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Interviewer: Tom Martin

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TM: Today is Monday, August 23, 2021. This is Part 3 of a Grand Canyon oral history interview with Stan Beus. My name is Tom Martin. Good afternoon, Stan. How are you today?

SB: Okay, fine. How are you doing?

TM: Very good. Thank you for asking. We left off in Part 2; you had just come to Flagstaff with your wife and children all packed in a station wagon and you'd gotten hauled up the hill to get to Williams because the car overheated.

SB: We had a trailer behind it causing even more of a problem. And it was a hot August afternoon.

TM: Can you tell me about the geology program at the Arizona Teachers College here in Flagstaff at the time that you walked into?

SB: Okay. It had a single geology professor there for two years before, and he was just leaving. And I was put in with the geographers under Agnes Allen, who was the head of the geography department, and I was included there with them. There is some overlap between geography and geology, of course, but not a lot.

TM: Tell me about Agnes.

SB: Okay, well, she had been, she'd been in there for a long time. She'd been an advisor to a number of committees, and I know and before I ever came and— But she was officially the chairman of the geography department, and the lone geologist was put in with the geographers under her supervision.

TM: Okay.

SB: And I didn't know— Well, I knew what I was coming to because I had stopped to interview on my way up the previous summer when I was going to do the last check of my field work. My dissertation was up in Idaho.

TM: So, this was 1960 that you interviewed, and you got the job in '61?

SB: I interviewed in, would have been in '61, and got the job for '62.

TM: Thank you.

SB: So, I think that's the way, I think that's the way it worked. Anyway, I came in '62, in the fall of '62.

TM: Who interviewed you in '61? Do you remember?

SB: Yeah, President Walkup and Agnes Allen. She was not very excited about me coming. She thought I was too— I'm not sure what she thought. I think she felt like I just wasn't forceful enough or something. I don't know. Anyway, I—

TM: Did she think maybe you were too young and lacked teaching experience?

SB: I was 32 years old. I wasn't too young.

TM: All right. Okay. What do you remember about President Walkup?

SB: Well, he was a very effective president and was there— I think he's the longest of any president at the university. He'd been there some years when I came, and he lasted number of years after. And when he retired, he and his wife moved to a house down the street from where we lived, so we got to visit with him and go caroling with them at Christmas time and so on. So, that was a nice association. But apparently Dr. Walkup felt good enough about it that he made the offer.

TM: Okay.

SB: And I accepted. It's the first offer I had gotten, you know. I had applied at University of Idaho, which is where I used to live, in Idaho. I mean, it was in the same state. It was

way up north, and I'd applied at, I think, at the University of Utah. They didn't really have an opening for geologist then, although I was well acquainted with one of their professors there because he had helped get me involved in the research project that I finally did, which was in Idaho and Utah, right at the Idaho border at Mullan, Idaho. And it was called Geology of the— Guess I've got to stop and think of the official name now. Blue Spring Hills.

TM: That was your thesis. That was your PhD thesis.

SB: Yeah, and it extended from Utah into Idaho, across the border and the nearest town near that was Mullan, Idaho. So, when I worked up there over the summer, I found a place to live with a widow lady who had an apartment in a basement so I spent my summer, full summer and part of another summer there working on that.

TM: So, did you apply to other schools besides the university in Flagstaff, the University of Utah, University of Idaho? Was it just those three?

SB: Those were the only three that I knew of that had an opening. I can't even remember now how exactly I have found that out, but I learned, knew that they did have an opening, so. And there may have been others that I didn't know about. I know one of the places that I had talked to were expecting me to be able to come, you know, in the middle of the year, like, in January. No, I want to get a job in Fall, in September. So, I didn't go— They checked with me later on to see, but sure enough I did have a job then, so. I don't know if they would have offered me one, and it was back in the Midwest. I probably wouldn't have done as well as I did in Arizona.

TM: So, when you walked into the university here in Flagstaff, were you expected to start teaching, like, right away?

SB: Yeah.

TM: And what classes did you teach that first semester? Do you remember?

SB: The first time I had the beginning geology course, and I believe at the same time that I had another earth science course. Now, earth science has a little broader perspective. It includes geography, geology, and you know, physics and chemistry and all these things, in a sense. It's not a whole lot different than, say, physical science, but this is called earth science with a strong emphasis on geology and geography. So that was my main teaching assignment that first semester.

TM: Just those two classes?

SB: I think so. If there was another one, I can't remember. It seemed like all I did was prepare for classes.

TM: Having never done it before. Gosh.

SB: I never done it before, but it went it went pretty well. I felt good about it the end of the year. And this time, the university, the state college, it wasn't a university yet. It was a state college. They were applying for to become a university. President Walkup had a lot to do, of course, with getting that finally approved and was effective in getting it accomplished, along with others. But anyway, the campus was growing. Student body's growing. And so, they added another— They let me add another course or two, beginning geology courses, you know, like mineralogy, the study of minerals and—

TM: Great

SB: Several other courses like that. I wasn't very good at teaching mineralogy, so I wanted someone to help, so they allowed us to hire a second person.

TM: Would this be in the spring of '63?

SB: Yeah.

TM: Wow. That was fast.

SB: Yeah. And—

TM: Who did you hire that spring? Do you remember?

SB: I have to think of his name for a minute. He had had some experience in geology. That was a good thing. He'd been, he'd worked in the oil patch in South America and had done some exploration elsewhere, and so it was helpful to have him.

TM: What about structural geology? Did somebody—

SB: That was also— That was another thing we added right away was structural geology.

TM: Okay, so mineralogy and structural. That's pretty core fundamentals of geology. That's important.

SB: That's true.

TM: Did you teach the structural, or did this new person?

SB: No, I think he taught structure geology and mineralogy, and I continued with physical geology and earth science. There may have been a third. I can't remember. There may have been a third course in there that I can't think of now.

TM: Let's back up a minute. When was the first time you actually went to Grand Canyon and looked over the edge?

SB: That fall. I knew I needed to know more about the Grand Canyon, so I just took a trip up there on my own and walked down into the Grand Canyon. I didn't go all the way to the bottom the first time.

TM: Okay. Smart. Smart.

SB: I could see all the marvelous possibilities there. In the succeeding years for some time, for at least the next 10 years, all of us who were on the faculty in geology considered it was part of the campus, you know. We just— Our courses involved going to the Grand Canyon. If you're teaching geology you usually always had an excuse to go to the Canyon with the students.

TM: That's really neat. The other thing I want to ask about, speaking of part of the campus, was the peaks and vulcanology because we have— Before you get to Grand Canyon, you go through all this—

SB: Yes, all that stuff.

TM: —all of the fairly recent volcanism.

SB: Yes. Yes.

TM: Did that play into your purview as well?

SB: Yes, it was certainly helpful to have, because here was a lot of volcanic activity and young volcanic cinder cones, as well as these older one peaks that had worn down quite a bit. And so within, I can't remember the exact timing, within another two years, we had other courses going, and so we invited a third person in geology. They had allowed us to hire a third person in geology. We now had three. So, with those three, we proposed the university allow us to establish an official undergraduate degree in geology, which they'd never had before.

TM: Okay.

SB: Which included the basic courses in all physical and structural geology and mineralogy petrology, structure stratigraphy and the earth science. The earth science courses were really for people who wanted to teach earth science in high school. And so, I did spend some time with that for several years, really, and it was helpful, and it developed into something more later on, in fact.

TM: But within three years—

SB: We were, we were still under Agnes Allen, I think, that first, that first of that year there three, but ultimately, they let us separate and be our own department, separate from geography.

TM: Do you remember what year that was?

SB: No.

TM: '64 or '65?

SM: About, about— Not '60. Probably about '65.

TM: Okay.

SB: Something like that. So then, eventually for a time, because by this time Agnes Allen was getting close to retirement. She's been here many years. She'd had a long history here, and so she was getting close retirement, so she eventually had— Because after, after those first few years, we had more in geology than they had in geography.

TM: My.

SB: Because we, you know— It was a very going program. Oil had been discovered in parts of Arizona and the Southwest and— So, things were happening and—

TM: Was that the—

SB: Eventually we hired— We had up to— I think we went up to five people. And by the time we got five, we really had a fairly well-rounded department. We had some who were specialized in mineralogy, in the structural geology, and we got one eventually who was working in geophysics. I can't remember exactly, you know, the specific dates of all these things happening. Within a few years we had a sizable, very active, and very strong department, and we're producing students to go on to graduate school somewhere.

TM: Okay, let's back up a bit. You arrived in Flagstaff in 1962.

SB: Right.

TM: What did Carma think about all this?

SB: [Laughs] Well, she knew that I was really struggling to make it work and it got even more complicated because that time they were short of English teachers. She had taught high school English—

TM: Right.

SB: —several years before we were married even, and one year after we were married, before I was drafted. So, President Walkup turned to her and said, “Could you teach the course in freshman English?”

TM: Oh. Now, she has a number of children to take care of.

SB: Yeah, we had three children.

TM: How did that all work out?

SB: Well, we managed it somehow that I could usually be home when she was gone, and she could be home when I was gone. We worked it out. It was not— She just had one class, you know, so she just had one hour every three, three days a week, or three or four, whatever it was, so she wasn't gone all day and she was— When she first got the offer, and he told her how much they were going to pay her, she declined and said, “That's not enough.” And then she was thinking of the whole year. He was just thinking of one semester at a time. So, when she found out, she said okay. At the end of that first year, she said, “I will do it this year, but I don't want to continue this. And I'm going to save the money I earn, and we're going to buy the other furniture that we haven't had that we need,” including that big chest right there and another one just like it.

TM: Nice.

SM: And over there. Nice oak furniture. So, she just did that one year.

TM: Was that in the fall of 1962?

SB: No, let's see. Yeah, I guess it was. It actually was.

TM: Wow. So, that was like [snaps fingers] Not only do you arrive; you've got to build your own classes. She, at least, had taught English. Wow.

SB: Yeah. And she was very comfortable with it, and I know we had some— In one case, we had the same student in both my class and her class. We compared notes on how he was doing.

TM: Did she enjoy that?

SB: Yes, except she just said she didn't want to be tied down that much with the young children at home. So, she didn't want to continue. But she did that one year. She said, “If I earn enough this year to buy this furniture, I'm not going to have to do this again.” So, she didn't do it again.

TM: Okay. Nice. Where were you living? Where did you rent a place to stay when you came to Flagstaff?

SB: When we first came, we just got ahold of a, well, he was at part-time realtor, and he was trying to get in a lot of businesses, but he had a place for us in East Flagstaff.

TM: Do you remember his name? It wasn't George Babbitt?

SB: No, No. He was just a small-time operator, but he did have some houses there. So, we rented a house, and it wasn't very good. It was just the best we could find on short notice, you know, but we took it. And we stayed in it a year, and then we move to another house over on this side of town, right in West Flagstaff, which was near the campus.

TM: In 1962, where was East Flagstaff? And where was the east side of town?

SB: It's the other side of the hill, you know. You go over the hill to go over where the Geological Survey station is. Down the other side. That's East Flagstaff on the other side.

TM: Right there. So, this is where today's— Was this Sunnyside? Today's— You go over past the GS, and then you come down. There's a school is there and—

SB: There's a high school there. Coconino High School is there.

TM: Yep. So, that was East Flagstaff.

SB: That was East Flagstaff.

TM: Okay.

SB: So, that's where we were. And we moved on this— We were on the other side, closer— We had a house right on the Rio de Flag. And I thought about that the other day when I learned that the lower Rio de Flag had flooded over dramatically, but we were on the upstream end of it where it wouldn't, we rarely saw any water in it at all, just a little trickle. In fact, one time I got— Well, I saw it going down there, and I had some plants that I planted in the front yard. I worked out a system that sucks some water up there and water the plants with the little trickle that was in there. But anyway, I'm sure that wasn't the area that was affected by the flood. It was downstream that we saw, that I read about it anyway. But we were there for about three years, and then this same realtor that we had dealt with had a big house, a nice big, old house. In fact, it had been lived in by the Babbitts, Babbitt family. Stone. Rock. Volcanic rock. And then they had added on. It was just a fairly simple house, but it was a two-story house. Big, big, tall story two-story with all this rock work. And then they added on a lower, wooden, built upon it, made it look a little different, but that was their living room, and then the upstairs were bedrooms, and kitchens downstairs and so on.

TM: Was this Downtown area? Where was this?

SB: It was at 622 North San Francisco Street, close to Downtown.

TM: Okay. 622 North San— Yeah, so, you go up the hill from Downtown, and then it levels out.

SB: Yep

TM: And you're up in that level area there.

SB: Just before, yeah. If you go up there far enough, you run into the hospital complex that's up there now. Well, this is— It was south of that. But 612, you see, so it's six blocks up. And then in the beginning of the third of the seventh block, I guess, going up straight up from—

TM: So, a little far to walk to campus, but you could bike it, if you wanted, easy.

SB: Yeah.

TM: This is downhill all the way going there.

SB: It's downhill, yeah.

TM: You'd have to work hard going home.

SB: I didn't really bike very much at that time because it was quite a climb to get up that slope that far. But so, we moved into it, and we had these three children that we needed to deal with, and it only had two bedrooms, I think. We needed more than that, so we built on to it. We built onto that addition, on that wooden addition. We duplicated it with a whole step above, which is two more bedrooms and a bathroom upstairs.

TM: Great. On top of the existing wooden extension?

SB: Yep. And that made it really a very handy place for us. It was an older house, and we were concerned about it because the— It was an old furnace system, you know, that was still not very efficient sometimes, but it worked okay.

TM: Was it oil or gas?

SB: It was— I think it was oil.

TM: There was a tank?

SB: I can't remember what it was. I can't remember now. It was either oil or gas. It was— It functioned on oil or gas. But it was an old, it was an old system. It wasn't very modern one and I was a little concerned, but it worked okay.

TM: Okay, and then I wanted to ask you about a professor in the math department who would have arrived about the same— No, he was there earlier. I'm sorry. His name was Harvey Butcher. He would have been in the math department.

SB: Yep, everybody knew him.

TM: What are your first recollections of him?

SB: He was inveterate Grand Canyon hiker. Okay, he used to spend his weekends at the Grand Canyon. And he didn't just go down the main trails. He'd go down one trail and try to hitch a ride on a raft down in the next trail and come out. So, he knew, after a few years of this sort of thing, he was the expert on places where you could walk down to the Grand Canyon and places where you couldn't. He tried most of them. He was— He just became a regular famous Grand Canyon hiker and even up to his very old age he was, you know. He was— Everyone recognized him. If you wanted to know what it was like in this part of the canyon, ask Harvey Butcher. He'd been there.

TM: Okay.

SB: He clearly took some river trips, too. But at that time— I can't remember when he first came, but we soon all got to know about him and— Most of us, I think, we're a little bit uneasy of ever trying to hike with him because he was such an inveterate hiker, so strong and active. I remember encountering him on the trail in the Grand Canyon several times, you know, seeing him coming up or going down, and here he was. Here was Harvey Butcher. I know his wife got a little bit impatient with him that every weekend that's where he went.

TM: Did you meet Roma, his wife? Did you visit with her?

SB: Not very much. I just met her briefly, so I didn't really know her very well. But him I got to know fairly well.

TM: Did you hike—

SB: He was also an inveterate chess player. Loved to play chess.

TM: Did you play with him?

SB: No, I didn't, because I wasn't a chess player.

TM: Okay, and then, well, Bob Packard, sort of going through the names of the Math Department. Packard was another amazing hiker in that Math Department with Harvey.

SB: Yeah, I didn't know him very well. I remember the name, but I didn't know him.

TM: Okay, so as a new— Well, you weren't new, like you say. You were in your 30s, but I was thinking as a new professor coming to Flagstaff, interested in geology, what were some of the things you found right away that really interest you or surprised you in geology of the area?

SB: Well, of course, most of it was new to me. I had read about the Grand Canyon, but I'd never been there. I'd worked on stratigraphy in Idaho and Utah and California, but never in Arizona, so it was all new to me, but it was just a marvelous— As I said, we

considered that the Grand Canyon was sort of an appendage to the campus. It was part of the campus.

TM: Would you take your students there for either an overnight hike or—

SB: Yeah. The beginning— The two beginning classes we had, and I taught them part of the time, all of us had a turn with them, physical and historical geology. Physical geology was the first introduction to everything, which is you learn about rocks and fossils and stratigraphy and layering and structure and faults and so on. Then the next one, historical geology. This is largely based on stratigraphy and the fossil record. Those are the two fundamental courses that we started all our students with. And we expect that our historical geology students to take a trip into the Grand Canyon and stay two nights and look at and sample stratigraphic section there and try to, try to measure a part of it, just for the experience of it, because this is what stratigraphers do, you know, and studying things. So, and most of them did. If they had a physical handicap that wouldn't allow it, we wouldn't, we would, of course, let it go. but if they could go, we expected them to go. Well, the first time I went, I was following Agnes Allen's recommendation is that we had— When the students came out, because it was such a grueling hike to come out for all the students, she recommended that we have mules come down and meet them, meet us down at the top of the inner gorge, which is about a, what, about a fifth of the way out of the canyon, I guess. And I did that the first year, but only the first year. After that, I just said students are going to go down, they're going to be able to, going to have to walk out. We're not taking them out on mules.

TM: Well, I would imagine it would be expensive.

SB: Yeah, oh yeah. It was.

TM: And you'd have to wait for the mules if the mules weren't there.

SB: It was effective, of course. You're going to be sure that everybody got out.

TM: Yes.

SB: We expected everybody, if they could go down, they could probably be able to go up if they knew we start early in the morning and do that. And we continued that for a number of years.

TM: And were you just going down to the—

SB: Phantom Ranch.

TM: Phantom Ranch, the Bright Angel Campground.

SB: Then we could sit with them. The next day, they would go around and look at the local stratigraphy and, you know, and examples, so on. Then the third day, they would

come out. So, they just got kind of a feel for what it was like to be in the Canyon. But we did have some assignments for them, you know, to look at the rock layers and to identify what kind of sedimentary rocks they were, and what kind of fossils we could find in the Bright Angel Shale and so on. And there were good tri—. Everybody could find trilobites in the Bright Angel Shale.

TM: I've got to ask you. I have never found a trilobite in the Bright Angel Shale.

SB: Really? [Laughs].

TM: Never

SB: Have you looked?

TM: Yes. I'm just clueless. I have never— Tracks, yes, but an actual trilobite, no.

SB: Well, they're there. They occur in certain places where they're well exposed. If I had time and could still do it, I'd take you down and show you where you can find some trilobites.

TM: I would love to do that because I just, like— I am trilobite poor. That's one of the things I was going to ask you is where are the trilobites? Having walked miles and miles of the Bright Angel shale and not found one. When did you start that? Was that in '62 or '63?

SB: It would have been in '63. If I did it the first year. I'm not even sure I had them do it the first year because I was all alone teaching then. Probably in reality it was the second year before we really got into this because then we were teaching physical and historical geology. And then historical geology students were expected to do the Grand Canyon unless they were physically not able to, and then they could substitute something.

TM: Back in 1964, the permit system hadn't been even put in place at Bright Angel.

SB: The what?

TM: The permit system to camp there.

SB: Oh.

TM: I think it was just a first come, first serve.

SB: Yeah, it was.

TM: Then maybe it was in the late '60s they started a permit system for that. Did you have— You would have had to get permits then from the Park Service for the class.

SB: Yes, right.

TM: Were you able to use a special administrative permit for that because it was a scientific endeavor?

SB: I don't, I don't know that we had to make a special one. And we did we did make reservations each time with the Park Service. And for a while that was okay, but finally our, our number of geology students in physical and historical geology got so big that we'd take them down. They'd take the whole class— Well, the class is very big. You can't do it because eventually the Park Service put a limit of 10 people in a campground in a group.

TM: Or 11. Was it 11 or 10? I forget.

SB: Ten, I think we had to have 10. Maybe it was 10 plus a leader. I don't remember, but we were limited to ten students anyway.

TM: Right. Ten students would be students and leader, that's right, for 11. Yeah.

SB: So, how do we manage that? Well, I can remember a few times when we would spend— I would go down with the first group and a graduate student. He'd stay with them the second night, and then the third night we'd send the graduate student out with the students and send another graduate student with the second group—

TM: What a good idea!

SB: —and then the third group and one— A few times I did that with three groups. I just stayed down there, you know, for about, what, five or six days.

TM: So, you had your own permit for five nights or six nights.

SB: Yeah.

TM: And then they would come down on their permits. What great idea!

SB: It lasted for a while, but finally it just overwhelmed us, and we finally had to give up on doing that on a regular, required basis. We had to change our system, our geology class to some extent and do other things and try to get them into the Grand Canyon to see it, but not to go down and stay for two nights, because it got to be just too many. We had— You have 60 students in the class. You do 10 at a time, I mean, you got to do it six times. We couldn't do that. We couldn't— That was just too complicated.

TM: Or you'd have to have two teachers down there and then wheel all these groups down to them.

SB: Yeah. It was too, too much. One was enough. So, that would represent— I can't remember the exact time when that transition had to take place, but I know it was some years after we've been there. And then after we had about six, maybe six faculty members, we came back to the administration again and said, "Now we want to offer a master's degree in geology." I remember the committee that was listening to us when we got— We were— Well, to be sure we showed them, so we made it very convincing— okay, we got it. We got it. You got— You're okay. Yes, you can offer a master's degree.

TM: Wow. Just like that?

SB: Yeah. We had to get a permission from a faculty committee and president would have to approve it, which, of course, he did.

TM: Was Walkup still the president?

SB: Yes. He was for most of my career. He was the president.

TM: Okay. Do you remember roughly what year that was?

SB: No, I'm thinking it was after we'd been there, after I'd been there about, I want to say about seven years or eight. I can't say. I was there for 32 years, and I think by the seventh or eighth year is when we offered the master's degree and started—

TM: So, 1970-ish.

SB: Yeah, somewhere around there.

TM: '71. And then for the master's program, was that a class-based, or would the students have to write a paper?

SB: They had to do a thesis, a master's thesis of some kind.

TM: And that meant that you professors then had to come up with ideas for the kids.

SB: Right. Yep.

TM: What were some of the more enjoyable theses that you presented to students that they came away with with gold stars?

SB: Well, I know one of them, one of them worked on the fossils in the Bright Angel Shale, and another one on stratigraphy, that is, the layers that are present in the Grand Canyon at various levels. And there's something about their fossil locations or fossil occurrences, rather. And then their best locations and so on. And the others, you know, others began to do structural geology things: the structures in the Grand Canyon and how they formed, and lots of major faults and some folded beds in the Grand Canyon, and some that have been turned up pretty steeply, and so with lots of things like that. And I

wasn't involved in structural geology specifically so much, so I didn't do as much with that, but we did have people there who did. We had staff members who did by this time. And it really went very successfully from there on for quite a while.

TM: And I would imagine they could work on volcanology, if they wanted, as well.

SB: Yep.

TM: You mentioned oil, and I was thinking about the Aneth oilfields out by Mexican Hat and Bluff and that country out there. So, not too far away from Flagstaff, there's a whole amazing amount of geology to work on.

SB: There is. Yep, and most of the students did pick something that was close by but not always. Some of them picked something that was far away, somewhere. One of their professors had something in mind warranted it. They wanted to do it, they could do it, so—

TM: Like the Blue Hills and how you managed your PhD working on something far away, and it worked out.

SB: Yep.

TM: What else do you remember about the early days of teaching at NAU? And this was no computers.

SB: Yep. There were no computers.

TM: Chalkboards.

SB: Chalkboard. A lot of chalkboard and slides. We used, after a few years, we all have a lot of slides we could use and showing, you know, projections of slides, 35-millimeter slide projector.

TM: When did you start breaking away from just the typical Bright Angel Trail to the Bright Angel Campground and back? When did you start exploring more of the canyon?

SB: Well, when we were doing master's theses. I mean, some of the students came up with master's theses, you know. "We want to do such and such a canyon." We did the geology of a canyon, I'll tell you about one example later on, but—

TM: Okay.

SB: A number of the students would select an area in the Grand Canyon, away from the Grand, or away from the Bright Angel Trail, where it was accessible. And there were various places where they were. You could come down from the north or come down from the south, and so a number of students did that. And I helped compile a list of all of

the theses done in the Grand Canyon. Gus Kotera [phonetic], who was one of the faculty members who came later on, when he retired to move back east, he wrote me and said, "I want to submit a list of all of the master's theses done in the Grand Canyon by our students." So, he had me compile that list. As far as I could. He knew some of them, of course, and I did, too. And I tried to—I just went through and looked at all the records we had of master's theses in the Grand Canyon, asked some of the students who could help me. They could easily spot some of them for me. So, I'm assuming he submitted that to the library here. I don't know because I did never see it. But I sent him the list of all the ones I had. And that brings me now to this one student that really did get me going with things later on. George Billingsley. He grew up in a rural area in Arizona, came to the Grand Canyon just absolutely fascinated with geology but it had very little background in it in high school or very— And had to really struggle with his geology classes, but he was so enthusiastic about it. But he did pretty well, even though he had to struggle. He had to struggle just to pass the undergraduate courses. I just remember that when I was his advisor and he was struggling with some of these classes, and I remember I suggested some that he should take and some that he might not be need to take. And when he finished his undergraduate degree, then he wanted to go for a master's degree. He was really ambitious and so he selected Tuckup Canyon, which is one of the tributaries out in the central western Grand Canyon. So, he did a geologic map of the geology of Tuckup Canyon. And he took me with him in a few times because I was supervising his thesis. And it was pretty hairy. You could get down. You could start at the top and come down the canyon, but then you had to come back out, and that was not easy to do. It was possible, but it was not easy. We had some cliffs on the way out and so on.

TM: So, there's a road that goes out to a stock trail that goes down to that big lava flow, that big pan of basalt there, and then the main drainage is on, I think, the east side of that and then it winds its way down through the narrows of the Redwall, and then you got some cliffs, some repelling you might have to do there to get all the way down to the river. Did he go— So that whole area? And this would have been in the 1970s?

SB: [Indicates yes.]

TM: Okay. I bet getting permits was easy for that.

SB: Maybe 1980s when George Billingsley came along. But anyway, he did a good job with it. And it was really a struggle, but he did okay with it. And so, he got his master's degree, and then he managed to go to work for the Geological Survey as mapping in the Grand Canyon because that's what his whole thesis had been on, and he was good at it. He learned to be good at it. And so, and right about this time, and this would have been now in the— Let's see. Clear back to early—I don't want to say 19— Let's see, when did I finish? In the 1980s, anyway. In the early 1980s, in Tuckup Canyon, he had discovered, and other people had seen the same thing in a few other places, namely Eddie McKee, who was a longtime Grand Canyon geology study researcher and did much of his life there, the rock unit in the western Grand Canyon that was different than any others that we had seen, and it was, it was between the Redwall Limestone, which is a great cliff

former and the stairstep stacking red beds of the Supai above. This was in between them. It was between the two. Nobody had ever noticed it before because it was so darn hard to get to. You can't just go out there and look at it, you know. It's halfway down the Canyon wall, right on top of the Redwall Cliff.

TM: And to get to the top of the Redwall out there is hard.

SB: Yes, either way, you can go down or up. It's awfully steep. Well, George had been involved in it. He'd seen some of that in the Tuckup Canyon area. By this time, we knew enough about it that we needed to know something more because this, this outcrop is, in many cases, just a lens shape. I mean, here's the Supai right on top of the Redwall. And you come along, and all the sudden, here's a lens-shaped deposit. It's not Supai, and it is not Redwall.

TM: So, the deposit would only be where the Redwall had eroded away into a little dip or into a—

SB: Into a little valley or a canyon. Yep.

TM: And then that formation would be in that, and then the Supai would roll over the top of it.

SB: Right. Yep. And so, to get that meant that the sea level had to come up just enough to fill up those little depressions that were in there. And it would be level and then there would be an interruption for a while, and then the Supai comes in on top. But there were lots of them, it turned out. And so, one day we— George and I— But by this time, George was working with the Geological Survey, and so he could get helicopter help, which was marvelous, you know. So, we had, we had a helicopter come. There were four of us involved. George and I were one team, and then another couple of grad students were another team. We had them plunk us down in places where we had seen what appeared to be these lens-shaped outcrops and leave us all there overnight to look and see what we can find. The intent being is there enough here to really make something, make this a real study. And so—

TM: Do you remember roughly where they would leave you?

SB: Yeah.

TM: What were locations? Where did they drop you off?

SB: Well, near Tuckup Canyon, for one place. I know we were there. And a place farther out, all the way out, almost to the westernmost Grand Canyon. There was a place there where they put us down.

TM: I'm thinking Separation or Surprise or Tincanebits. All of that stuff out there.

SB: And this one out in the far west had a huge lens, several 100 feet thick. It had been eroded that deeply and then filled up with sediment in the Redwall Limestone, and then topped over by the Supai on top. So, apparently that had, you know, we did the interpretation we were beginning to see was that the Redwall Limestone was exposed for some time to erosion and erosion wore some valleys, stream valleys into it, and then the sea came in and flooded it and filled up the stream valleys and deposited limestone and sandstone and then— There were some fossils in there that had never been seen in the Grand Canyon before. They were not brand new to the world, but they were brand new to the Grand Canyon. Because it was a different age. It was a period that the people who really work on this carefully with the timing suggests it's about 10 million years in the time, for the time those valleys were cut until they were filled by these sediments.

TM: So, this would be an unconformity between the Supai above and the Redwall below where the geological erosion material would have filled up this area and then eroded down again. And then the Supai built up on top of that.

SB: Yeah. Yeah. And, of course, some of the Supai is non marine, you know, and some of it is marine, and so— But it covers all these things. And most of these U-shaped deposits, lens-shaped deposits were in the west, western Grand Canyon. They were thicker and thicker in the west. They got thinner and thinner as we came east. And finally they disappeared. And the eastern-most Grand Canyon, you don't see that much there. One or two places where you can see a little bit, a little bit of a tiny—

TM: Tiny. Okay.

SB: And so, then we figured, well, this is really a new formation. We've got to do something with it. What we're going to call it? Well, George was thinking about calling it the Shivwits Formation because it's out of the Shivwits Plateau, you know, where the big outcrops are. No, we don't want that.

TM: Why not?

SB: Well, I didn't, I didn't like Shivwits. Then we said, well, one of the finest outcrops we've seen that we have measured and looked at is in Surprise Canyon. It's been such a surprise, why don't we just name it the Surprise Formation? So, well, we tried that. Well, no, you can't do that because there's already a Surprise Formation in California. You can't duplicate formation names in the United States That would be confusing. So, we said, right, we'll call it to Surprise Canyon Formation with Surprise Canyon being the type section.

TM: Okay, so maybe that's where the helicopter took you out west was to Surprise Canyon.

SB: Yeah, at some point, it did. Yes. And see, that one helicopter trip was the one that really got us started with it, because he put the two of us down in different places. We stayed overnight. We looked at outcrops and— The idea was to come back tomorrow and

hopefully, hope helicopter could find us, remember where he put us. He did. Is it worth studying? And the answer was yes. There's lots to do there, and so we did, and so—

TM: Wow.

SB: George and I, essentially, both worked on that, he doing it from the Geologic Survey perspective when he could get to it. And once in a while he would get a helicopter on loan as part of his job, and he and I could go with the helicopter, say, “We want to go there. We know there's an outcrop there. We want to go measure it.” We couldn't get there without a long, long hike in and out, you know. The helicopter would just plunk us down there and pick us up two days later and take us home again.

TM: And this was in the 1980s?

SB: Yeah. We ended up with it— And it took several years for us to get it all together, of course. We finally published it in the Geological Survey publication, first giving it a name. And then later on we came back and did a thorough job and put together a whole— In fact, George actually got to meet a senior editor of this paper where it describes this about Surprise Formation. That was the most exciting research that I had ever done in my life in geology because every time we went out, you know, we'd find something new. Sometimes new fossils. Certainly a new outcrop.

TM: Fun. Very fun.

SB: It was really exciting. I mean, it's a fairly simple thing. It's not— It's just a little piece of the Grand Canyon history, but it's a piece that had been missed for all these years because it's so difficult to get to.

TM: That's right. That's right.

SB: Nobody had been able to see it and get back and talk about it.

TM: Right. So, George, in the 1970s, spent some time working on the river as a river guide.

SB: Yes, yes. That's what— That's where he first started working. Before he got working for the survey, he was working as a river guide.

TM: So, he finished his master's, and then he was working as a river guide.

SB: And his wife too. They were both river guides.

TM: Right.

SB: Yeah. They were both river guides in the summer.

TM: And they were big hikers, too. They were doing all kinds of hiking here and there.

SB: They were enthusiastic hikers. Yep.

TM: That's Susan, isn't it?

SB: Yes. Yeah.

TM: Gosh, we've been going almost an hour here.

SB: Have we?

TM: Yeah. Time's been flying right along here. Maybe this is a good time to put a comma in this interview series. Before we stop, though, I want to ask you what else do you remember about the Surprise Canyon Formation? Did you get your master's students, other students working on that as well with—

SB: George was the only one who worked on that specifically.

TM: Just George.

SB: Yeah. And he didn't just do that. He just did this— He did the geology of Tuckup Canyon, but there was Surprise Canyon in it.

TM: Okay. Do you remember what it was that attracted George to Tuckup? I mean, it is fascinating. There's volcanism out there.

SB: It's a very challenging place to get in and out of and one that where the geology wasn't known in detail down the Canyon. You could see it from the river. You could see it from above, but—

TM: There were some there were some historic mines out there, too. So, it's a pretty rich area in geology.

SB: Yes, it is. I don't know much about the mining part of it because I didn't get involved in that, but there were some mines out there that— Yep.

TM: Well, certainly just the volcanism alone. I mean there's a fairly fresh flow of that whole volcanic pan there in the big valley. And then off to the east, there's this little volcanic neck there on the east arm of Tuckup. I don't know if you remember that or not. So, it's an odd place out there. It's pretty neat.

SB: Yeah, I can't remember that specifically.

TM: Okay, nice. All right. Well, with that, this will conclude Part 3 of a Grand Canyon oral history interview with Stan Beus. Today is Monday, August 23, 2021. My name is Tom Martin. And Stan, thank you so very much.

SB: You bet. Thank you.