking forward to maybe doing some stuff with Rebecca, also. And Herb's always a pleasure to work with. I haven't worked with him so much anymore, but Herb is a really good guy. And then you get somebody like Alvis at – just so enthused, at Agate. And he's always a fun person to be with, too. So, another good person to work with.

Santucci: Very good, well—

Evanoff: Bob McKissock was fun, but of course he's retired now. I really liked Bob. Bob was good. Just to let you know some people I really like.

1:29:09

Santucci: Yes.

Evanoff: So, anyway. Anything else?

Santucci: No. I think this was really good. I greatly appreciate your time. And thanks for all the good work you've done in national parks to help us better understand the Cenozoic of the Great Plains.

Evanoff: Oh, yeah. Well, it's been fun. Why don't you come out? We'll do some historical, maybe I can get George Hartman down and we can argue some more about where Pinos Springs was. (Santucci laughs) Get you out there and take the whole tour. In and out of the park.

Santucci: I really appreciate this. Thanks again for spending the time, and I'll make sure I send you the transcript.

Evanoff: Okay. That sounds good. And one last thing. I haven't heard from Bob, but that doesn't surprise me. He's of a generation that doesn't, he isn't instant on getting back. But I'll ask Bob Emry about it. But he is Mr. White River vertebrate paleontologist. And saw so much and worked so many years with Morris that getting some information from him would be great. Even though he really probably hasn't worked on the park so much. But, I don't know. I'd love to hear what he has to say about some of the, working with Morris or something like that.

Santucci: Absolutely, yes. That would be great.

Evanoff: And also his experience has been incredible. Bob's always fun to go out in the field with, you know. Okay, very good.

Santucci: Thank you so much.

Evanoff: Sure enough. It's been fun.

Santucci: You have a great day.

Evanoff: I've got to tell you, I've been sitting here outside of my favorite Greek restaurant in Loveland, where I had lunch. And I've been sitting in my car with the air conditioner on because it's 90 degrees outside while I've been talking to you. (laughter)

Santucci: Well, go get some dinner.

Evanoff: Oh, I already got it. That's why I came over here. I wanted to have lunch before I talked to you. So I got to do some stuff here in Loveland and then head home. And I'll talk to you a little later, okay?

Santucci: Safe travels. And thank you.

Evanoff: Yeah. Let's plan on doing a tour up here.

1:31:13

[END OF INTERVIEW]