

Joseph Smith: All right, we are here at the Beaufort Laboratory in the library. It is July 24, 2023. We are here to interview Dr. Randy Ferguson, former staff member at the lab. Present is myself, Joe Smith, Dr. Don Hoss, former director, Dr. Doug Vaughan, and Dr. Jeff Govoni. We will start the questioning with Don.

Don Hoss: This is Don Hoss. Well, Randy, I remember when you came. I think you came as a microbiologist, and maybe from Florida State.

Randy Ferguson: Yes. That's true.

DH: If you would just tell us how you happened to come from Florida State. [laughter]

RF: To here.

DH: This obscure spot on the map, and then what you did, kind of orientation.

RF: Okay. First of all, I want to tell you, this is an honor to be here with you guys. You might see me crying or laughing. Okay. Just be tolerant. If I say anything that either pokes you or interests you, please stop me. We can dialogue if that's okay. I was born in Manitowoc, Wisconsin. Several generations of my family lived there, both sides. It's on the shore of Lake Michigan. So, I spent a lot of time in the Manitowoc River, on the lighthouse that was guarding the entry into the river. Car ferries coming and going. Turns out my great uncle was the manager for the train in-train out of the car ferries. My grandfather and I used to get on the car ferry, at the train entry to the car ferry, and then we would take the short ride down to where they put the cars on and the people. Then we'd get off. I loved it. It was really – then of course, Lake Michigan is more than a lake. It's more like an ocean. It's just a freshwater ocean. Anyhow, we lived in Manitowoc till I was about fifteen, moved to upstate New York, Finger Lakes region, and we used to fish for lake trout, which was a lot of fun. We were there less than a year, and went to Highland in the Hudson Valley, and did my high school all down there. Small school, we graduated sixty-three seniors. I'm going to share with you the advantages and disadvantages of a small school. I had a ball. I was my class president for three years. I never ran, never tried it, but they just voted me in for some reason. President of the Honor Society. I was class salutatorian. Sports-wise, as a freshman, I was three letters, in football, baseball, and basketball, same thing all the way through. Started on the high school team, on the senior team when I was a sophomore. There was just not enough people. There weren't many people taller than me, stronger than me, or faster than me because it was just a small place. It was a riot. It was a good place to be. The downside of the small school is I didn't know anything about college coursework, never any exposure at all. I'm sure many of you had that same experience. Went up to Cornell University. I had a Regents College Scholarship, which was based on tests I took for the state. I had a small amount of money coming to me because they wanted me to be in biochemistry. Just to tell you the meeting we had for the biochemistry group. There was forty of us. The professor said, "There will be eight seniors." Said, "There will be eight seniors." So, I started looking around for things. I also found out that ecology was becoming an interesting topic. There were some new books written by it. There were several authors that were fighting for the terminology. You guys might remember that if you're going through the same thing. I just love the idea of learning about the environment. I chose to go into science and study the

environment as opposed to going into business. I had an opportunity to get my master's degree with one more year at Cornell. I'd get my bachelor's degree and my master's degree after five years. I said, "No, I'm in a hurry to get going." So, ended up going to Florida State University. The reason was they had a new marine department. They were just starting up and had a pretty famous guy running it. They gave me a teaching scholarship. I was going down there and teach laboratory. I had some money. So, that's where I went. It was a wonderful experience down there. I came out of Cornell with a mediocre average and an incredible education. That's all I can say. I was fortunate enough to have a major professor at Cornell that hired me to work on Long Island, studying the effect of Long Island duckling farms on phytoplankton in the water around the island. I also did an independent study where I was counting phytoplankton, measuring ATP concentration and nucleic acids, just plotting the cell counts versus these other measures of potential measures of biomass. So, I went down to Florida State. I was teaching. I loved it. I was having fun teaching all these freshmen introductory biology. I was taking courses that I couldn't sign up for at Cornell because I just put them in. I didn't have time to fill them in. By the way, if you're majoring in biochemistry, your first elective was second semester junior year.

DH: Was what?

RF: Second semester junior year was the first time I could have an elective. It was awful. It was math through math majors, botany for botany majors, zoology for zoology majors, chemistry for chemistry majors. There was all of these folks from New York City and all these big schools that had a year at least of freshman classes. They all were in it to become doctors. They were in the Regent School, which I was, because that's where biochemistry was. But they really wanted to become doctors. They were just pushing on the curve. It was hard, hard to keep up with them. Like I said, I learned a lot. At Florida State, I was there. I was enjoying it. I was taking these courses. I didn't have a sense that I knew what my plan was. I wanted to get my master's degree and get out of there and go to another school. So, I went to the head of the department. I said, "I want to know what I have to do to become a master's student in your school." He said, "Well, we're really interested in this because we don't have many graduate students that are wanting to graduate." They were afraid about Vietnam. So, they kind of gave me a shot. I took what they called a qualifying exam. I had to pick five professors. Each was going to give me a two-and-a-half-hour essay test that I would take on Monday and Tuesday. Then on Friday, I would face the music in front of them. So, that's what I did. It was really interesting. I had taken a year of plant biochemistry and photochemistry. The guy that was teaching, that was the one that was going to get me. I made a serious mistake on my essay because he asked me to list all of the plant hormones I knew and what their function was in a plant. He said, "Why did you call this particular chemical a hormone?" I said, "Because I made a mistake." [laughter] He said, "Why was it a mistake?" I said, "Well, hormones in plants are chemicals that are produced in one place in the plant, and they have their impact somewhere else in the plant. But this chemical was an insight effect about its impact on the growth of the plant. Therefore, it's not hormone." He was disappointed, let's just put it that way. So, he started asking me questions after questions. It was like Socrates and laying down questions. I was answering the questions. Then he asked me another question. Finally, the head of the department who was a botanist raised his hand and said, "Can I interrupt this interview?" The professor I was talking to said, "Well, I don't have a choice there." Talked to his major professor. So, he did. He said, "Fine,

no problem." So, his question was, "Would either one of you please tell me what the hell you've been talking about for fifteen minutes?" I tell you what, the whole thing just –I had a ball after that. But it was getting pretty tight before that. Shortly after that, they sent me out in the hall. I was out there for half an hour. I said, "What's going on in there?" So, they called me back in. I go back in. They told me, "Well, congratulations, you passed the test." I asked, "Well, what does that mean?" "Well, it means that you don't have to get a master's degree." That special study I did, I presented that to the group, and they said that was enough to convince them. I didn't have to get a master's degree. So, they said, "You can go ahead and get your work on your PhD." I said, "What do I have to do for that?" They said, "Well, you have to have two foreign languages. One of them can be statistics." [laughter].

DH: That was like me. I could take computer science as a foreign language.

RF: Right. Honestly...

Male Speaker: Not us and Joe, we had to do real languages, telling us – [laughter]

RF: You had to do real language. That's awful. Well, I had had it. I had taken a year and a half of Russian at Cornell. But it was tough. So, I just opted to do French and statistics. My major professor gave me a book written in French, on marine biology. So, I just translated everything I could find in there. He had a written test where he had xeroxed a few pages. I had to translate that in a given period of time. So, basically, all I had to do is get my committee and pick my dissertation topic and go to it. I said, "No, I can't do that." So I started taking statistics. I took a couple of statistics courses. Honestly, that's why I got here, those courses. I'll go into that in a minute. So, that's what I did. I did statistics. Then my last year, they gave me a dissertation year fellowship, which basically, I didn't have to do anything, so I could write my dissertation. It was a great experience. Okay, let's get to how did I get here? My major professor was an oddball. He was doing research for the federal government, stuff he couldn't share with me. He didn't publish. He didn't have a PhD. Here I am, coming out as a youngster with a PhD. Never went to a scientific meeting. Never had anything to do with a publication and the universities. Here's another, he didn't have any connection to give me any hope of my dream, which was to be a professor in the university someplace. It just couldn't happen. So, I went to my placement officer. He was a great guy. He said, "You need to get a job in the federal government." I showed him all my stuff. He said, "You, here's what you do," every different grade activities, like statistics, botany, zoology, fishery, biology, all of that stuff. He said, "Go through all of that and find out which ones you can qualify for, at least to an eleven or twelve, and fill those out." He said, "I will send a copy of each one of these to all of those agencies that hire in these types of skills. Then someone will pick you up." So I was getting all of these opportunities, this chance, this chance, this chance. I was always told, "Too bad, didn't make it." These are all federal jobs. I went back to them. I said, "I'm getting really discouraged. What's going on here?" He said, "Oh, those are for promotions. They're not really for hires. Don't worry about it. That means nothing. It has nothing to do with you. It has to do with that." I said, "That doesn't sound right, but I guess I can live with it." Then I got this letter. Oh, and he told me he sent it to all of the regional labs or headquarters, every one of these agencies. Guess what? Doug Wolf went to Petersburg, picked up my stuff, and brought it back here. He started writing me letters.

DH: Who did?

RF: Doug Wolf. Then all of a sudden, I got a call from Dr. Rice. He said, "I'm coming down to —" was it Tampa Bay Lab or where the headquarters was? He said, "I'd like to stop by and say hello." So, he showed up in my lab. I showed him what I was doing my research on. I had built a three-temperature incubator inside a constant temperature room. I was looking at the effect of temperature, light, and nutrient concentration on growth of phytoplankton intestines. Anyway, he was fascinated. He talked to me and he said, "Would you like to come up and visit our lab?" I said, "Well, sure." So, I went up, visited the lab. It was Doug and Ted and the guy that was my boss when I first came here.

DH: He was Dick.

RF: What's his name?

DH: Williams.

RF: Yes, Dick Williams. Yes. He was a character. But he was a scientist.

JS: You do not remember approximate date, right?

RF: For that meeting?

JS: Yes.

RF: It would've been probably late winter, early spring of [19]71.

JS: When did you actually take your degree at Florida State?

RF: June [19]71.

Doug Vaughan: Did you get that, Joe?

RF: Anyway, I wanted to tell you about Bernie, another character, because basically, that group offered me the job. He was the one communicating with me. He said, "Now, you've got to — when are you going to show up to work?" I said, "Well, I've got my graduation coming up on this date." He said, "Oh." I said, "What's the problem?" He said, "Well, you have to — it's absolutely critical that you start work on the first day of a pay period because if you don't do that, you're going to be screwed up the rest of your career." [laughter] So, I'm looking. Here, that was the day of my graduation. My major professor didn't have a degree. I had to get up there on the start of a pay period. So, I loaded up the van on graduation day and was headed to Beaufort. I didn't have a clue about Beaufort, except that I'd be learning about menhaden because the lab's name was the Menhaden Lab at that time, I think. It was a fish. I was willing to go. So, that's what I did. So, that was how I got here. Honestly, the diversity and the quality of the scientists in this lab was wonderful. I found out there was a reason for that.

DH: Let me see what I put down here.

RF: I found many solid researchers, diverse expertise in [inaudible] fields. I found scientific freedom. It was because, I eventually found out, that we were protected and pretty much in isolation from regional bureaucrats and Washington folks. Honestly suffered through my entire career. I'm sure all of you experienced that too. Access to the North Carolina State University through adjunct faculty was terrific. I got to know John Hobby. He started me in my scientific career here. My first really important thing was that he was using the microscope, the epifluorescence microscopy in freshwater to count bacteria that no one else knew existed, because they're doing all culture work. Honestly, in typical water, most of the cells are 0.2 plus microns in diameter. All of the ones you can culture are bigger. He said, "Randy, I can't get anybody to believe me." He said, "Would you consider trying this new method?" I said, "You, darn tooting." Dick Williams just out of good fortune, had bought a microscope that was convertible into the epifluorescence approach. So, I didn't have to beg for a new microscope. I just had to get the new illumination system. Do you guys know what that is? Basically, the light enters from the top, goes down through the objective, illuminates the specimen on the stage with a blue light or very high energy light. Then if you put chemicals on the plants, they will fluoresce. So, you're looking at fluorescing cells that absorbed a chemical. It was like looking at the stars as opposed to fighting with the [laughter] illumination from the bottom.

DV: That scope is as far as I knew when I retired, because I basically inherited custody of that scope including the substage fluorescence capacities. It was still around. The Lord knows what's happened to it now.

RF: Anyway, it led me into a completely novel approach to marine bacteria. Now, when I first came here, I said, "Oh, well, I can't wait to get started on phytoplankton." Tell you the truth, I was told that all we needed to know about phytoplankton, we had already gathered here. We want you to look at the bacteria and its whole detritus situation. So, I started messing around. I spent, I don't know, a month or so looking in the journal, trying to find technologies that I could apply in the salt marsh. It's just after talking to John Hobby [laughter] and he said, "Right, that's all. It's just not an environmental study. You're not looking at the primary drivers in this heterotrophic system. These bacteria, you have to see them in the microscope. You have to count them." I was a failure at being able to do it with mud. But I was very successful doing it with planktonic bacteria. No one shut me down. I was able to do it. I was so grateful for that. So, that led me into this business of counting bacteria in many different places. I did it off Peru. I did it in the Gulf of Mexico. I did it off New York Bight. I did it in the estuary. For the first time, working with Bill Sunda in the trace metal part, and several things happened. We got involved with trace metal treatment of equipment before we gathered samples. Because with that approach, he actually, and his coworkers in the trace metal side, were finding oceanographic continuity in space, vertical and horizontal space by using these techniques. The original techniques were contaminating the samples with zinc, and copper, and all this stuff. As a result, well, maybe that's why we can't get much information from culture work in radiotracer studies we were doing, because we didn't know about trace metals coming in and poisoning the cells.

DV: Is that when we started ordering Kevlar wire to send the —

RF: Kevlar bottles? Yes.

DV: Well, yes, to send the Kevlar line, what used to be called SEN bottles.

RF: They were Teflon.

DV: Line, but the wire was Kevlar. Well, is that right? Does that sound right to you, Randy?

RF: I don't think the wires were Kevlar, but I'm not positive because I was not thinking like that. I was thinking about what the sample was in contact with the water, which was acid clean Teflon in these PVC containers. So, as a result of all of that, we found oceanographic continuity of the distribution of these microscopic bacteria that no one else had looked at before. We found in the trace metal side with Bill, there was oceanographic continuity of the distribution of those when the samples were treated properly. Also, Bill and I did a cooperative study where they looked at a chemical and an in-situ bioassay of bacteria to look at. He would control the free metal ion concentration in a set of experimental bottles. Then we could look at the radiotracer uptake of amino acids and stuff as a function of the abundance of the trace metals in the water, which he could control.

DV: How did that play into, at the time, was the microbial loop paradigm?

RF: Well, the microbial loop paradigm was happening.

DV: Yes. That is what I said.

RF: Honestly, dealing with 0.2 by 0.2 and a half micron cells was a hard sell. I was up in the New York Bight. They were studying the effects of dumping sludge and sewage in there, [laughter] just what I wanted to do. I was taking some samples. At that time, I didn't trust preservation. So, I was doing live sampling work. I had a vibration table that I created. It was so funny because I had this table. There was plywood on the top, Styrofoam. Then I had to buy tennis balls to put on the bottom of that, so I could put it on a solid surface.

DV: Yes. A huge lead laid – [laughter]

RF: Well, I didn't go that far, but Bernie, "So, what are you doing buying tennis balls?" [laughter] He said, "You're going to get me fired or something." Anyhow, I took some measurements. I was going to save this for the end, but I got off of the *Researcher*. I think it was called the *Researcher* in those days. I had to get off it, onto a small ship, a small fisherman's boat who was hired to come. We had to go down to Jacob's Ladder to get to that boat.

DV: I was actually supported for a couple years at Rhode Island, saw a sailor after he threw Jack Harris on the Mesa project.

RF: Was that the...

DV: New York. Yes.

RF: Okay. So, anyway, I was the last one to go over because I stayed back to make sure all of the stuff that I brought and other people brought got over first. I was the last one to get down. I got down on the Jacob Ladder. I was up near the top. I just watched the boat doing this. So, I said, "Okay, up, down, up, down, up, down." I came down the ladder to where it would be when it came up. Then it kept going down, kept going down. I said to him, "What goes down's going to come up." So, I clammed up that ladder. That boat came and slammed the Jacobs Ladder right under my feet. I just barely made it off of that impact. I actually still get down there and get on board. Basically, I essentially went on as far as I could safely go. Then I grabbed a guy way on the boat and swung in, but I was almost killed. Anyway, the reason I brought that up now is because I gave a presentation at the lab, because I had already done a bunch of count. It was at the – I can't remember the lab. There's a big – one of the energy-related labs, atomic energy-related labs up on Long Island South. Do you remember what that is? It's on Long Island. No, it was on the mainland. Anyway, after I gave my presentation, a hand came up. The guy said, "Thank you very much. I said, "Oh, that's great. What are you thanking me for?" He said, "Well, you just explained what all these viruses are doing out there. They're living off of these ultra-small bacteria. I've been following the research on that. I don't know if that's ever been pursued or not. But anyway, it made me feel like at least someone believed in what I was doing."

DH: That is always good. [laughter]

RF: That's good. Okay. So, anyway, John Hobby was a big part of that. I had nineteen students I was associated with at North Carolina State. Most of them were ones that he kind of abandoned when he left the university. He felt bad about it. So, I tried to help with those. I had a number of graduate students, Ruble and what's his name? Park Ruble and Tony – [inaudible]

DV: Tony Colombo. Was he a postdoc, or was he a graduate student? He had a postdoc once?

RF: He was a graduate student, yes. He did have a postdoc too when he came back. Anyway, working with those students was a blessing. So, another outstanding feature of this lab. I hope that's still happening. I don't know. Let's see. I've covered all of this stuff. Honestly, I got tired pushing these counts of bacteria and stuff. It wasn't predominant. My fellow microbiologists out in the publication world. So, I just was looking for something else to do, which was good and bad. The good part was that I was doing some meeting new people doing other things and not being kind of isolated in that. The bad part was that, I lost connection with that group. Anyway, there was a positive and negative to all of that. But I ended up in doing all kinds of different things. It was fascinating. I was doing aerial photogrammetry for seagrass, satellite imagery of the land cover. It was an attempt to use satellite imagery to monitor change in land cover in coastal areas. It was always said that most people in the United States live along the coast for good reasons. But that's a problem because managing the development is an issue for fisheries. So, that was great. I got involved with AVHRR and sea surface temperature. I remember the days the nymphs was using AVHRR as a mapping device where they could say, "Here's where

you have to stop your fishing, fishermen, because you're going to be hitting the sea turtles." Do you remember that stuff? Yes. Anyway, I was really discouraged because what I found out – I wanted to use the AVHRR for looking at the thermal behavior along the coast and effects of hurricanes or whatever came up. But what I found out was the satellite imagery was coming with two, three, four, five pixel error in the geospatial location of the imagery. I said, "That's not good. I'm a scientist. I want to know where the hell that data is." Not only that, the NIMS people were using this imagery, which was not exactly correct, geospatially. So, they were creating a situation where they might not have been preventing fishing where they should have, or they were allowing fishing where they shouldn't. Anyway, another guy that I just was amazed at his skills, and that was Charlie Kraus. He said, "Randy, we can do this. We can fix that error." I had been calling people dealing with AVHRR in NOAA. They were not very positive about my problem. It turns out that they're doing that for a reason. If somebody knows exactly where that satellite is at a point in time, it's easy to shoot it down. I think that's what the problem was.

JS: Yes. What was that? It was also...

RF: It was doing all kinds of other things besides...

JS: Well, they rectified that problem. The way that they rectified it was because NOAA had this thing about giving out expertise to all ships at sea, and we dropped this expertise. So, they took the XPT data with sea surface temperature and exact location, ground truth. Yes, by where you made them. They eventually rectified it. But the other reason why they were slow was for other military reasons besides shooting down the satellites, and that was exact location of a temperature signal could be very useful to foreign Navy.

RF: Right. Especially submarines. So, anyway, what Charlie and I did was we created a computational way to fix the error. We published that. It didn't get a whole lot of positive reviews or citations. But basically, what it was, we took the pixel image as if it was a checkerboard, the pixels. It was very easy to differentiate land from water with the AVHRR imagery. So, we used USGS maps of where the land is. Then we took this checkerboard of where we had identified land versus water on the image. We just did a stepwise movement up to the maximum agreement between the remote image and the base map. We achieved an accuracy of one pixel. You can't do any better than that. That was one of the things we published. It's funny because Charlie requested a pallet of PCs after one of the censuses. Every census, the federal government buys a new computer for everybody. So, they can – [laughter] They can do that. Then they put them in storage, as far as I know. So, Charlie says, "I think I can get a pallet of those." We'll hook those together. They can work simultaneously and just make this process, which is very tedious, extremely fast. Yes.

DH: Charlie Krause?

RF: Charlie Krause. Yes. He figured out how to do it. We did it. It worked perfectly. We published that. Anyway, he was great about that because when we got the pallet, guess what happened? The first thing the pallet showed up, everybody was grabbing, taking it off because they needed it for something else. I don't know how many we ended up with, but it was much



less than [laughter] than what he had hoped for. But still, we had it working pretty darn good. Yes, so he was terrific. Some other things you might know about me, I got myself in a bit of trouble with the powers that be because when I was doing the satellite mapping, I was realizing it takes a long darn time to get the photographs at the right time, to get those photographs interpreted, to get the base maps from NOAA so that we could do the accurate geolocation of those images. It took a long time. It was expensive. There was no way that we were going to be able to do annual studies when the satellites are doing it every darn day or maybe twice a day. I tried hard to do it with satellite imagery, but it was just not feasible because of the cloudiness of the water and the tides and all of that stuff. Water turbidity was a real issue. That's why I got interested in maybe doing something else. What that was, the state was having the Department of Agriculture update the hydrographic maps for coastal North Carolina. The hydrographic maps of the coast were pathetic, especially in areas where there was virtually no relief. How can you do a depth elevation study when everything's so darn flat? So, I worked with the agriculture department up in Raleigh and helped them. Actually, I did the first draft of the hydrologic units for the new space. The guy that trained me how to do it went through it with me to make sure I didn't make any stupid errors. But basically, I did that because we now knew where the grasses were, but we didn't know where the land was that was releasing water in proximity of those plants. Because the hydrologic units were poorly mapped, I thought it was worth the effort. I volunteered to do that. I got in pretty tight with the USGS and with the Department of Agriculture because the agriculture department was actually doing that work. I tried to get support from headquarters to do that, to actually work together with the geography people and the hydrology people. That's when they sent me up to D.C. for six months, I think it was. Remember that?

DH: Yes. There was a rush of that at the time towards the end.

RF: I know. Bill Sunda went up there too for a different reason. But basically, the reason that I went up there, I found out, by the guy that was my supervisor up there, was that we tried to kill this project with the last NOAA director. We were not successful. But we're going to be successful with this director.

DH: Who was it up there you worked with?

RF: Hal Stanford. Yes.

DH: Who?

DV: Hal Stanford. Sorry, to interject that, but I happen to know that [laughter].

RF: He was another character.

DH: He was indeed.

RF: I had the opportunity to select a different person to be my supervisor, my contact. But honestly, I didn't want to do that. I wanted to go up against the teeth of the issue. That probably was a mistake. I don't know if I want to go here or not. Great. I can do more on that if you

want, but I don't want to do it on my own. Let me just know how my time to it.

DV: One practical application that I am aware of, of those seagrass charts that you made...

RF: Fishing. [laughter]

DV: Exactly. I think it was like a Friday afternoon. These two gentlemen show up at my office. I do not know how they stumbled on me. But they said, "We understand your lab has charts of seagrass beds." I said, "Yes, Ferguson, Randy Ferguson has produced those. I think we could find some." "Good. We need some right now." I think I went up to your office. You gave me one or two. We went down in the conference room. We spread them out. We are going to go here. Anyway, long story short, they spent the weekend in Coos sound catching red drum and speckle trout over these grass beds. They stopped by the lab on Friday on their way out of town just to say how great these charts were and how many fish they caught. Me, being a fisherman, I was just fascinated by their stories anyway.

RF: Do you remember the Apes Project?

DH: Yes.

RF: Well, they had a big presentation. I was one of the presenters talking about seagrass and how you can't manage something if you don't know where it is and how much you got. You got to have the maps for that. So, I was making that case to the Apes audience. The other case I was making, this is important because there's a serious chance that we're going to lose these plants as a result of pollution. I said, "If you want to have the same situation that happened up in Chesapeake Bay, I don't think so." Because they're suffering to recover the crabs and all that stuff. There was just problems. I made that case in a couple of – obviously commercial fishermen guys showed up. They said, "You're not fair." I said, "What do you mean I'm not fair?" They were allowed to destroy Chesapeake Bay and get what they wanted out of it. Why can't we have that right down here to destroy our bay and do what we want to do? I said, "Good grief." That's an issue we've all struggled with, I think.

DH: Still a struggle.

DV: Yes. Randy, well I am on a little bit of a roll. I had another observation. 1989, we had the first red tide event in North Carolina in the State's history. I think you were one of the first ones at the lab to recognize it for what it was, red tide. I think it puzzled a lot of people. But your experience at Florida State and on the Florida panhandle in southwest Florida, you again were one of the first to recognize what was going on up here.

RH: Do you want me to talk about that for a minute?

DV: Sure.

RH: I knew what it was when I was driving into the lab because I was listening to the radio. I had listened while I was at Florida State to the radio when I was going in, when there was a red

tide going on. It's the same exact reports by people who are suffering from something. It just was exactly equivalent to what I heard when I was down in Florida. So, here's the deal. I drive in early. I think, we started work at quarter eight. Bud Cross was on what used to be the front door. I think that's the first time I ever came through the front door here. [laughter] He was standing at the porch of the front door of the old building. He said, "Randy, would you be willing to take – who is the trace metal chemist, young guy.

DV: Evans?

RF: No,

DV: Crumbley?

RF: No, no.

DV: At the time, a trace metal chemist, well, son of, for one.

RF: No, no. It was – I can't remember his name. Anyway, Bud wanted me to take him out to the beach and that we were going to be met by some politician who had a four-wheeler. We were going to collect samples together so we could show how the trace metals are causing this. I said, "Bud, it's a red tide. All I have to do is go out there and get a jug of water." He said, "No. Yes, well, okay, take your sample if you want to, but make sure you get all these samples along the beach." So, we drove west. There was a lot of green little things in the water and stuff. We were taking those samples. I asked him a favor when he wanted to turn around and come back. I said, "Take me on down to the inlet because I've got this big bottle. I'm going to walk into the inlet as far as I can go and get some water because that's where the red tide will be moving in and out." He agreed to that. So, I collected a big bottle. I held it up in the air. I was looking for the tide effect. There they were. So, I told the guy, "We got to get back quick because I want to make sure that the temperature doesn't change in this drug." I got in. Pat Tester was there. I said, "Pat, here's the samples, go in and take them. Check them out." I got something I got to do. [laughter] She looked at the samples. She came, said, "Yes, they're red tide." I said, "Okay." "Hey, that's great." So, we went into Bud's office. I said, "Bud, this is red tide. So, we got a problem here." He called the state fish lab. He called the state fish lab. The state fish guy said, "Okay, we're shutting her down." I'm sitting there. I said, "Oh, God, I hope I'm right." [laughter] But then I was saying, "But I hope I'm wrong." [laughter] It was terrible. I went back to Pat. I said, "Pat, I'm up to here in all kinds of stuff. I didn't want anything to do with the red tide." So, she agreed that, okay, she'll work on that. But she ended up doing a lot of that stuff. However, Channel Twelve somehow heard about me, gave me a call, and asked me if I would talk to him about the red tide. I asked Bud. He says, "Yes, that's all right. Sure. No problem." So, they came down. I was in the little laboratory room I created in my laboratory so it would be dark, so we could do our epifluorescence work in there. So, anyway, this newspaper recorder comes in with this camera. I'm in there. We're talking about the red tide. I'm explaining what it was. I said, "Would that camera hook up to this screen over here?" He said, "Sure." So, I put the red tide onto the Channel 12 newscast.

DH: I remember that incident, not the detail.

RF: Yes. So, if it means anything to you, I might be able to find a video copy of that report. A video, yes. I'll see if I can find it.

DH: See the thing we are trying to archive.

RF: Yes. Right. The point was that the state had sent down people to collect water samples. But they did what they always do. They collect some water and sample. They put it in a cooler with ice. Take it up. That's the last thing you want to do with a crimson tide. Is that what it is now? Because they explode. That's what happens on the beach. The foaming of the waves, the water, those little bubbles break. The red tide cells explode. They release a neurotoxin, which is stronger than cobra poison. It gets into your eyes. It gets into your lungs. I have a sister who has lung problems. She was in Florida. She couldn't go out the doors, living several miles from the beach. That story, I do say that I knew from Florida State just by accident. This is an accident that happened with a graduate student. We just happened to be talking in the lab. I was doing some microscope work. He was doing some Microsoft work. He was doing electron microscopy. He was testing all different kinds of fixatives because different fixatives do different things to different tissues and different cell types. We were culturing the red tide organism in the laboratory. [laughter]/ So, I knew what they looked like. I knew what they were. He had a pipette full of them. He was putting them into a microscope slide. He took the pipette and put it into a jar that was sitting next to him. He was doing his work. We were talking. Then he looked, turned around and looked. "Oh, darn," he said, "I put my pipette into the glitter aldehyde bottle." He said, "Oh, God, I just ruined this. It's terrible." I said, "Wait a minute. Take a look and see what happened." The darn things were fixed. They still had their flagella on. First time in history, just a total accident. So, anyway, we knew how to preserve them. We sent samples down to Florida. The Florida people, we were at – was it the state lab over there? I don't know if it was the state lab or the North Carolina. There was a meeting place. Lots of people were there waiting for the callback from the Florida people. Turns out that it was red tide. They confirmed that. That's what happened. So, it was an interesting event. Yes, I don't know that it's ever happened since. I know Pat was helping the state doing monitoring just in case.

DH: I do not think it has ever happened.

RF: That thing hung around for months. I mean, it hung around for months. There's another story to that if you're interested, but it's about all of these potentially damaging algae. There's a story that Bill and I used to talk about.

DV: The red tide tiger. Just things get superseded by *Pfiesteria*, and all of a sudden *Pfiesteria* was the monster. To my knowledge, I do not think a red tide incident has happened again in North Carolina. It has in Florida, the west coast of Florida. That is just my recollection.

RF: Yes, but from what I recall, the real problem with red tide is for people who have issues either with their eyes or with their lungs. One other species and it's cats. I went to my vet doctor after the incident with my dog. We were talking about the red tide. I explained how the red tide,

that all of the shellfish that had to be confiscated and put up in a pile. He said, "Oh, that's why all the cats died." He said he knew cats were very vulnerable to neurotoxins. When they were eating those shellfish, they were dying. The people were coming to him. He said lots of cats died because of that. But that was the main part. Other than slowing down fisheries and, honestly, the fish aren't so much troubled by it as shellfish. The shellfish accumulate it and then can be a damage to people who eat it. RF:

Yes, sir. Anything else?

Jeff Govoni: This is Jeff. You mentioned one, and I do not want to jump ahead if you have more to say about your personal history at the Beaufort Laboratory, but one funny story that you have mentioned already is going down the Jacobs Ladder and over the side of a ship. It is funny in the sense that could have been fatal, I guess, but yes. You also mentioned Dick Williams to me on the phone. You mentioned a funny story involving –

RF: This is hearsay.

JG: – when you first got there. But maybe you do not want to get to that, the funny story point yet. Maybe you have more to say.

DH: You got time.

RF: How's our time?

JG: I got the time.

RF: Are we okay?

JG: It is 18 past 11.

DH: I am just wondering. Any story about Dick is worth recording.

RF: Well, it was hearsay. I wasn't there in person.

DH: Maybe I can verify.

RF: He was doing something on a piling on one of our peers.

DH: I can verify.

RF: [laughter] Okay.

DH: I did not tell it.

RF: [laughter] You didn't tell it? Well, maybe you shared it with me. I don't remember. But he was a character. He was going to solve a problem. The problem was that he couldn't stay underwater long enough to fix whatever it was he was doing at maybe putting some equipment

on the piling. There was nobody there to help him. So, he tied a cement block to his ankle [laughter] and threw it in so he could do his work. Everything was fine. Apparently when he was done, he realized, "I can't get in here." [laughter] Who was there to help him, do you know?

DH: Well, several people gathered. I gathered after it was over. I was not there for the exciting part. [laughter] But there was somebody to help, but they were not assigned to help. There was somebody obviously just out, because he is still with us as far as I know. [laughter] He would do things like that regularly. He had the activity of a shrew. He was just one great scientist.

RF: One of the great things that I didn't mention which I can give credit to him about, was he actually had purchased an analog computer. I was struggling with computer modeling using digital computers. It just, at that time, was a pain in the neck to do modeling with a computer. The software was not very helpful. Anyway, I actually set up with – I can't remember who it was. Who was the super runner? The real super runner?

DH: John Coutney?

RF: No. He was a younger kid. He was here for a while. He was a runner. He was a real fast runner. I can't remember his name. Anyway, he was doing a study of the community in a seagrass bed out on the, what is it, Phillips Island. He was doing a study on that. He asked me if I would help him do a model. He was interested in carbon flow and all of that kind of stuff. He was actually under Gordon's. He was his major professor. Or who was the guy that was over him here? I can't remember his name. I'm so sorry about that.

JG: Well, Mark used to think that he was pretty fast. But I do not know if that is who you are thinking of.

RF: This guy came to the lab as almost a professional runner. He knew guys that were professional runners. A couple of them stopped by. Anyway, he was another character. But I'll try to get his name if you're interested. We actually published a paper – you can find his name. I looked up my name in google.com or Google Scholar. I don't know if any of you guys have looked there, but it's kind of interesting because it collects articles published in peer reviewed journals by scientists. I don't know how I found out about it. But I just went to take a look at it. They list all of your articles, how many times they've been referenced, and you can actually pull up the paper. So, you just look up Google Scholar, Randolph Ferguson. There are a couple other Randolph Fergusons in there. Don't pay any attention to that. But Randolph...

JG: Randolph Bell and Research Gate has the same function, as does an outfit called Academia that does the same. Academia, you have got to pay for it. Research Gate does not.

RF: I don't know why they're there, because I never participated in that process. Someone mentioned it to me. I said, "Oh, what the hell. I'll go take a look." So, maybe that could be a source for your history.

DH: We ought to get together and write a short book on Dick Williams. [laughter] It says a lot of it wonder he lived some of like that one. Yes. It is quite dangerous.

RF: Oh, there is an interesting coincidence that for some reason, the lab got hooked up with the *Palumbo*. It was a Puerto Rican University research festival. I went out on that.

It was great place. It was an exciting thing because the state room I was in, didn't have an airtight door to the outside. I had a closet in the corner through which a bunch of pipes went down into the engine room. I could see the drive shaft by [laughter] looking in my closet. Anyway, we were out doing a bunch of work for somebody else. It was a fishery project. Someone had filled these plastic bushel baskets with concrete and put an eye in it. They were using them for their nets. They were weights. Any recollection of that?

JG: Well, back then they call them tom weights, but...

RF: Anyway, there was three or four of them back on the stern of the RV *Palumbo* [laughter]. Two of them broke loose. It was one of those days. It was rolling, rolling, but no one could go back there because it was so dangerous. So, they got two groups together. The groups were to focus on these two bushel baskets of concrete that were going slam, slam, slam. I was one of the members of one of those groups. Basically, we totally had to trust the other party that they would actually time it right so that we could both get to those babies. Two guys would hold them, so they wouldn't get started going to the other side. Then somebody else was securing them. We actually pulled that off. Like another funny story? Wilson and I were doing this study off the coast of Peru. While we were there, I don't know, but I think it had to do with the different tide seasons they have. Anyway, there was a reason to go down there. We were on the, I think, it was the *John Brown*. It wasn't the *Researcher* anymore. It was the former Secretary of Commerce or something. But anyway, we were out there. Wait a minute. No, it wasn't there. Sorry. It was in the Gulf of Mexico. We were doing studies of two or three days at a single location. So, we were taking samples at 4:00 a.m., processing them, running an experiment. Bill would do all the calculations.

JG: Think that was a synoptic cruise thing that came up with Don, as I recall, in the Gulf of Mexico where he was on the research or something. We were out there at the same time on the Oregon too, I think.

RF: Yes. Okay, I remember that. So, anyway, we were doing those studies. I was the one that got up at 4:00 a.m., went out to where they were bringing the 30-liter go-flows on board. I had to carry them up to a trace metal clean distribution trailer. One morning, I was there. I was the only one without a harness because I had to take the bottle and walk away. So, there was a lady and then a fellow that were the two that were picking up the bottles and loosening them up and giving them to me. Well, I was standing there. We were, I don't know, 40 feet maybe above the water. I can't remember exactly the distance, but there came what I was told was a road wave. It was about 5.5 feet above the deck I was standing on. It just came across and swooped through us. The lady who was out on the, what do you call it? She was out on the little platform. Hero platform, is that what they call it?

DH: Yes. Not like that hero.

RF: She got folded over the railing of the platform and hurt pretty bad in her abdomen. The

other guy was fine because he was up a little higher. He was holding the wire. It hit me in the chest. All of a sudden, I was being pushed back. I would've gone all the way to the stern, except that I hit a pipe with my shoulder. It stopped me. Then the water just dissipated. All of a sudden, I realized, "Oh, where are my glasses? I can't see a thing without my glasses." [laughter] So, I said, "Oh, well maybe, and just maybe they're back there." So, I walked back there. Then I found them on the deck. [inaudible] Wow. It's unbelievable. Crazy. Crazy.

DH: Well, I think we better wind down. But it has been a great interview. I appreciate you coming in and taking the time. Well, I am really glad to see you again.

RF: Well, same here, Don. We got a lot to share, and that includes our own characters which have changed through the years. I think the love that I have for you guys...

DH: I got a, I think from Sears, and that reminded me of the times we had going to Sears [laughter] meeting, which we will not discuss here.

RF: All right, thank you.

[end of transcript]