

Riparian Group Interview: Linda Ashkenas, Art McKee, Stan Gregory, Norm Anderson, George Lienkaemper, and Al Levno; by Max Geier, November 21, 1997; 8:30 am, Forestry Sciences Laboratory, Corvallis, Oregon. Transcription: Elizabeth Foster

Participants in this group interview represent a wide variety of disciplines and roles: stream ecologist Ashkenas, Forest Director and riparian ecologist McKee, stream ecologist Gregory, aquatic entomologist Anderson, geomorphologist Lienkaemper. This work took place at the forest-stream interface, blending understanding of landforms and physical processes, stream ecosystems, and influences of forest vegetation, including the near-stream shrub- and herb-dominated plant communities. Comments include history of the Stream Team on the OSU campus and research spanning the IBP and LTER periods.

Max Geier: What I wanted to do here is start out with kind of a general statement of how this group fits in with the rest of the project, and then ask each of you to introduce yourself to the transcriptionist, who needs to be able to identify your voices. First of all, this is the third in a series of small group discussions that are focusing on the history of the Andrews Forest. There was an earlier interview with a small watersheds group. That went really well. We also had a kind of conceptualizing the Andrews session up at the Andrews site. There will also be an IBP group interview that will follow this one. This group, as I understand it, will be focusing on aquatic research and riparian issues. So, we need to start off here, just kind of going clockwise, please introduce yourself and identify the time frame of your first involvement with aquatic and fisheries research at the Andrews, and your position or responsibilities at the time of your first involvement there, and your current activities or focuses.

Linda Ashkenas: I may not be able to remember all that, so you may have to prompt me. I started working in the [OSU] Department of Fisheries and Wildlife with Stan Gregory in 1984, and I think I had my first trip up to the Andrews that year, because I remember standing in Lookout Creek with Stan, Dave McIntire and Gary Lamberti, and various other people, and being totally over-awed by it. I think I started doing little bits of field work up there that year, but my full-time, more intense field-work up at the Andrews didn't really start until a year or two later on the riparian project with Art, Fred, Gordon and numerous other people, who were still involved. I am still involved in a variety of ongoing and up-coming projects, in and around the Andrews.

Art McKee: I started work at the Andrews the late winter of 1970, and was originally hired to do a lot terrestrial vegetation sampling, but there was a short-handedness in the early years of the IBP program. I was sent, kicking and screaming down the hill to the stream, to work with Jim Sedell, who was a freshly hired post-doc, and it turned out to be less painful than I thought.

Max Geier: I remember, when we were going through the workshop phase and someone mentioned something about Jim Sedell and how they enjoyed working with him, and just the disbelief around the room. (Laughter) I'm not sure what that is all about.

Stan Gregory: I started working in the Andrews in September of 1971, came out as a graduate student. And I arrived in Corvallis the same week as Jim Sedell. A really bad week for Corvallis. I went on to work with the U.S. Fish and Wildlife Service for about four or five years, but still maintained some projects in the Andrews, and then in 1981, I came back with the university and the "Stream Team" [semi-formally designated group of people around Corvallis interested in aquatic systems that meets weekly during the academic year] and we got the riparian grant and that went for about six or seven years, and then, when Ken Cummins left, I applied for his position and got into the Department of Fisheries and Wildlife [OSU]. And this is it.

Norm Anderson: From the Biology Department on campus [OSU]. My involvement in the H.J. Andrews project goes back before, well to the IBP days, and the infamous meeting at Pack Forest where there was supposedly a big tussle between the University of Washington and Oregon State University, because we're the site for much of the IBP work. Fortunately, Oregon State had one Jerry Franklin as a major spokesman, and I have been asked by Jim Hall to get into the records. He said, "Why are you guys so hung up on lakes?" (Laughter) I think Jerry might have been promoting the H.J. Andrews site for this thing, and I don't think at that time, his interest in the running water part was particularly well-developed. (Laughter) But, with Jim Hall and myself, and I think Jack Rothacher, the aquatic project was dreamed up. Then, it was a case of where was it going to be done. We first hired Cary Kerst, who first worked for streams on the Andrews and came up with Mack Creek as a site. In 1970-71, we started hiring post-docs. The first one of these was Jim Sedell. So, Jim Hall and I went on sabbatical; Jim to University of British Columbia, myself to the River Lab in Britain. When we came back we were working for Jim Sedell. (Chuckle) And a big mess. (Laughter)

George Lienkaemper: I started my first work in the Andrews in 1975. The summer of 1975, I was hired by Fred Swanson and Bob Beschta and Jim Sedell to catalog and describe log and trees. I started out in Mack Creek. Spent much of the summer in Mack Creek and Lookout Creek and took on logs for a couple of years, for a couple of summers. I was eventually hired on their River Continuum project. I worked with Jim Sedell and others for about a year-and-a-half when I was finally picked up by the Forest Service here [Corvallis]. I started in small watershed work. However, I've kept my hand in the log [large wood in streams] business over the years. But, most frequently with the somewhat annual visits to the log roundup [in Mack Creek] with Dan and Linda and Randy and various other draftees, usually in the fall. So, we maintain some touch with the logs, although most of my time now is spent at the computer terminal at the GIS shop [Geographic Information System Laboratory].

Linda Ashkenas: You have to understand, it's not just "in touch" with the logs. George has the incredible sense for where a log none of the rest of us can find, is. It is a very strong relationship.

Max Geier: Fall, or is there a particular season when that sort of work is done?

George Lienkaemper: Well, at the time of the year when we can seemingly all sort of clear our schedules enough to do it. The leaves have fallen so it's sometimes easier to find those logs, although, if they are covered with leaves, they are not as easy to find. But, it's a time when it is just easier to get around in and to get there.

Stan Gregory: It was always nice and warm. In the early '80's, when we started the log study, we were out there several times during the summer and fall, and we noticed there was a tendency to miss logs a lot during the summer. Then suddenly, when the leaves drop, we could find all these pieces of wood sticking out. So we moved it, and as George mentioned, it fits our schedules. And then through time, we noticed that if we had the third or fourth week of October, there is a good chance that the World Series was on, too, so in the evenings we would get come in and either listen to the World Series on the radio or go down to one of the taverns and watch it. Seems to reinforce research. (Laughter)

George Lienkaemper: There was a certain social attractiveness to all of this. It is the chance to get together that we don't necessarily often have. And you don't have to think particularly hard that week. It is a nice break.

Norm Anderson: Same kind of social attraction of chasing storms.

George Lienkaemper: That's correct.

Norm Anderson: Watershed.

Stan Gregory: So much. (Chuckle) That ended in three years, some of these things take longer to end than that one. It is amazing that it lasted three years.

Max Geier: When was that?

Stan Gregory: Oh, 1971 through '74. Actually, it was really '72 through '74, and it was part of the IBP study. We were trying to get an idea on carbon storage and transport, and one of the problems with stream systems is that most of it [carbon] moves during a storm. We were running Watershed 10 through a net, so we captured all of the particles that were flowing down the stream. But during storm flow, there is no way that we could build a net big enough that it would take it. So, you have to tend the net and change it and stuff, so everyone on the stream project, were assigned weekends that they were responsible to watch the net.

Norm Anderson: We got overtime pay. (Laughter)

(Everyone talking and laughing – dialogue unintelligible)

Stan Gregory: If it rained on the weekend, people had to head out. During the week, the crew would head out. Let's see, it was December of '72, might have been '73, that a storm came in

the end of November right after Thanksgiving. Jim Sedell was up there constantly and he was there through right around the 20th. We relieved him saying, "Jim, you got to at least go buy some Christmas presents for your family." He had a new baby at the time, but he refused to leave. He was going to be there. So, Vicki and I went up and we decided to spend Christmas up there tending the net, to be with Jim and help him out on Christmas, on the night before Christmas Eve. Suddenly, it opened up, we saw the stars for the first time in weeks, and he was able to get down to Christmas Eve with his family and the new baby. "Jim, you got to get out of here anyway." But, he knew he was a blithering idiot. Actually, I have a picture, I should drag it out: A blithering idiot at the time I snapped the picture of all of us playing cards. We were also playing cribbage. And we got through about four or five rounds before we realized that we were playing with a pinochle deck. (Laughter). We kept going whew, that wasn't very good.

George Lienkaemper: I think that having have been in association with the rainfall record over the years, I believe that particular month of December, it rained every day.

Art McKee: That was also when we were replacing the dams down at the settling basin, because of the old one being leaky. Ripped that one out one evening and started rebuilding the next day, we had a real big flow come in, and Jim and I were building this in hip boots. The water starts out ankle deep, was knee deep at noon time, and by mid-afternoon, it is coming in over the top of the hip waders. And.....

George Lienkaemper: Filling the dam. (Laughter)

Art McKee: Just had to get in there and do it.

George Lienkaemper: They were young then, and eager.

Art McKee: Well, those crazy times.

Linda Ashkenas: I know sometimes when we go trotting around now in our new gear, I wonder how we did all that winter work in rubber hip boots. Frozen legs.

Stan Gregory: I had mentioned this before in our earlier discussions, that in the early days we didn't have the lush facilities or the posh facilities we have now. There were two trailers. You have heard all about them. The trailer at Rainbow was where most university types would stay. So, we got up there for one of these winter samplings and it was a cold snap, so when we came in at night to the trailer, the pipes were frozen with no running water. So, we turned the heat on, and went ahead and went to bed. With the heat the pipes became unfrozen, and we didn't realize it, the facet was open but the sink was closed, so it overflowed, and for hours and hours. So, at about three o'clock-four o'clock in the morning someone got up to use the bathroom and there were several inches of water in the trailer. So Jim quickly jumped up and he was scurrying around, trying to figure out what to do. We opened the door trying to get it out and that wasn't getting all of it out, so he got a bit and brace, went to the far end of the trailer and drilled a hole

in the floor to drain the water out of the trailer. For years, we would go over there and lift the rug and there was still a cork in the hole.

Max Geier: I am just curious, about the short life span of this work compared to other projects. Is that because of the man-power involved?

Stan Gregory: Yeah, I mean, you can imagine you're in Corvallis, and every time it rains or a front comes in, you have to drive up to the Andrews. And sometimes a storm hits and sometimes it doesn't. So, you ended up spending a lot of time driving back-and-forth. It always seems that a storm came in on holidays, anniversaries, and in the middle of the night.

Norm Anderson: We didn't have a cell phone either.

Stan Gregory: Oh, no. (Chuckle) Nope. You just had to dash to the mountains.

Norm Anderson: I am going to say this on the storm-watch part. I wasn't probably available for all of the weekends that I was supposed to be.

Stan Gregory: Well, you were up there.

Norm Anderson: I was up, but I won't claim to have been there as often as the post-docs and the grad students.

George Lienkaemper: One of the other things that happened when Watershed 10 was harvested, the quality of the type of research began to change a little bit. The truth is, it wouldn't matter how many people you had up there after the harvest. They were still hauling sediment and organic matter out by the wheel barrow load. Winter storms would come in strong.

Max Geier: As I understood it, this was volunteers, or the group?

Stan Gregory: The group's always kind of worked that way. You have a task and you don't worry about who has assigned responsibility. You do it.

Max Geier: So, the decision to end would be a combination of a lack of enthusiasm to continue it, and the research problems?

Stan Gregory: Funding mainly, the program coming to an end so you have to wrap things up.

Art McKee: Well, there are also two pretty complete years' worth of data to give a sense of the total output. It was pretty easy to estimate.

George Lienkaemper: I think that some of the technology changed as well. The settling basin itself was concrete. Was that done before the – ?

Art McKee: -- That was done in the summer of '72, and the reason that Jim and I rebuilt the dam is that the first dam we put in there was a sieve and it leaked terribly, and we had to knock it out and start over again.

Stan Gregory: This was trying to get everything down to about half a micron during most, no not a micron, we had what, 500 microns on that? Down to 500 microns. We would even have finer mesh so the settling basin gets coarse material, but it doesn't get the really fine materials.

Max Geier: How have fisheries and riparian structures changed since the time you first arrived at the Andrews?

Norm Anderson: I think the best summary of it is that it has evolved, from independent contractors, where there was quite a lot of cooperation between personnel working on the different projects, to a better, much more landscape or whole watershed view. The really nice thing about the whole project is that it has continued for maybe 30 years. It is essentially the legacy, the memory that continues. What you're doing as far as tying up a lot of observations, maybe getting at some of the truth. (Chuckle) But seeing the evolution from, say, independent projects, and in my own case, as in a lot of other cases, extreme naivete to start with, as to what these interactions really are.

Stan Gregory: That period Norm mentioned, 1969-1970, was a real landmark in the aquatic studies in the Andrews, because there had been stream studies in the 1950s. [Bruce] Wyatt and [Donald] Wustenburg, two graduate students from the Department of Fisheries and Wildlife [OSU], did studies on the fish population and the effects of logging or timber harvest on the fish population [Theses completed in 1959 and 1954, respectively]. It was those records that were some of the earliest studies of the direct effects of logging on fish in the West and the Northwest, but those were just individual projects. They weren't tied into much of anything else. But, it wasn't really until the watershed studies that there were more water chemistry, sediment studies, that kind of thing. It wasn't until they started IBP in which they were trying to represent the ecosystems present within those watersheds that they turned to Norm and Jim Hall and Jack Lyford to put together the aquatic program that was really the start of any kind of coordinated aquatic studies. So, they deserve the blame.

Norm Anderson: Jack Donaldson should be mentioned.

Stan Gregory: And Jack, yeah.

Norm Anderson: Because he was essentially in charge of a lot of this when Jim Hall and I were away for a couple of years.

Stan Gregory: It is interesting, when I first arrived in the fall of '71, there was an intense argument going on between some of the aquatic types and Jerry [Franklin]. There was an interest in having the aquatic research go in the McDonald-Dunn Forest or in the [Willamette]

valley here, a little bit closer to campus, and that a two-hour drive or hour and 45-minute drive to the Andrews was viewed as eating up a lot of valuable research time. We could do something closer. That debate went back-and-forth, and I was not part of the decision, but I kept getting rumors from Jim [Hall] and Jim [Sedell] and Norm [Anderson], about how the discussions were going. I'm not sure, actually, at what moment it was finally decided once and for all, that it was going to be up in the Andrews. I think, in the long run, it was a very fortunate decision, but --

Norm Anderson: It wasn't just the aquatic research interests which were bothered by that two-hour commute. Mike [Newton?] was heavily involved with the program at that time, and to Mike, the idea of driving two hours for a stupid --

Art McKee: Mike was involved?

Norm Anderson: Oh yeah.

Art McKee: I couldn't really remember Mike being --

Norm Anderson: Mike and Scott [Overton] were. Scott was leading the charge in modeling.

Stan Gregory: And here Scott was, and here Mike was. Mike began to back away when he realized it wasn't going to be possible to work in the woods locally. The decision just took on far too great importance than we ever would have imagined. It was very, very needed.

Art McKee: I think, when you mention these things being very important, this is kind of one aspect of what brought the aquatic people together, what it was to be a team.

Stan Gregory: Yeah, I remember Jim talking about the drive between Corvallis and Seattle, and the troops would leave here in the van driving north with no real consensus as to whether the aquatic components were all that important or not. Jim would say repeatedly, "We're the best stuff you got." (Laughter) He still says it, and he is right. Basically, when you look at it, we're the big story, with the possible exception of the overall story of the old-growth forests. You look at the program itself, the Andrews, the aquatic efforts most dramatically made advances in science and policy. A lot of times terrestrial findings flowed into the aquatic story. But the terrestrial folks supported the aquatic programs from the time that I have been here. The aquatic research programs always been a really important part of the overall effort at the Andrews. It has evolved, as Norm said, to incorporate more attention toward forest-aquatic interaction and to move up in scale considerations. But, I think what set the group here apart from other similar research programs I have been involved in, is there is, in addition to the attention being paid to mass fluxes such as the carbon coming out of Watershed 10 or the hydrology itself, there has always been an intent to look at the biology of the streams and the communities there, and understand how the aquatic ecosystem works as a biological entity and ecological entity, not just as a transport mechanism for sediment, nutrients, and so on. An awful lot of places in the country tend to focus on one aspect or the other. This group has had a really good balance between the two.

George Lienkaemper: Just to add on to that, my inclusion with the Stream Team in general stems from an understanding of the importance of the physical templates and the physical processes that were going on in the stream as well. Fred Swanson's work, and hopefully, the work that I did, was embraced by the stream group and has given that some importance. I think that's a good move on Swanson's part. (Laughter)

Stan Gregory: It will be interesting to see if people would differ around this, but one of the best things about the group of people that have been on the Stream Team, is that they are very accepting of people and ideas, and so, if you got an idea and it seems like you've got the drive to carry it through, even if they don't agree, they will give you a shot at it. And give it visibility, so no one gets shut down, no one wants to keep everyone else kind of shut down. And I think that allowed a lot of things to come up and have their moment when people were paying attention to it and have their influence, and then, it shifts and changes. Norm said, the program has evolved. Part of it is that certain things have their moment in the sun, but a lot of things are always cooking behind the scenes. And very few times can I think of negative personal interactions where people became contentious and people were told they couldn't do certain kinds of research. If you want to make it happen, make it happen. As a result, we have been able to get the best and brightest of a lot of different people. Norm mentioned that he and Jim [Hall] returned to find Jim Sedell leading the charge. And they could have done what is the very human thing, take the leadership role back, to set an example, (laughter), but Jim was not too territorial.

Max Geier: The origins of the aquatic team would have been the term aquatic team from back in the start of the '80's, or IBP? Is that when the Stream Team came in or is there more?

Norm Anderson: Ah....

Stan Gregory: Right around '72, '73.

Norm Anderson: I would say it was probably the time you were showing up to do aquatic entomology, and I wasn't here.

Stan Gregory: One of the things I missed out on was getting the direct classroom experience under Norm. I learned a lot about aquatic entomology from Norm over the years in his office and in the field, but I missed his class and he had one of his graduate students teaching it.

Norm Anderson: I really think with Sedell, Triska, Barb Buckley, and Lin Roberts, that was about the time that we started calling it the Stream Team [mid/late 1970s].

Stan Gregory: I think it had been bubbling around occasionally as the "stream team, then, with the start of the River Continuum project there was a workshop was held at Stroud Water Research Center in Pennsylvania to select one method for measuring primary production in streams in the project. I'd been asked to go back to it, and use the chambers that would be used

in Mack Creek. So, I put together a t-shirt at the OSU Bookstore. They printed photos or letters on the shirts, so I put "PR > 1" on the front of it. For the back of it, I found a picture of an ugly bunch of cowboys, and so I put that on the back of it, and above that I put, "Stream Team." That kind of solidified what had been bubbling for the last couple of years. We just started calling it Stream Team.

Norm Anderson: And it got into the OSU staff directory.

Linda Ashkenas: Yeah, it did.

Stan Gregory: Actually, that is a very good point, you know, once things get institutionalized it is usually all downhill from there. The "Monday Morning Meetings" and all the other things that have endured, and the Stream Team has not been institutionalized, no one is required – [to attend]

Norm Anderson: No, I think that is really, really important. It is what's informal and such, and it kept going. (Chuckle)

Linda Ashkenas: It's been a struggle in some ways to keep it informal.

Stan Gregory: Yep.

Linda Ashkenas: It really has been hard. I mean, when I see people, especially grad students, slaving away over slides for their Monday morning meeting. Now we only frown on slides. You should do overheads. It is meant to be informal. This isn't a presentation to the National Academy of Sciences.

Stan Gregory: Yeah, these are intended to be informal briefing sessions started from these meetings, to get the week organized, and to say who was going up to the Andrews and who wasn't. And particularly, the grad students would present their research proposal to the gurus, and get their approval and disapproval, and then someone would come in and give us an informal talk. We actually had it in a small corner room in the main office in [OSU Dept.] of Fisheries and Wildlife, and we could all fit in there. They were extremely informal. At one point, in fact, that was back in the days that Norm smoked a pipe, so we would always put him next to the window and open the window. So, Sedell, Triska and myself, one day we all came in with squirt guns lined up, and so as soon as Norm got out his pipe we all went [sound of squirting water] and doused his pipe with our squirt guns.

Norm Anderson: It is amazing that we're still alive (laughter) after smoking and all this second-hand smoke that you people endured.

(Several in group agree)

Stan Gregory: One of these days you're going to feel real good.

Norm Anderson: One of these days I am going to apologize.

(Group laughter)

Stan Gregory: I doubt it. Keep working on that thought. (Laughter)

Norm Anderson: Anti-smoking from the start.

Linda Ashkenas: You ought to hear Stan pick on this one grad student of his. He's a start-again, stop-again smoker.

Stan Gregory: He's been starting lately.

Linda Ashkenas: He's been starting lately.

Norm Anderson: Speaking of these Monday morning meetings and all that you have been listening to, this has been extremely valuable to my students. To be able to give talks at those, because part of our department has instilled a requirement of giving your masters or your doctoral thesis proposals or these things to the whole department, and the whole department never shows up for it when the students are going to do these things. In the aquatic line, we have always had an audience of interested people because of this kind of interaction.

Stan Gregory: Yeah, it's great for the students because, like Linda points out, it wasn't as imposing. It does scare you, and I remember being scared in the early days getting ready to present things to Norm and Jim Hall, sure they were going to chew me up and spit me out. I would be in there all night getting big overheads ready for this talk. So, it's good even though it intimidates. It's not a negative event and it's not really that high pressure. It is informal, so that they can go through the paces and find out, hey, I can do a good job and get positive feedback and, this isn't as bad as I thought it was going to be.

Norm Anderson: And more importantly, defend their own ideas.

Stan Gregory: Yes, defend your own ideas.

Art McKee: It's informal and small enough that we get an interaction, not just a question and answer period.

Stan Gregory: It is funny, most of them go smoothly, but occasionally you get one where someone thinks an idea is just bullshit. Wait a minute, I don't believe that at all. Someone may start criticizing or questioning it sharply, and people will watch that and let it go for a bit. But, if it looks like it's getting too negative or the student or the person might be walking away from this a little bit ripped apart, other people start coming in and kind of defending and supporting, and so I have never seen anyone just get ripped to shreds and left in pieces. Someone always

becomes their champion, if they feel like they are getting picked on. That is a nice safety net that's there.

Max Geier: You said this is informal. How do people get placed on the program?

Linda Ashkenas: Usually they get badgered by somebody.

Norm Anderson: Arm twisted. (Laughter)

Stan Gregory: Arm twisting with about one in ten being a volunteer.

Linda Ashkenas: We do get volunteers and it's helpful to have them.

Max Geier: Just a clarification question here. You were talking about this earlier battle to not go down to the Andrews. Were there other places that were directly in contention at that point, or what were the decision points?

Stan Gregory: Alsea was certainly one of the names that came up repeatedly.

Norm Anderson: But a lot of people wanted to do their own research under the umbrella of the IBP grant on independent plots.

Stan Gregory: I have always been surprised that it didn't end up over in the Alsea watersheds. Those were in the waning years of the Alsea watershed study [started in 1959], and I am surprised it didn't land on those three watersheds.

Art McKee: I think it a lot of that [reason for it not happening] is that it was private land.

Max Geier: As opposed to the public land administration of the Andrews.

Art McKee: It was a strong site, but tragedy struck them out. It was more of a cattle problem and a lot of other things.

George Lienkaemper: The Forest Service had done quite a bit of background of work that the university was in no-how.

Norm Anderson: They just had four watershed studies. Watershed 10 was the latest study. There is no question, but the forest [was the dominant focus]. Frankly, just walking around Flynn Creek, and over there was tough.

Linda Ashkenas: It was the salmon [that attracted the aquatic researchers], is that what you are trying to say?

Norm Anderson: The boomer holes to fall into and disappear into, and things like that.

Stan Gregory: I don't think you can really address the history of the Andrews and success of the program without recognizing that very strong, I would suggest, really great leadership of three people: Jerry Franklin, Dick Waring, and Fred Swanson. They have been the leaders that have held things together and called for action when there has been a crisis, and they each have different, drastically different, leadership styles; not one of them is the same. Each of them in their own way, really, if they have a commitment, if they have an idea, they stick to it and it is tough to move them away from it. I think their leadership has been a key, and so when you get people like Jerry, champion of the Andrews, you are going to have to have a hell of an argument to move him away from it. Even the tension between Jerry's approach to science and Dick Waring's approach to science, in the early days of the '70's, is really what stimulated things in the Andrews. It was a very healthy tension between experimental controlled-approaches, versus large scale looking at pattern and process. You see reflections of both of those in the program, still to this very day.

Art McKee: The initial emphasis on modeling, I guess, was needed in the grant-writing part, is something that the Stream Team seemed to avoid by going to conceptual models as opposed to the mathematical aspects, and somehow it seems to have made it easier to have cooperation.

Max Geier: Is there an example of that?

Art McKee: A fair bit of the emphasis or interest in natural history and biology has been incorporated into the overall scheme of things. And the conceptual model I'm referring to is the eventual interaction of the terrestrial and the aquatic systems, and maybe going as far as possible with feedback loops and with invertebrates up to the fish.

Stan Gregory: Was the conceptual model ever quantified?

Art McKee: Yep, yep.

Norm Anderson: Another aspect that I think is peripheral, but also central, is that the Stream Team stayed together so much because of the Mount St. Helens eruption, that all the same people that worked on the Andrews at the time of the Mount St. Helens eruption, were able to get together and get money for research up there, essentially carrying on the same big program back at the Andrews. And there is really where Fred Swanson really came into leadership along with Jerry. I sometimes wonder if Jim Sedell caused the eruption, so he would have something to do with the forestry people. You begin to worry when you see Jim getting bored. (Chuckle)

Max Geier: Could you give me a time line or development of the conceptual model, and how it evolved?

Stan Gregory: It kind of grew out of ideas right around the mid '70's. A fellow named Robin Vannote had some ideas. He had been reading some of the geomorphic literature and liked their way of looking at streams as a continuum, so a bunch of stream ecologists got together,

Jim Sedell, Ken Cummins, Wayne Minshall, and Robin. They started discussing this idea that could end up in a proposal to the NSF, to compare streams across the United States, and try to start to develop some of Robin's ideas about applying a few geomorphic principles. In some ways, you know the rift continued, and the leader gets attacked as being wrong or gets attacked as being painfully obvious. Tough to be both at the same time. (Chuckle)

Art McKee: Painfully, obviously, wrong. (Laughter)

Stan Gregory: But, I do think that it was important that, like Norm says, conceptually you recognize the strong influence of the interaction with the terrestrial landscape, and there is a highly probable nature of that interface as you go from small streams to large rivers. It's likely that your ecosystems are going to change along that gradient. So, it's a nice concept. It would get so complex if you tried to quantify it, that it would crash. On the other hand, I would suggest that the Stream Team hasn't been anti-modeling. We just use it where it works and don't feel the need to model everything that we do. So, Dave McIntire developed an excellent stream ecosystem model that is up on the web now.

Linda Ashkenas: And Donna's models.

Stan Gregory: Donna's [D'Angelo] models. We have had small bits and pieces of other models. It's that adapting the research to the situation, as opposed to having one trick that we try to apply in all situations. The other thing, the River Continuum people did get caught up in this somewhat, and modeling people tend to find themselves forced into, is if you produce either a controversial concept or model, then you are at the stage that it will be attacked and criticized, and then, even if you don't want to defend it, you usually get dragged into defending it and large portions of your time are spent defending something that was in the past. So, you can't keep moving. Maybe our ideas haven't been that controversial or we haven't used that many models, but we haven't had to get into defending the research and controversies too much.

Art McKee: I think it is a matter of perspective.

George Lienkaemper: One legacy of the River Continuum is it brought people like Ken Cummins to the Stream Team, and work on the Andrews brought some fresh people in, and new ideas, I guess. The legacy persisted for a while. People have moved on, but certainly their work is embodied in the larger work in the Andrews.

Stan Gregory: There was an interesting eight-year period, like George says, from the River Continuum days right around '75, up through into the mid '80's, at about '85, '86, in which a large number of people came through the program, either as leaders like Ken Cummins, post-docs like Milt and Amy Ward, and then, graduate students like Cliff Dahm, Chuck Hawkins, and Nick Auman. I'm sure I'm forgetting someone, but all these people have gone on to other universities and other programs, and are playing major roles nationally in stream ecology. It was just really rich in those days. To be honest, when I took the position that Ken vacated in '86, you know, things have happened since then. We have had people in the program, but never the

richness in that ten-year period. Bob Naiman was a post-doc on the River Continuum, Dale McCullough was a grad student and a technician in those days. It was so rich that I look back and I look at my program now, I must have really dropped the ball here, because it was so great, then. We've got great people right now, but not nearly the number, the richness that it looks like looking back.

Art McKee: Just as I said, being a victim of your own success, that the people were included they needed for that job. People like Triska that work such wide backgrounds, from microbiology to fish.

Stan Gregory: Yeah, there are microbial ecologists, chemists, bug types, fish people.

Norm Anderson: But, the one real central paradigm that comes out of the Stream Team was the effects of forests on streams, and a lot of that is because of the fortunate nature of being in an old-growth forest, having an old-growth forest to work in. To me, that is one of the big legacies, it's role in so many different directions. And there are not many places in the world you can do that.

Max Geier: You were talking about the people who kind of came into the early continuum era phase, then, kind of moved on. I was talking to Tim Schowalter the other day, and he used the phrase the "Georgia Mafia" as when people moved into the Georgia LTER program, and they've gone on to be leaders. He was suggesting that the Andrews wasn't in that kind of category, that there were few people that came out of the Andrews to go into other areas of leadership.

Norm Anderson: That's maybe the case in terrestrial, but you look at aquatics and they all came through here.

Linda Ashkenas: When we had that nitrogen-fixation meeting back at Coweeta [LTER site with its academic side based at Univ. of Georgia] a couple of years ago, it was amazing the number of people from the aquatic program, right here. I mean, I am sort of a Johnny-come-lately to the stream ecology community. We are now a leading LTER or equivalent site program.

Max Geier: So, this group is in a leadership position in this kind of research?

Stan Gregory: Georgia has a very strong and excellent program led by Judy Meyer and Bruce Wallace.

Norm Anderson: And Jack Webster.

Stan Gregory: Yep.

Norm Anderson: He had ties here.

Linda Ashkenas: Very strong.

Stan Gregory: We have always had strong relationships with students, back and forth. Art came out of the Georgia program for a while. They have a great program, no denying it.

Art McKee: And then the other ones include Alabama.

Stan Gregory: Yep, Alabama has a good, a really nice program with the Wards who were here, and Art Benke, and Bob Wetzel, and Keller Suberkropp.

Linda Ashkenas: In New Mexico.

Stan Gregory: And Cliff Dahm down in the New Mexico LTER program has been one of its major players. He did his graduate work in the stream team. And Nancy Grimm, I think we had input to her career; I don't think it was as strong as it was for some of these other people. But, Nancy, who's at Arizona State right now, is developing the new urban LTER site down there for Phoenix. She came through here as an undergrad working on her senior thesis out of Hampshire College. Chuck Hawkins at Utah State has an excellent program with Todd Crowl. Chuck was one of Norm's graduate students.

Linda Ashkenas: And Wayne Wurtsbaugh. He came out of Davis [Univ of Cal.]

Stan Gregory: And the Colorado State program, particularly in fisheries and aquatic ecology, and then they have a good terrestrial program, but have never connected.

Linda Ashkenas: That is because their LTER site doesn't have any water on it.

Stan Gregory: Yeah, but sooner or later someone makes a connection somewhere.

Art McKee: There is total polarization when you're on a campus with major turf wars, and the competing ecology labs at Colorado State.

Stan Gregory: And then, University of Washington is the major ecosystem research center in the U.S. right now. But they are having institutional problems where the leaders are kind of at odds with the administrators, the scientific community is at odds with the administrators, and so we [Andrews program] have several people from the program down here, interested in aquatics and that are up there now caught up in these battles; Jerry Franklin, from the terrestrial side, and Bob Naiman, on the aquatic side. Actually, there is another wing of the stream team in the South Florida Water Management District, and its major regional program dealing with landscape-level management, particularly rivers and lakes. Nick Aumen, who was a graduate student here [OSU] working on large wood and microbial ecology, is now head of that research program for the South Fork Florida Management District, and also, Al Steinman, a student we had in our plant-herbivore work here, really great scientist-students. There's actually the recent coordinator under Nick Aumen, and then Peggy Wilzbach, has some contracts through one of the institutions to work there, so there are four Stream Team members down there running the South Florida program.

Linda Ashkenas: Gary Lamberti.

Stan Gregory: The river restoration project that gets a lot of national press, is a project of the South Florida Water Management District. Gary is at the University of Notre Dame now. These aren't obviously all of the aquatic programs around the country, but I think we have people in a lot of different programs. This guy, Dave Gallat, was a strong influence on people who came through in a variety of roles. Dave was a technician with us for several years, and now he is one of the major players in the Mississippi River flood-plains research program. Dale McCullough was a research assistant with us for years, and now he is one of the major leaders in the Columbia River Inter-Tribal Council. So, I think people have been influenced and have influenced us in a lot of different ways. It's not just say you train someone and then go out and do things.

End Side A, Tape 1 (of 1)

Begin Side B, Tape 1 (of 1)

Norm Anderson: Walking over here, I was talking with Stan and he admitted that I had sent him my version of the early days' history of the Andrews Stream Team project, a two to three-page copy of that. So, if you get on him, maybe you'll get a copy.

Linda Ashkenas: Another problem.

Stan Gregory: I'll see if I can dig it out. I also had some of Cary Kerst's early notes on Mack Creek, its characteristics and how appropriate it would be as a study site.

Max Geier: Yeah, that would be real helpful.

Art McKee: Fish population?

Stan Gregory: Mack Creek in '72. Howard Horton had actually worked up in Mack Creek in the '60's, but didn't have any population estimates and didn't take any samples. I'm not sure what he did. But there are some crude population estimates in Lookout Creek and lower Mack Creek.

Al Levno: Also, some from right above the Blue River falls?

Stan Gregory: No fish sampling there that I know of. I didn't think that sampling went that far down. There was a photograph of the falls. There is a waterfall that was a partial barrier for spring Chinook. They came up in the Andrews occasionally, but when they put in Blue River Reservoir, it inundated the falls and blocked fish passage. So, Chinook couldn't get up there anymore. But it used to be within the range of spring Chinook.

Max Geier: Roy Silen talks about fish studies in Lookout Creek, and clipping the fins and throwing the fish over the net.

Stan Gregory: Right. That also could have been cutthroat and rainbow trout.

Max Geier: Okay.

Stan Gregory: And there are photographs in the archives, and then, Jim Hall came up with a new batch recently that we gave to AI for the archives. It's got some pictures of different things back to the '60's. I want to think about Cary's notes about on-site collections maybe.

Max Geier: I wanted to ask if you would like to characterize the River Continuum conceptual model and some of the spin-offs from that. What probable kinds of inquiries or models for inquiries arise from it? Who's providing these kinds of questions that were the basis for modeling efforts? What drives the kinds of questions that researchers are posing?

Norm Anderson: A lot of it is coming up with the storyline that will be funded, in putting your overall ideas onto some sort of framework that can get funding. That is what quite a lot of these workshops and discussions with people across the country have done. Funding comes about because you need to test an idea.

Max Geier: So, if you're looking for a niche for yourself, you look for a way to define a problem that would allow you to get a grant. Is that what this is about?

Norm Anderson: Also to tie your expertise in with several others.

Stan Gregory: I think we get stimulated when we get put on the spot to come up the kinds of storylines, as Norm put it. It can be that we have to give a paper at a meeting. So, you start looking at your research and so you come up with a new hypothesis or a new concept emerging from your research. If that is compelling enough, you think, oh boy, we could chase this down experimentally or do research, and it becomes the nucleus for the next research proposal. But, you really have to refine it and shore it up so it could withstand the review and be successful. Having done that, you get your results and you go back out on the circuit presenting at national meetings and doing things like that. To put those pieces together, you have to not only explain the results that you got from your previous research, but you've got to come up with what this means, what are the implications, what are the new questions that emerge from this. So even in writing up the papers and presenting at meetings, all of these things, they force you simplify the story. What does it mean? Okay, there's the story-line, but what are the implications? And, if it has fairly profound implications, you better be able to back it up by future research or people will conclude that doesn't make any sense.

Max Geier: Can you give me an example from experimental efforts that show that?

Stan Gregory: Let's see. The large woody debris story would be a perfect example, for instance. My memory of the history, is that in the IBP days, we were trying to figure out how these stream ecosystems worked, and there was a lot of emphasis in those days on the storage and flux of carbon as a common denominator of ecosystems. So, there was a lot of looking at the standing

crop carbon and the transport of carbon, and at the same time people like Norman [Anderson], Jim [Sedell] and others, were trying to do this. Hank Froehlich [OSU forest engineer] happened to be looking at landslides and debris flows and the role of logging slash in precipitating these events, particularly in small streams after a logging show where logging slash was piled in the channel. He thought the stream would pond up and flush out the slash, so he started developing ways to measure the amount of slash left behind in the stream after the logging operations. And he suddenly realized, "There is slash left behind by logging operations, and there is stuff that was there before." So, he started just making the distinction himself, but he was still looking at it totally from a logging operations point-of-view. Then Jim Sedell caught one of his presentations and said, "Could you show us how to make these measurements?" Jim actually drug Hank out to Mack Creek, they got down in the creek, and Hank showed him how to measure the amount of wood. From that, Jim and others started kicking around the idea that there is a lot of wood here, and they started developing ways of measuring that and measuring the biological activity on it, like Norm [Anderson] with insects associated with the large wood. So, you put together a story like this and instantly, a lot of people said, "Wait a minute. This is just an artifact of the old growth in Mack Creek, and this doesn't apply to our stream." In responding to that, you say, "Okay, to what degree it does that make a difference," and you start getting measurements in the Smokies and measurements in the Hearts Content [a stand of remnant old forest in Pennsylvania], and measurements around the world.

Norm Anderson: Yeah, certainly Georgia [Stream ecologists] and such got into this, and found that so much of their secondary production was due to things living on the wood.

Stan Gregory: Yeah, in these sand-bedded streams.

Norm Anderson: Harvesting stuff from everywhere else.

Stan Gregory: They would be studying shifting, sand-bedded streams, and most of their bug production and so forth, was off of the wood, the snags. The whole idea kind of grew. I take that as one of our enjoyable successes in that the terrestrial types around here started saying, "Well, we've got [dead] wood, too – large wood on the forests floor." Finding it was important there.

Norm Anderson: They wrote a review paper, and then they asked the aquatic people to --

Stan Gregory: And we pitched in.

Norm Anderson: There was a meeting on campus here [Logging Debris in Streams Workshop] where Sedell and Triska and such made a big pitch, but to the logging outfits.

George Lienkaemper: In '75.

Stan Gregory: Over in Cordley Hall. [Wilkinson Hall]

Norm Anderson: That's really a big one as far as changing views. The poor logging industry had been told that they had to have streams clean, and then they were told, "Leave the stuff in." They just threw up their hands. What do you do?

Max Geier: Who talked at that meeting?

(Several people answered): Jim Sedell, Jim Hall, George Brown.

George Lienkaemper: I think it was the college.

Linda Ashkenas and Stan Gregory: College of Forestry [Organized by George Brown of the OSU College of Forestry]

Norm Anderson: That's definitely a highlight, I think, of what came out of research.

Stan Gregory: It was kind of set up, how do we manage this problem of wood and slash and logging operations, and then suddenly, there were a couple of papers that said, "Hey, this isn't all bad - it does some good things," and it caught everyone by surprise. Gene Likens from Hubbard Brook was in town and caught a piece of the story from the discussion of wood in streams, and went back and got a graduate student, Bob Bilby, working on wood in Hubbard Brook streams. Actually, Bob is out here and working with Weyerhaeuser, and is a regional leader in application of that work. Actually, that is one of the real interesting sides of the wood story; not just it's research and how the concepts come about and get extended and tested and pushed around, but the way it also leads into land management, because it suddenly became an issue in how you manage the stream-side zone, not just for shade. Typically, things have been focused how well you anchored the banks and how well you shade for fish. And that was pretty much it. If you could provide bank stability and shade, it wasn't an issue. But, suddenly this new view says, "Hey, you're putting in wood and because the trees so grow tall and they could come from quite a ways away from the creek, and not just this little edge that could shade the creek." This thinking suddenly pushed back riparian management quite a ways up the slope [literally and conceptually].

Art McKee: "Streams need merchantable timber, too." [Quote from Jim Sedell]

Stan Gregory: Right. In the early days when they started recognizing they needed buffer strips, they said, "Okay, we'll take the merchantable timber and we'll try to leave everything standing that we can that isn't merchantable." The point was, "No, it's not just the small stuff; it's the big stuff that's critical." So, you've got to leave merchantable timber, and that was heresy in the late '70's. You can follow the influence of such thinking about large wood all the way up to the Northwest Forest Plan. This idea of leaving buffer strips with widths of two potential tree heights emerged. Buffer strips of one site-potential tree height is intended to cover an influence of wood that you can defend from a pure aquatic point-of-view. If you go to two site-potential tree height as the width of the riparian zone buffer, then you are getting into issues of wildlife communities and micro-climate and plant communities and stuff.

Norm Anderson: Even have to take a terrestrial view of things.

Stan Gregory: Begrudgingly, you will admit that is true. It is interesting as other people around the world look at the Northwest and what's coming, there is a big question emerging. It's just like being back in the '70's again. Well, wait a minute, do the processes associated with large wood that are being described in the Northwest and are the basis for all these management strategies that are coming out; do they apply in our system? Do the riparian zones work that way here? And does wood function that way here? In the Southeast the Forest Service is getting a lot of resistance right now, saying you can't just take these concepts out of the Northwest and plop them in the Southeast. They don't make any sense, wood doesn't do this here.

George Lienkaemper: It is very interesting. I recently received a message from a graduate student at the University of Tennessee, who had come across some reference to published data that Stan and I collected in 1977 in the Great Smoky Mountains. He might not of been alive when we were collecting those data. But he was back in the Smokies collecting wood data and was interested in comparing it to what we observed.

Norm Anderson: He had some historical record. [Laughter]

Stan Gregory: We are even seeing lots of interest right now, and we are working with people like Angela Gurnell and Geoff Petts in England, who are interested in asking the question about how should we manage large wood in British streams where it has been removed for centuries, where riparian zones have been limited to one- to three-meter wide buffers, at best. That's a riparian buffer. They were very proud they got farmers to leave a three-meter buffer. They are asking questions about what role would big wood play in British streams and rivers and what is possible in future landscapes. So, it's kind of cool to see Mack Creek suddenly landing up in the "New Forestry" in England.

Norm Anderson: And the other thing I think that came out of it that tied in with the wood story, is the historical work Jim and Judy Froggatt did on the amount of wood that was in the Willamette River. That is a sort of a direct legacy of the H.J. Andrews.

Linda Ashkenas: You mean, that is why I spent a large portion of my life in murky archives?

Stan Gregory: Yep.

Linda Ashkenas: And Mack Creek?

Stan Gregory: You aren't allergic to a little mildew spores are you?

Linda Ashkenas: Yeah, I am. (Chuckle)

Max Geier: You're continuing that?

Stan Gregory: Right.

Linda Ashkenas: The historical twist that Norm is talking about has sort of carried over out of the Andrews and into the Willamette basin as a whole, and particularly the main-stem Willamette River; by Jim Sedell and Judy Froggatt and a few other people.

Stan Gregory: Karen Luchessa.

Linda Ashkenas: Jim and Karen Luchessa were the ones who really started this idea that historical data had some value in looking at where we are now. Stan brought it around to point out that it can help us determine where we were going to be in the future. So, we do historical reconstruction of the Willamette River.

Stan Gregory: We were finishing up a report for the EPA on the condition of the channel and the riparian forest in the Willamette [River and Valley] in 1860 and 1895 and 1932. It's supposed to be turned in today. I should be doing that instead of being here.

Max Geier: I'm just curious, what kinds of records do you look through to reconstruct that?

Linda Ashkenas: There is a series of things. The first place, we are very fortunate that the Nature Conservancy decided on their own in association with the Oregon Natural Heritage program, to find out what the vegetation was like prior to settlement, and they are using survey notes that were made by the General Land Office survey when they laid out the township section and range grid. Combine that with their own knowledge of plant associations and soil types to come up with a map of what the Willamette Valley, in this particular case, looked like. [ca. early 1850s] And, it is kind of hard to ignore the aquatic system of the Willamette Valley. So, that has gone along with it. Because it was the first area settled, the [Army] Corps of Engineers has been very intimately involved in determining how the river looked and functioned since about 1860, so they have series of mapping efforts they did of the complete Willamette River, the main-stem river. In addition, dozens of less complete mapping and survey type information, which all have been, through great pain and agony and George's help, transformed from surveyor's scribble into GIS data layers, so we start to take a quantitative look at how things have changed.

Stan Gregory: Some of the early work Jim [Sedell] did had a profound influence on people around the country, and has been cited quite often as an example of river simplification. But, they took a small section of the Willamette to work on. One of the questions was, "If you take the whole river system, do you see the same pattern? Or does it differ quite a bit?" We had a good indication that the northern end of the valley was quite a bit different than the southern end of the valley. So, it gave us a more complete picture of the degree to which the channel and riparian vegetation have changed. The early work would lead us to believe that the change was primarily due to channel modification, but it is actually looking like probably, vegetation riparian forests were modified to a far greater extent than the channel had been modified. This actually

gives us a lot of hope. I mean, that is good news if the riparian forests can regenerate and can come back. It is much more difficult to get channels to function again. And some of the channels that we thought we had lost historically, actually are still there. It's just a matter of letting them flood.

Art McKee: Like a golf course? (Laughter)

George Lienkaemper: Just create a better hazard. (Laughter)

Max Geier: One of the directions that this is taking, is more focus on some of the broader-scale ecological impacts on riparian systems.

Norm Anderson: It goes from pure, curiosity-driven research, to landscape-planning.

Linda Ashkenas: When I first started working with the Andrews group, that was one of the things that really struck me as being different from other programs that I had been associated with. I came out of the tradition of more single-researcher, pure-research, whatever you want to construe that as. The team approach from the Andrews was different, but also the idea that the research that you were doing had a very intimate and strong connection to land management practices, was for me, fairly novel, and I suspect that has always been there at the Andrews. But for somebody who comes from the outside looking in on that, especially if you come from a pure university background, it is weird and it's very exciting, and very, what is the word I want, gratifying in many ways. It is also a hassle in some ways, like getting permission to add ammonium to Lookout Creek springs to mind. (Laughter)

Stan Gregory: Two years of our lives. [For permission to implement this NSF-sponsored project]

Al Levno: Two years of our lives.

Stan Gregory: In a way it was.

Max Geier: Water quality concerns?

Al Levno: Yeah.

Stan Gregory: It was an experiment, and researchers fall underneath the jurisdiction of laws pertaining to land use, and so, before we could do the experiment, we had to assess potential off-site effects, and therefore, the project fell under Federal regulations. We had to go through a review.

Al Levno: Just about anything you do in a stream has off-site effects. Water, even what it does.

Stan Gregory: The great curiosity of these issues we have dealt with has been that it's enjoyable. I think it is why the Stream Team is what it is and why the Andrews program as a whole is what it

is. People are always picking up a new idea and dabbling with it. Sometimes they are mega programs funded by National Science Foundation or EPA, sometimes little projects run by the agencies that have given us a little bit of money to work with, and sometimes it is just people, we have an idea and want to dabble with it. One of the best examples came recently when we twisted Norm's arm to give money, and in the last, what, eight years or so, five years, moved to one of the hills around Corvallis, and has a little temporary stream flowing through his property, two of them actually. He has been doing this out of curiosity, looking at the invertebrate fauna associated with the streams on his property. So, he gave a Stream Team talk about the biodiversity of "my backyard," comparing it to the work that he and his students have done up at McDonald Forest and here in the valley, and talking about the proportion of the fauna that we find in the valley here that is in his backyard. It was amazing how rich these little streams were that people discount as not really being a stream. I think that kind of curiosity is something that has kept us all going. It doesn't have to be the big stuff. It is about the curiosity that you have.

Norm Anderson: Two hundred and fifty species of invertebrates.

Stan Gregory: Winter term. (Laughter)

Norm Anderson: Want me to read the list?

Stan Gregory: (Muffled laughter] Moth to a flame.

Max Geier: How do you characterize criteria for selecting a locale, or finding how a particular research project might have changed over time, since the time of your first involvement with the Andrews?

George Lienkaemper: It went from lab streams to satellites.

Stan Gregory: Site selection is like snowflakes, independently falling. They are all different. You pick them for so many different reasons. Sometimes it is access, sometimes it is the particular feature that you are trying to find, sometimes, it is that it is remote. You are looking for something that is as far away from a road as you can get. You study Mount St. Helens, that's about the mountain.

Art McKee: Set the goal and they are always objective-driven, except in Norm's backyard. In too many instances people do it because it is the human element of it.

Norm Anderson: I'll have to admit that I was not a strong proponent of the H.J. Andrews as a site in the early years.

Art McKee: It's a long drive.

Norm Anderson: I mean, how many pipe-fulls can you smoke in that time? [Norm was a dedicated pipe smoker]

Art McKee: Depends on what you're smoking. (Laughter)

Stan Gregory: We used to tease Nick Aumen. He would come up to the Andrews and Mack Creek and go up into the old growth and sample wood. But he needed to get his samples back down here to campus to run all of his microbial tests as quickly as he could. So, Nick would show up, you would hear the car come up, and he picked a log just barely inside the fringe of what he needed (Laughter), old growth, and take his sample and dash back to his car and race down the road. He would be in Corvallis before we had lunch, so we used to tease him about the ghost of Nick. Sure, you were up in the Andrews, looking. We were tagging all pieces of wood in Mack Creek, and there was a piece up on the road they had pulled out in a given storm, so we put a number on it and called it Nick's log. It was as close to the road as possible, so he wouldn't have to even get out of his car. He would just lean out, take a scraping and run back to the lab.

Max Geier: So, at least one of the constraints would be technical requirements. I would imagine that has changed significantly over the years.

Stan Gregory: But even now, you still depend upon what you are trying to measure. Some things you can measure remotely, other things you've got to have specialized instrumentation, and you have to measure for a short period of time. Some things you can preserve; some things you can't.

George Lienkaemper: We have a project coming up this summer, in fact, where a good chunk of the budget is going to be Fed-Ex'ing coolers back to Massachusetts for sample analysis.

Stan Gregory: Depends on the project.

George Lienkaemper: Depends on what you're working on.

Stan Gregory: The question is --

Norm Anderson: Mostly analogy

Stan Gregory: I have never had two projects that the site was selected for the same reasons.

George Lienkaemper: I don't think that there is any such thing as a purely replicate field site.

Art McKee: There are horrendous assumptions when you began to block.

George Lienkaemper: I just had had an experience a few weeks ago trying to help a student do some site selection making use of GIS technology. I mean, her criteria were impossible.

Stan Gregory: Yep, it happens all the time. People come up to the Andrews and say I want to work on "x,y,z" and this is what I need for the site, and there is a lot you need to know in deciding which of these criteria you can match with.

Norm Anderson: But remember, picking sites for the old-growth clear-cut, regrowth. (Chuckle)

George Lienkaemper: The riparian study.

Norm Anderson: Yep. Grasshopper Creek.

Stan Gregory: Grasshopper Creek.

George Lienkaemper: Geez.

Linda Ashkenas: Talk about a drive.

Art McKee: Way up in the --

Stan Gregory: The great thing, and this is one of the parts of history that you won't get into the book, is the fun and the experiences we have all had that make it enjoyable and worthwhile. Like picking sites. We are trying to check them, it's winter and there is snow on the ground, and Hawkins and I go into Grasshopper Creek to check it out.

Art McKee: In the snowmobile.

Stan Gregory: In the snowmobile. We had one snowmobile, but two of us, and it wasn't big enough to carry two of us, so one of us had to be pulled behind on a rope on skis. (Chuckle) So, on the way in, I let Hawkins drive the snowmobile and I skied behind, which actually turned out to be quite smart, because it was going uphill. Coming back for many miles, we were going downhill and Hawkins was behind on the skis and he kept being faster than I was, coming up on me and screaming at me madly to speed up, but realizing as soon as I did, that we were flying down the hill. So, we came across the flats, and suddenly, there was a big hole in the road and I aimed at the hole and bounced out --

Linda Ashkenas: You and Chuck have this thing for those.

Stan Gregory: -- Bounced out in the snowmobile. I was okay, but I looked behind. I knew Chuck was coming through the same hole. He hit it and spring-boarded up about 15 feet in the air, straight over a hill. Crashed.

Linda Ashkenas: These two guys have a thing for holes in the road because the same thing happened at Mount St. Helens. When we were driving much too fast down a road, Chuck was driving, I was in the middle holding a can of mandarin orange slices for us to refresh ourselves with after a day on the ash plains of St. Helens, and Stan was riding shotgun. Stan saw a hole coming up in the middle of the road and Chuck was driving, and not paying any attention. Stan had his mouth full of mandarin oranges and so he just went, "Whoo, whoo, whoo." (Laughter) Chuck and I looked at him, like what is going on, and then we hit the hole. And --

Stan Gregory: - Mandarin oranges went flying all over the cab. (Laughter)

Al Levno: I didn't realize that was something you had replicated.

Stan Gregory: Sure "whoo, whoo, whoo," (laughter) is still "whoo, whoo, whoo," which means "stop" in Oregon. (Laughter) It is those experiences that actually keep us all in it. That is what makes it enjoyable.

George Lienkaemper: Was there any basis that the site selection was based on a swimming hole being up there?

Norm Anderson: No, I don't think so.

Al Levno: It is a mosquito. A very big mosquito. I was hoping Norm would identify it for us.

Stan Gregory: Instead of being the biodiversity in my backyard, it's the biodiversity in my back. (Laughter)

Max Geier: I was curious about the ways in which initial study designs of the earlier research and selection of sites, might have an influence on the kinds of things done on the Andrews now?

Norm Anderson: Certainly having Mack Creek established as the aquatic part, was a start. It got me into LTER, and leads to the particularly historical aspects of it, and what I call basic science.

Linda Ashkenas: Some of it, I think, is also driven by the desire to connect and test ideas. You have been working in Mack, you have been working in Lookout, let's see if we can sort of replicate some of the results working in other streams. And that, for example, was what led us to do all of those riparian creek studies, for example. Which is someplace that we have never really worked on since, but it is driven by that kind of idea.

Stan Gregory: We do have the problem in stream research that we've never fully been able to deal with in experimental designs, is that your samples are supposed to be independent of one another. In a creek, because water flows down a hill, you have a tough time meeting that assumption. So, many of the statistical analyses are invalid.

Norm Anderson: Quasi-replication.

Stan Gregory: Pseudo-replication. Historically, a lot of stream studies would go to small sections of 50 meters, 100 meters, and study little pieces of stream. And people started going, "Hey, wait a minute. Look at this stream. It's a lot different if you walk up stream another 100 meters." So, people started extending their studies to do entire reaches. Then this paper came out in '83 by Stuart Hurlbert.

Linda Ashkenas: Pseudo-replicate.

Stan Gregory: On pseudo-replication and the fact that many studies were pseudo-replicated, because the samples weren't truly independent. He used Dave McIntire's work, actually, as an example in laboratory streams, that you couldn't take multiple replicates out of the same experimental stream, because it was just all one treatment. So, on the stream side of things all of our studies had this, as Linda mentioned, the scarlet "P" of pseudo-replication stamped on them. We tried in a few of our studies to start expanding the number of streams, but we still aren't replicating treatments, because that starts getting into the huge number of stream sites and even finding the ones to meet those criteria is a challenge, let alone sampling them.

Norm Anderson: Which is prohibited.

Stan Gregory: Like the "pool complexity" study we recently did on a randomized block design in three streams, but we are finding from looking at the variance, that really it would take about ten streams to statistically find the difference, if it were there. So, we're constantly chasing this problem of coming up with rigorous experimental design in stream systems that don't lend themselves to those types of statistical approaches.

Linda Ashkenas: Cornfields.

Stan Gregory: Cornfields. Right.

Norm Anderson: That's where applicative plot designs are possible.

Stan Gregory: And the lake people for ages, have been putting things in flasks, so you can have 100 lakes in your growth chamber. And 100 streams in the growth chamber. We would bitch and moan about it. It is a problem. In site selection and study design, streams do present a challenge.

Art McKee: Let's back up a little bit to answer the question correctly. The Andrews is typical of a lot of sites, especially in the LTER program where you have continuing measurement programs on particular regions of streams or stands up in the hillside, to give you a data-based sense that extends through time. And then you try and replicate that out over space, and those particular long-term measurements programs are really important to look at a variety of processes. But you also have a group of people who are being optimistic and looking at other studies that spin out of what they gained from those studies, and all those other things that come down the road. They seem to pay attention to and formulate hypotheses from that. There is always some mix. With the Andrews Forest, there is certainly a very unusual and healthy mix of those kinds of different ways of doing business. There is no question, but what a particular manipulation in Watershed 10 provides a particular legacy that you are left with. But the insights from the monitoring of Watershed 10 are important. Ideas come from previous research; they come from insights.

Norm Anderson: Any truth to the rumor that Stan wants to clear-cut the clear-cut on Mack Creek again?

Art McKee: I don't know? I keep hearing it.

Stan Gregory: I keep wanting to shade it, except it won't close up.

Linda Ashkenas: Whatever did you say after the flood when the willow thicket was finally temporarily flat?

Stan Gregory: It barely opened up a bit so you could walk through it.

Linda Ashkenas: Oh, it was wonderful. Sometimes you couldn't have walked out in that creek in a full upright position.

Stan Gregory: Mack Creek. Two tenth of a percent. I mean, that's darker shade than anything that we have ever measured.

Norm Anderson: You know, this is something that I didn't understand about shading and such, and the impact of forests on streams until I went to Britain and went through pollard forests. They were so shaded that you basically couldn't sense the stream except for the water. That is kind of what is happening in the Mack Creek clear-cut.

Art McKee: You ought to ask Stanley about the breeder stream, because – (Laughter)

Linda Ashkenas: I knew that was going to come up. [Laughter]

Art McKee: This is a significant piece of research, you know, it rivals cold fusion. (Laughter)

Stan Gregory: And it is documented in the Valley Library [OSU]. They are teasing me about my master's degree. There was a technique developed for measuring primary production by a fellow at Oakridge National Lab, Dan Nelson, by using a release of radioactive phosphorous to the stream.

Linda Ashkenas: This was back in the good old days.

Stan Gregory: Yep. He decided that would be good to get a whole stream measurement of metabolism, so we got permission through the PNW to release P-32 into Mack Creek. But we didn't want to mess up our study site, so we went down in lower Mack Creek, way down below the clear-cut several hundred meters, added P-32 and sampled for six weeks. It is a mass balance approach. You have to measure the amount you put in the water, the amount that shows up in the biomass, and so forth. That was when I got my first strong lesson in hydrology, because I knew how much I put in, and then I assumed I had measured the discharge to figure out how much went by. When I calculated how much came out the bottom end, I had more coming out than I had put in. It was because of the error in measuring discharge in that boulder-bedded

stream system. So, I was never able to come up with the measurement of metabolism, because I had more radioactive phosphorus going out than I had put in. So, I received good-natured ribbing over the years for my breeder streams.

Art McKee: We'd do a calculation of the rate of increase over the distance between Mack Creek and the reservoir, and found that it was just enough that the reservoir should have glowed at night. (Laughter)

Linda Ashkenas: How come that never came up when we were wanting to put ammonium in Lookout Creek? We had years of practice in this sort of thing. (Laughter)

Norm Anderson: He knew about hydrology by then.

Stan Gregory: I learned my lesson. I did get one good thing out of that experiment though --

Linda Ashkenas: Oh, the slide.

Stan Gregory: I got everyone to help me carry all of the gear down, radioactive phosphorus and everything. It was a big show. So I got a picture of Jim Hall, Dave McIntire, and Sedell.

Linda Ashkenas: No, was it Norm?

Stan Gregory: Or was it Norm?

Norm Anderson: No, I wasn't there. I am against radiation.

Stan Gregory: Flipping me the bird. (Laughter)

Linda Ashkenas: All in lab coats.

Stan Gregory: All in lab coats and with latex gloves on. (Laughter)

Norm Anderson: There should be a mention in this, too, and if you're getting to the historical records of the number of bricks that were hauled up into Mack Creek, because apparently aren't enough stones there.

Stan Gregory: Bricks. And broom handles, too.

Linda Ashkenas: That was my first introduction to Mack Creek, as I recall. I went up there and there were bricks everywhere, and there were broom handles, too. Looked like someone had gone mad and they all had numbers on them. There was black plastic....

Stan Gregory: I didn't know --

Linda Ashkenas: What else, wire? And there were more research traps than I had ever seen, and I had just finished working for people who carried around bags of concrete, rolls and rolls of wire mesh and gasoline powered hammers, and I thought that we had been quite heavy handed in terms of environmental manipulation.

Stan Gregory: But tides took care of that.

Linda Ashkenas: Tides took care of that, yeah. I had an ice chest full of Easy-Off oven cleaner.

Stan Gregory: Actually, I should be careful about the history that we get out. Talking about the changes in philosophy, at one point we were hiring a research assistant, and it was a woman. And there was a question to whether the woman would have the necessary muscle to do this heavy-duty work. So, the test that we put this candidate through, was that for three days she had to carry backpacks of bricks up Mack Creek, and if she could carry these 50 pound packs of bricks for the three days without complaining and work the full day, then she got the job. And she did, but I'm sure that kind of test today would land us in jail or at least in court. (Chuckle)

Art McKee: Is she the one who you guys saw when cross-country skiing into Mack Creek?

Stan Gregory: Yeah, she was pissed. She was a believer in the dangers of hypothermia and she indicated that we had a problem. She insisted that we all go to the safety training, and we did. They had a mountaineering group there, also training on hypothermia. So, Jim and myself, and someone else were sitting there, and they said first sign of hypothermia is loss of judgement. And I said, "Oh shit, we are in big trouble."

Max Geier: There was an ice chest full of Easy-Off oven cleaner?

Linda Ashkenas: Oh, that was a different job.

Max Geier: I was going to ask you about the pseudo-replication issue. You're referring to "Riparian Grant Number Two," as an example of effort trying to replicate another stream, when you are doing something like that or when, I am thinking about something that is not focused on current research, but at the time you were looking for some kind of research site or type that would be similar to Mack Creek, or is that -- ?

Linda Ashkenas: Yeah, that is the idea, but it's not that we have totally given up on that. Stan just mentioned having to add wood in replicative blocks in different streams. So, it's not like we have totally given up on it, it's just that, I think, we have recognized the logistical difficulties that trying to get good replication in this study can entail.

Norm Anderson: I think this is maybe one of the reasons that the darn quantifications we made in our mathematical modeling would mean that we could quite easily say we couldn't do it.

Stan Gregory: You run into limits. If you really consider what we are doing in our research group, trying to ask questions, making credible observations, and quite often we would like to use formal statistics for drawing those inferences, but quite often it puts you at a choice between do you learn a lot about one system and recognize though that it might be an artifact of this one system and get into greater detail. Or, do you learn just a little bit about a lot of systems, so that you could extend your conclusions across a lot of systems? Each research effort that you get into, you have to make that choice. I think we would be idiots to deny the fact that we've learned an awful lot about studying the Mack Creek old-growth. It is not replicated, but it has influenced a lot of what has happened in science and management in the Northwest, because we have gone into it in great detail to try and figure out how it works and to the degree that it's representative.

Linda Ashkenas: And we have done it for a long period of time.

Stan Gregory: Long period of time. So, it's a balance that you have to find and each scientist has a different level of comfort.

Max Geier: I want to get on your view of how changes in management priorities, and how social climates influenced priorities or viability of riparian research in relation to Norm's point about funding.

Norm Anderson: Well, you get certain fads happening in science, and I think in public perceptions, too. One of the nice ones at the present time is the biodiversity issue. Nice from the standpoint of more concern for the environment, and essentially for protecting places, because of what's there or because we don't know what is there. This is where, if you will, "locking up" H. J. Andrews is very, very valuable. Have a place to keep on going.

Stan Gregory: I think we would be idiots to deny that politics and the social sciences have no influence on availability of funds and the type of research that goes on. But, to be honest, for the last 30-40 years in the Northwest, there has been enough concern about how humans are influencing the landscape, that if you work hard enough at it you can find a relationship between stream ecology and land-use. So, we have not lacked for that political hook. The flavor or the nature of it changes from year-to-year, and there are opportunities that come up, and disappear.

Linda Ashkenas: I think one of the best examples of that is cutthroat trout. For years and years we have worked on cutthroat trout in Mack Creek, Quartz Creek, and Lookout Creek, and we have followed these populations along. And for years cutthroat trout were really the poor sister to salmon, particularly, and steelhead to a lesser extent. It was always, "Why are you guys in the Cascades working on cutthroat trout?" And we heard this from, Gordie [Reeves] certainly, and from people at ODFW we worked with. And now, all of a sudden, cutthroat trout are right flat in the cross-hairs on everybody's list of concerns. And we are the only ones with any data. So, I think it is sort of dictated by where you work, in terms of what you happen to work on, and the sort of cycles about what's hot and what's cold, for both management and research topics.

Norm Anderson: But another spin-off from the start on the Andrews, and eventually the work on the Willamette and the interest in Corvallis in the Willamette studies, was exemplified by starting to have these sessions in the Corvallis Library. And they had to take them down to the Majestic Theater to have enough seating. (Chuckle)

Linda Ashkenas: It's one of those things.

Norm Anderson: Standing room only.

Linda Ashkenas: I think for a while, it looked like it would be really neat to work on the Willamette. But that is an area where maybe funding and personnel constraints were so strong, that it was like, well, you have to wait. You have to wait until that interest catches up to what your research interests are.

Norm Anderson: Certainly entomologically, interest from the general public in the record of that stream has grown.

Stan Gregory: I think part of what has been possible in the aquatic research could be attributed to the atmosphere at OSU. I mean, here in Corvallis, I still have not met anyone who can indicate why there is such a wealth of multi-disciplinary or inter-disciplinary, truly inter-disciplinary studies at OSU, when they are so difficult to do in other places. It is nothing that the university has sanctioned or deemed, and said this will be our focus. As a matter of fact, that probably would have killed it. It just happened and I'm not sure why.

Art McKee: But it's really nice to see the number of administrators that have come to see it. The Bob Winters, of course, the George Browns.

Linda Ashkenas: I don't think it was ever set up consciously by the university, but it is not as they have gone out of their way to impede it either. And there have been enough people who have fostered it and encouraged it.

Max Geier: Which is suggesting that it is something that emerged naturally, and then, they embraced it.

Stan Gregory: I am not sure who the original suite of players would have been; if it's Merriweather, I mean Merryfield and Dimick or whomever. Norm, Jim Hall and others started accepting that, and built on it. So, it built an atmosphere here that it was accepted and encouraged, as opposed to or discouraged. I can't help but think that there was a time period between the 1950's and the 1970's that was a pivotal time, that indeed, it was going to happen at Corvallis, or it was going to become like all other institutions.

Linda Ashkenas: I think one of the things that might have contributed to that, was the way the College of Forestry [OSU] and Department of Fisheries and Wildlife [OSU] were set up in that the

students, both undergrad and graduate who go through those programs, are likely to go to work for agencies, be it ODFW [Ore. Dept. of Fish & Wildlife] or the [U.S.] Forest Service. And those agencies already had a presence in town as management agencies. The headquarters was here, Oregon Department of Fish and Wildlife has a regional headquarters out at Adair. Because the students who came through were likely to go to work for those agencies, I think they had a tendency to maintain the contact with their old professors and their other colleagues that may have contributed to setting up that interaction that has blossomed to what we see today.

Art McKee: Also, you've got to give credit to very good PR people in Jerry Franklin, Sedell and such, in the number of people that they have taken to the Andrews and shown what is going on. And that's half of the people who are administrators here.

Al Levno: Art had a really strong, strong role in that.

Stan Gregory: Yeah. There is not an individual in the Andrews program or at OSU that has ever spent so many days leading tours as Art. And professionally that can be murder, I mean a lot of people professionally say, that there is no way that they would allow themselves to get into that position. And, it was a big risk for Art to agree to take that task on.

Norm Anderson: He must have learned that from Jerry.

Art McKee: What is that?

Max Geier: Some people have indicated that the reason why EPA is located here is because of the Andrews group, and then, the LTER program. I'm just throwing it out there.

Stan Gregory: I don't think EPA is here because of the Andrews group. As a matter of fact, if I had to guess any reason why EPA might be here, it might have been Chuck Warren and Peter Doudoroff's work on toxicology.

Norm Anderson: Their connections to the Andrews, as far as I remember, is zero.

Stan Gregory: Yeah, it has always been very limited, and particularly back in the early days of the Corvallis Lab being established here in the '70's. Like I say it was, if there was any attraction to research, it was an attraction to Chuck Warren's work. Chuck had an early role in IBP, but there was a parting of ways. Particularly Scott [Overton] and Chuck saw differently about modeling, and Chuck decided he didn't want to be involved.

Max Geier: It's an interesting point about the students flowing into these agencies looking for jobs. Are you suggesting that this led to more in terms of inter-disciplinary focus because of the different kinds of jobs in the area?

Linda Ashkenas: That is just sort of off the cuff remark. I don't know if that is true or not, but I'm trying to imagine what it was like before we had this inter-disciplinary institutionalization

that we have now. I think it is natural that when you first start out in a job like that, you are going to maintain ties that you already have where ever they were, with your major professor or your fellow students. And it is just being so close, early things like the Alsea Watershed study, where a number of people who were students on that project ended up in agencies. That was a lot of the beginning of the ties that were fostered there. And certainly, having somebody like George Brown, who's now the Dean of the College of Forestry, start out as a grad student cog in an interdisciplinary project, has helped that career move along. And by people who has helped foster it from an administrative view point.

Stan Gregory: A lot of people think it would be good for us to form a College of Natural Resources and not have a College of Forestry. We would have Fish and Wildlife in the same program as all the Forestry and Entomology and all the other sciences. Even hydraulic engineers and everyone under this common umbrella. I watch inter-disciplinary studies, and I think in some ways it is really healthy that we have these different colleges in different places, because there is a reason to be inter-disciplinary.

Norm Anderson: You institutionalize the inter-disciplinary umbrella and it will be gone. Again, the cooperation of the university with the Forest Service has been central to the Andrews.

Linda Ashkenas: You can look within the university, citing lack of cooperation as well.

Max Geier: Everyone is running out of steam here. Let me ask one last thing. What do you identify as the most important research issues and outstanding questions what emerged from your work at the Andrews?

Stan Gregory: There is a huge number of questions going into restoration. How do we restore systems that we don't think they are not where they should be? How do we manage across land use types? So, it is not just a forestry issue, it is an ag and urban issue as well.

Linda Ashkenas: Can we take the lessons we have learned for the Andrews and apply them to different landscape sites? That is a really good question.

Norm Anderson: And from the headwater mountain streams to the valley where people live.

Stan Gregory: I would think about these ideas of how we were going to manage or restore these riparian areas, and then how we balance them against the projected changes in human population. Can we do it? The population is changing so fast that our planning institutions can't even keep up, to get into the social side of it, even if you've got the best science. But, as you go into that kind of large scale and human dimension side of things, there are also questions about how do riparian zones in the first place. How do they regenerate? Most of the plant ecology studies have been in forests, and so as a result forest ecologists don't know how riparian systems die, how they grow. So, basic research on how riparian systems functions and nutrient uptake are some things that are always mentioned as information needs for riparian zones. They are important in picking up nutrients before they go into the streams. Most of that is cited

in studies from Georgia and Iowa and we don't know much about how the streams in the Northwest function. How much of the nitrogen passes through riparian zones is taken up? We don't know. There is a huge number of primary research questions than applied research questions.

End of Interview—Recording ends.