

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
VOICES ORAL HISTORY ARCHIVES

IN PARTNERSHIP WITH
NOAA HERITAGE AND THE NATIONAL WEATHER SERVICE

AN INTERVIEW WITH
DR. RICHARD FEELY
FOR THE
NOAA 50th ORAL HISTORY PROJECT

INTERVIEW CONDUCTED BY MOLLY GRAHAM

LYNWOOD, WASHINGTON

JANUARY 14, 2021

TRANSCRIPT BY
MOLLY GRAHAM

Molly Graham: This begins an oral history interview with Dr. Richard Feely for the NOAA 50th Oral History Project. Today's date is January 14, 2021. The interviewer is Molly Graham. It's a remote interview with Dr. Feely in Lynnwood, Washington, and I'm in Scarborough, Maine. We'll just start at the beginning if you could say when and where you were born.

Richard Feely: My name is Richard Feely from NOAA's [National Oceanic and Atmospheric Administration] Pacific Marine Environmental Laboratory [PMEL] in Seattle, Washington. I was born on February 26, 1947, in a small town south of St. Paul, Minnesota, called Farmington, Minnesota.

MG: I'm interested in tracing your family history and finding out how your family came to settle in that area. Could you start on your father's side?

RF: Yes. Both my grandparents on my father's side and mother's side originated from Ireland. They were both family farmers. They both migrated to the Midwest. My father's side migrated to Farmington, Minnesota, and established some farms there. There is a very famous park in Farmington called Feely Park, and it was established there because it sat on the original Feely Family farm. My grandfather on my mother's side, his family, ended up in Park River, North Dakota. They were farmers as well. He was the leading potato farmer in the state. He was the state potato farmer specialist. As a sidelight, he designed new varieties of potatoes and, because he was a seed producer, got them distributed. What he did is he created seeds that were very impervious to diseases. He had his own laboratory in his office at work. When I was a little child, he would bring me to the laboratory. I was five years old. He'd bring me to the laboratory and show me how the experiments worked. I would have to say my starting point in science came from my grandfather who had a huge impact on me.

MG: I'm guessing both sides of the family were impacted by the famine in Ireland.

RF: Yes. The families moved over in the late 1880s. They didn't know each other then, but they moved to Minnesota and North Dakota. But they came for the same reasons, and they immediately started farms. My grandfather was the leading businessman in Farmington at that time. He was the person who provided the seed for all the farmers. He had the biggest building and the biggest elevator and provided all the seed for the farmers. He was a very important person in that area, and he was a delegate to the Democratic Convention in the late 1930s. He was a very political person as well.

MG: Was this your mother's father?

RF: I was speaking about my grandfather on my father's side, from Farmington, Minnesota. He was a very impressive person because he was very politically motivated and had very strong opinions. He was a very strong Democrat and believed quite heavily in Democratic farmer labor unions and working with the government folks in developing programs for farmers. He had a major role to play, so instilled in us a sense of duty.

MG: Would he have been involved in the Works Progress Administration [WPA] at this time?

RF: I don't know that. He may have been. I've never heard that story. But because he provided the seed for farmers, he was sort of the liaison between the farmers and the government. There were a lot of issues back and forth, and later on, environmental issues that he had to deal with. All of his sons, except for my father, worked in that industry. My father went to college at the University of St. Thomas, where I went to college, and he was an extremely good athlete. He was probably one of the best athletes at the time. He played four sports in college and lettered in four sports. He, later on, became the head basketball and baseball coach at the university. When I went there, my father was the athletic director and basketball and baseball coach. We, as four boys growing up, spent our lives playing sports under my father; we all played underneath my father. He was also a very great educator. He taught until he was seventy years old and instilled in us the importance of education. Because of that, all his four boys and my mother graduated from St. Thomas University, just like my father did. In fact, my brother Dan, my youngest brother, who is a doctor now, graduated arm in arm with his mother on graduation day.

MG: I was curious about that. I know your mother attended the University of St. Thomas University, but I wasn't sure when because it wasn't co-ed until 1977.

RF: No. When she went there, she went there because there was a very strong seminarian program at the University. The campus of St. Thomas University is co-located with the St. Paul Seminary. She went through to become a chaplain. She ended up becoming a hospital chaplain. She got her degree there. Our whole family was linked with that university for all of my childhood. I worked there from the time I was twelve years old onward.

MG: I'll ask you more about that when we get there. I was also curious to hear more about your ancestors. Do you know what part of Ireland they came from?

RF: Yes, I do. They all came from the Galway region. We've run the family history back. On my father's side, they all came from Galway, as I said, as farmers. We can trace their history back. I'm about seventy-five percent Irish. On my mother's side, it's mostly Irish, but a little bit of German and French on her side, but the family came directly from Ireland on their side. My grandmother on my mother's side, very strong German, and she could speak German – a very strong German person, a very strong-willed person. I lived with them for a while when I was growing up, so they had a huge influence on me. It was a very positive influence. I was the only member of our family to actually live with them for a while.

MG: I was curious how they found this part of Minnesota to settle in. Were there other Irish families that had sent word back that this was great farming territory?

RF: Well, I think the reason for settling in Minnesota was driven by the Catholic Church because there was a bishop in St. Paul, a very famous Bishop in St. Paul. His name was Bishop [John] Ireland by consequence, and he actually brought many of the farmers over to Minnesota because the famine was so bad that they really had to make a rapid change in many cases. A lot of Irish people first went to New York and then from there went directly to Minnesota. One of the buildings on campus was named after that bishop. That's why we know all this history so well.

MG: Was the Catholic Church a big part of your family's life?

RF: Very, very much so. My mother, as I said, was a chaplain. My father was very religious, and they would have religious study clubs every week. My parents would bring over all the professors from the university that taught religion and bring them over to the house. They would study religion in our house once a week. We would talk about that. They would bring their children in to hear some of the lectures. We went to Mass almost every day. So yes, you got up at six in the morning, and you went to Mass. You had a very strong Catholic background. Religion was very much part of our life. My dad was a college coach, which means you had to go to Mass before every game and pray for a good outcome. Since he was the most successful college coach in the State of Minnesota at that time, it somehow worked out.

MG: How did you feel about that growing up? Did you dread going to church so often, or was it something you enjoyed?

RF: I enjoyed every part of it. I had the great fortune of having three brothers. My older brother was two years older than me. We were very close. Then my two younger brothers, who were very close, were all involved with athletics, all played sports a great deal. They were all very successful. I was the least successful athlete in the family, but I enjoyed it immensely. I enjoyed the relationships with my brothers. My father once told me, "Dick, I think you're going to make a better scientist than an athlete, I think you ought to go into science," and that was really good advice at the time. I didn't accept it very well at the time, but I appreciated it later on.

MG: I was curious how your parents met.

RF: My dad, after he went out of college, he went directly into the Army. This was in 1944. Because of his athletic background and his training, he became an officer in the Army as a trainer for cadets. He was the physical education specialist, so he had to train them to get into shape. He did that in Coral Gables, Florida. At that time, my mom was going to the University of Miami. They met there and fell in love right away. They both had exactly the same religious background, which was very important to them, and the farming background, which made a big difference as well. They fell in love, got married there, and then they moved off to Texas because his training center moved to Texas. My older brother was born in Texas, right near the end of the war. Then he came home, had a couple of jobs beforehand, but almost immediately went to St. Thomas very early on, in the high school because the high school and college were on the same campus. He spent many years in high school and then eventually moved over to the college and became a university professor.

MG: The high school and the college were connected? Was it a private high school?

RF: Yes, we went to St. Thomas Academy, and St. Thomas Academy was at the time on the university campus. It's now separated. They now have their own campus. This was an all-boys high school and an all-boys college at the time so it made great sense to do that, and the seminary was just down the road. It was a very, very unique setting, a very strongly Catholic setting. We basically spent our entire career in high school and college on that campus. I would work there every single summer, working for my dad. For me, growing up was playing sports, being on campus, learning what college life was all about way ahead of time, and thoroughly enjoying it.

MG: What would you be doing for your dad? What were your duties?

RF: He was the director of the summer program for kids, and it had included both teaching swimming and teaching sports. My job was as a lifeguard in the swimming pool and also as a sports trainer for the kids. We would go there every day. We would work an eight-hour a day and probably make about a couple of bucks. If we were good on Fridays and did well, he would treat us with an ice cream cone at the end of the day. He got a lot of good work out of his boys. It worked out very well for us. We got a lot of great training and a great life.

MG: What brought your mother to the University of Miami? That seems like a long way to go from the Midwest.

RF: Well, my grandfather, her father, was an incredibly successful entrepreneur. He was terrific. He had a farm in North Dakota, his primary farm in Park River, North Dakota. It was fun to be with him in the summertime because we would go out into the fields, take you by the hand, and show you all the plants that he was growing. He had a variety of different plants because he was developing seeds. So he had many different plants. He'd get the seed and put it in his laboratory and test it. He'd walk you through the farm, and he would show you each plant and explain to you what he was doing. I was learning genetics as a five-year-old from my grandfather. He was an amazing man. But he also had a farm in Florida. He didn't like the winters very much, so he had a farm in Florida, and he had lots of lots of crops that they grew down there as well. He had dual farms and was very successful in farming both. He and his son ran both farms. It was wonderful.

MG: You mentioned a little bit about your father's service. Did you have other relatives that served in World War II?

RF: Yes, my wife's dad served in World War II. He was on one of the ships in World War II in the Pacific. He was an incredible person as well. He was very good at whatever he did. They didn't have anybody that could do any kind of office work. So when he was on the ship, he did all the office work and took care of that. That made a difference because his later job – he ended up selling office equipment for the rest of his life, and he was the most successful salesman. He learned from his experience. But he was over there in the Pacific, in World War II, a very dangerous situation for him. Of course, my uncles also served in World War II, as well. We come from quite a large military family. In fact, I have two nephews, and one was in the Air Force Academy. He is now stationed in Alaska, and the other one, his brother, is now a pilot for the Coast Guard. We have a very strong relationship with the military.

MG: I was curious if your parents or your grandparents faced any discrimination when they came to the United States because of their Irish background or because they were Catholic.

RF: I've never heard much said about the Irish background because I think it had to do a lot with where they settled. In Minnesota, at that time, early on, each community was usually their own particular nationality. So that was always fun for me in Minnesota because if you wanted to see what it was like to do a German folk dance, you would go to one town, New Ulm, Minnesota. If you wanted to see what it was like to do Scandinavian dancing, you would go to Minneapolis.

But in St. Paul and Farmington, they were mostly Irish, so you knew where the different regions were. In fact, when I was growing up, if you wanted to hear a different language, you'd go to another specific town. It was so settled in the individual communities what the nationality was. For us, it was great to see that. It was great to see that there are the wonderful groups of people carrying their heritage forward. If you grew up in St. Paul and Minneapolis, they were two cities right next to each other, Mississippi River in between, but, in fact, they were entirely different cultures, absolutely different cultures. As kids growing up, we got to see that. My wife was from Minneapolis. She comes from Swedish, Norwegian ancestry. I'm from St. Paul; I'm of Irish descent. We knew that difference growing up and really cherished it. It was quite phenomenal. My sense of community came from that experience for sure.

MG: Were there ways in which the culture was brought over in terms of the food you ate and the customs you had?

RF: Yes, for certain. Both my grandparents – we lived in St. Paul, Minnesota, but we went down to Farmington every single weekend to be with my grandparents because all my cousins were there. My grandparents on both sides had this concept that the biggest meal of the day was at lunch. That was the primary meal, and you had a light meal at night. This is that farming perception. You came home from working in the fields from about six o'clock onwards, and you had a big lunch, and then you went back out in the fields. Then you had a light dinner before you went to bed. When I was with my grandparents in North Dakota, they did the same thing – big meal. Of course, they had potatoes, right? You had to have potatoes. You had to have meat. You had to have a vegetable. But with my grandfather in North Dakota, since he developed and created many different varieties of potatoes, they were a big thing because we would have a potato meal with this particular Red Pontiac potato because he developed it, or we'd have a white potato another day because he developed that. I got to learn all the different varieties of potatoes and what they meant, and how they are resistant to disease because of the genetic work that he had done over the years. So I learned about that. But the food was very, very specific in Minnesota. I also remember, as a Catholic, you could not eat meat on Friday; it was not allowed. So we had fish every Friday night. It's not like fish is here in Seattle. I can guarantee you that. It was quite a bit different.

MG: How was it different? What kind of fish were you eating?

RF: Generally, we were very poor. My parents on both sides came from poor [families]. When you ate fish in Minnesota, you ate fish sticks, and fish sticks were frozen. Never did I ever taste salmon, or did I ever have a cod fillet. No, that never existed. We had a much different viewpoint of fish at that point in time. However, we also did a lot of fishing when we grew up. One of the advantages we did have is my grandfather had a beautiful cottage on Lake Bemidji in northern Minnesota. When we went up there in the summertime and caught our own fish, we began to appreciate how good fish could really taste. There were both sides of it.

MG: You mentioned your grandfather being involved in politics. Was politics something you discussed in the home? Were your parents politically aware or involved?

RF: Yes. It was very much a part of our lives. Both sides of the family were strong Democrats. Their perception was that there should be a relationship between the government and the farming community in particular, but there's got to be a relationship, and it's got to be a strong relationship because we're providing the food for America, and the government needs to help out. When you have a major catastrophe, like a major set of storms that occur one year or that destroys a crop, the government has to come in and help out those farmers. What you learn really quickly is that all farmers live in a very tight margin. The margins are small, and so they need help from the government to make sure they can get through that. At that time, that's the way it worked out. These were all small farmers. They weren't big farming corporations as they are now. So that discussion at the table about how that should work out, and getting through the war, coming out of the war – I grew up at the time, right out of the war. Getting through that, seeing the growth in America at that time, living pretty much simple lives, and discussing these issues, not just with my grandparents and my parents, but all my parents' brothers and sisters and our nephews and cousins – it was a very broad family discourse. They had their friends that we got to know as well. So you'd hear all sides. It was very good. When we would have family dinners in Minnesota, it would extend. I remember very clearly as a young boy, about a sophomore or junior in high school, going through the Cuban Missile Crisis and listening to how scared my mom and dad were and how frightened we were during that week-long episode of the Cuban Missile Crisis. [Editor's Note: The Cuban Missile Crisis of October 1962 occurred after the U.S. discovered that the Soviet Union was installing nuclear missile sites in Cuba. As a result, the United States and the Soviet Union engaged in a thirteen-day standoff until the Soviet Union agreed to remove the missile installations in exchange for American military concessions in Europe.] Or, later on, when [John F.] Kennedy died, and actually sitting down with my parents. [Editor's Note: President John F. Kennedy was assassinated on Friday, November 22, 1963, in Dallas, Texas.] They all felt that Kennedy was the most important person in the world at that time. It was an enormous shock. We lived through that with our parents. I would say having a political awareness with my family was a very immensely important part of our lives.

MG: Were either of your parents and their families impacted by the Great Depression? I know that sometimes farmers fared better because they grew their own food.

RF: Both of my grandparents lived through the Depression because they had their family farms and because they had their farming businesses, and they provided food. One very strong recollection about my grandmother herself, who was a very wonderful person and also went to church every day. Because many people at the time didn't have any food and there weren't very many ways to get food, she would bake every single morning. She would get up every morning, bake, and then leave something out on the porch. Whoever needed that knew that. She'd just leave it for them, and they would get some food. It taught us the importance of giving. She was probably the most loving person I've ever met.

MG: You were the second son born of your parents?

RF: Yes. My older brother was born when my dad was still in the Army. He was born in Texas in 1944. I was born in 1947. I was born in Farmington MN. My older brother was a high school principal and, of course, a sports enthusiast. His claim to fame, besides being a high school principal and many stories about that, is that he was also the most successful girls' softball coach

in the state of Minnesota. He just wrote a book about that. He just gave me a copy of his book. It's all about Title [IV]. [Editor's Note: Title IX of the Education Amendments of 1972 requires gender equity in any educational program or activity that receives federal funding.] It's all about the effort to bring women's sports to the forefront in America and his part in that. It's a very fascinating book.

MG: That's so interesting.

RF: My dad was the athletic director at St. Thomas University at that time. So he had to deal with Title IX. They had to change all their buildings, and they had to hire coaches real quickly. They had to change the locker room so women could play sports. So it was very real for us. There were absolutely major changes that took place. But my brother was kind of a leading proponent of really advancing girls' sports, and that was one of his fortes. One of the things he learned very quickly is that his girls' teams learn teamwork. If he could instill that sense of teamwork with the girls, they would be successful. Interestingly enough, he said, "I had more success teaching teamwork to girls than I did to the boys. When I found that out, I decided I'm going to focus my attention on that," and he did. I think he's still the only softball coach in the state of Minnesota that's ever won two back-to-back state championships, a very rare thing. They have the field named after him. So he had a very successful career but made a big impact in Minnesota sports by advancing women's sports. I think that having that sense of fair play – the title of his book is *Heart is Everything*.

MG: I'd like to get a copy. That sounds very interesting.

RF: Yes. He is an amazing person in how much he believed and instilled that belief in his girls, and the testimonials in his book are wonderful.

MG: When were your younger brothers born?

RF: My next brother, Tom, named after my dad, was born five years after me. He was a high school guidance counselor for his career. He also was a special teams coach for football and wrestling. It was interesting because he got into the field of teaching kids in high school how to be a placekicker in football. It was good that he did because his son Jay Feely played in the NFL [National Football League] for thirteen years and was on five teams. Now he's a CBS Sports announcer for football. I just got an email from my younger brother today about the kicker for the Atlanta Falcons was one of his students, and I didn't know that. So my brother was very successful, very specialized. He has his own kicking school that he teaches. He just recently wrote a book about his life as well. I'm still reading that. His whole life is again about positive attitude, working with people to make them believe what they can do, showing them how to do it, and helping them achieve their goals. Consequently, both of my brothers have that approach to life. Then, my youngest brother, Dan, was quite a bit younger than the rest of us. There was a separation there. But we all had strong ties anyways as his children came up. He was a very good wrestler in sports and also played football, and very successful that way. Well, he became a family doctor in Minneapolis and has a very successful career in family medicine. He's on the frontlines COVID right now, and he's taking care of all the people and giving them their shots. Every day, he has to come home, take all his clothes off in his garage. In Minnesota, in the

wintertime, that's a big deal because garages are not heated. Then, go and take a shower and get those clothes into the washer and dryer before he can come into the house to be with his family. That's what he does every day. He has been the one who has taught us all to be very careful about COVID. Every time we have a question, we call him on. I just got an email from him; he said, "I just got the shot today." This was a couple of days ago. We're all very excited because we're all waiting for that opportunity. This family of ours meets every year in a resort. We have all the children, all the grandchildren. My parents started this whole process. All fifty of us get together once a year and share these fond memories together and create new ones. We're trying to keep the tradition very much alive. It's worked out very well for all of us.

MG: Did you have to postpone that reunion last year because of the virus?

RF: Well, my two brothers own cabins, and the doctor brother rents a cabin. I stayed home because of COVID. My brothers were very careful. They stayed inside in their own cabins, but they were able to communicate. We still found ways to interact with each other via Zoom during that time, as well as it's what we do every week anyway. It's just an incredible closeness that we have.

MG: What are some of your earliest childhood memories? Can you tell me more about the area where you grew up?

RF: Well, I grew up in St. Paul, Minnesota. It was interesting then. The one thing that made things different in Minnesota is, at that time, if you were a kid in Minnesota, you could go out after school and play all day or all night and just play. Your parents would know you were in the neighborhood but didn't know exactly which kids they were playing with. But we were playing, of course, with the neighborhood kids, no big deal. We got to know all the neighborhood. My dad would organize a basketball game in our backyard every weekend. We got to play with all the kids in the neighborhood, but we were able to really get to know the neighborhood and all the people very well because of that. We would then play sports during the summer and throughout the year. Most of the time, you walked everywhere. In Minnesota, that was a big deal that you walked. I walked to school every day. I remember many times when the snow was very high or it was extremely cold. Sometimes, it would be thirty or forty below. It was very seldom, but every once in a while, our parents would drive us to school if it was really cold. I remember many times coming home from school, particularly when I was in high school, coming home from school, and my hair would be frozen because it was so cold. I had just gotten out of the shower from playing sports, and my hair would be frozen by the time I would get home. You always remember these kinds of experiences. The other aspect of it was that we grew up around lakes. By growing up around lakes and interacting with lakes in very special ways, fishing, swimming, and getting out and hiking – I did a lot of hiking – I really developed a love for the outdoors and a love for the environment. By the time I got to be about eighth grade, I knew what I was going to do for my life. I was convinced I was going to be an environmental scientist. That was because of, of course, Jacques Cousteau and his influence on all of us. I thought that it was pretty natural that my love for the lakes transitioned into a love for the ocean. Although I had never seen the ocean, I had this love, and that's what I wanted to do. When I was in college, I decided I was going to become an oceanographer. But I had no way of knowing how to do that. I would write letters to the universities asking how to apply for graduate school, and Texas A&M University

responded back. Texas A&M University is in College Station, Texas, which is a hundred-and-fifty miles from the sea. So I went to Texas A&M. I first got a master's degree in chemical oceanography by analyzing samples that were provided to me by my professor. After I got my master's degree, there was a big transition that had to take place. They had to make a decision whether you were allowed to go on for a PhD or not. They would call us in one by one, talk to us at great length, and tell us whether or not we passed the test, and on that day, tell us whether or not you were going to go on for a PhD or you had to leave. So when it was my turn to go in there and have this very serious discussion – my whole future depended on what happened – my professor says, “Well, Dick ...” This professor, Bill Sackett, who was a very famous oceanographer, says, “I see here that you've taken all these courses, which is good. You've done fine. You've done your work. You've already written the thesis. But it's not clear to me that you've been out to sea yet. Have you been on a cruise yet?” I looked at him, and I said, “Well, to be honest, professor, I've never seen the ocean yet.” Here, I had a master's degree in oceanography, and I had never seen the ocean. He said, “What? Well, we're going to have to change that for sure.” So he immediately said, “Yes, you can go on for your PhD, but we're going to send you to sea right away.” From that time to this day, I've had over a thousand days at sea on ships.

MG: So you'd never even put your toes in the water?

RF: Never put my toes in the water, no. Because I went right from Minnesota to Texas. I had never been around very much other than that. So he changed all that. I went out to sea my first time with him. It was in the wintertime. It was very miserable. I got sick right away. I thought I was going to quit oceanography on the spot. But he said to me, “Why don't you stick it out and see how it goes?” I got better. So I hung in there.

MG: I'll ask you a little bit about this first experience at sea, and then I want to jump back to your early education. What were your first impressions of the ocean? I've always lived near the ocean, and it's been a big part of my life. What was your early relationship with the sea like?

RF: I absolutely loved it. As I say, working in lakes – because I had a project working in lakes when I was growing up. I knew I loved to be on the water. I knew I loved working in lakes. I didn't know what I was going to do, but I wanted to be an oceanographer. For some reason, I linked it to the biggest thing in the world, the oceans, so I made that switch right away. So when I went out, I knew this is what I wanted to do for a living. I had no doubt in my mind. What we did, of course, is we started out on cruises. These cruises were in the Gulf of Mexico because we were at Texas A&M University. To go out where you actually never get to see land and go out for long periods of time, you either loved it, or you hated it. I loved it. I thought it was amazing because everything that happened out at sea was totally fascinating to me. I just thought seeing the biology as you drew the nets in and looking at the organisms and relating the chemistry to the value was just very exciting to me. I always wanted to link chemistry and biology together in whatever way I could. At that time, there was very little understanding of how the chemistry and the biology came together. So that, to me, was an exciting new research arena that was yet to unfold. I learned to be a diver. Because I learned how to be a diver, I got to go underneath the surface of the ocean and see how the animals lived and appreciated what it was like to do that. I had many wonderful diving experiences, some fairly precarious. One time, we were diving in the

Caribbean, and this is one of my first dives with my diving instructor, and my job there was to have a bag behind me. As we collected organisms for a study, they threw them in my bag. We started coming back out of the water, and we were going on to the raft. I got onto the raft with a bag of fish, and the diving instructor behind me got in. He said, "Did you see what was behind you? Right behind you?" I said, "No, I didn't." "You're glad you didn't see him because it was a ten-foot whitetip shark, who was very interested in your bag." So indeed, I was very, very cautious at that point, quite scared. We got onboard the ship, and sure enough, there were sharks all around the ship. We had no idea when we were in the water. I think that if I had known what had happened, I probably would have swallowed water or something and just gotten very upset and done something really stupid. But because I didn't, I didn't have that problem. Nevertheless, we just learned to love the sea. We would go then down to Galveston, as I learned how to go to Galveston, or we went to Port Aransas, and we started camping out by the sea. My wife was very much the same as I was. My wife Terry was a much stronger swimmer than I was, and she loved the sea. We would go down there and camp out by the ocean and really enjoyed it a lot. It was great. Once again, my wife was very much the same background as I was. She put me through graduate school. She was a nurse, so she was very much in demand as a nurse. She was the operating room supervisor in Navasota, Texas, just south of College Station. She had the job; I didn't. She paid the bills; I didn't. We didn't have any money. We were always very poor, but we were able to survive. I think we survived on like two-hundred dollars a month at the time. It was a long time ago. But it was a great life, and it was a great opportunity. It was a wonderful experience to begin to understand oceanography and begin to appreciate oceanography, work with the professors and work with the students, and grow and develop the capability to study oceanography in a very real way. I learned that I loved going to sea. So getting a job where I got to go to sea often was a great thing.

MG: I want to back up just a little bit and ask about before you went to college. How was your interest in environmental sciences supported or nourished? Did you have certain teachers that encouraged you?

RF: Well, it's very interesting. I really loved watching Jacques Cousteau's movies. I would say watching his movies really engendered my interest in oceanography. But many of my professors, who were great people – they were absolutely wonderful people – gave me a great foundation in chemistry. I had a great series of professors in chemistry. They didn't know how to instruct me in oceanography and get me prepared for it. They suggested I take a survey course in geology. That professor was just wonderful. He allowed me to see what geosciences were all about and how I could connect up between the geology, and the chemistry, and the oceanography. Jack Brownstein was his name. As I learned from him more and more, the more I loved it, the more I thought, "This is what I want to do." I knew I was in the right direction. Then he did help me figure out what graduate schools to apply to. He was just this delightful teacher. He would call you out and tease you and kid you. He was just a delightful man. But he had a great sense of what it means to be an environmental scientist and what it means to bring together the concepts of chemistry and physics and geology and biology.

The more I studied under him, the more I knew this was the right thing for me. As I said, he helped me figure out what graduate schools to apply for. He helped me and wrote letters for me. It made a big difference. I think he was the reason why I got into graduate school. I had the sense

all along that this is the direction I wanted to go in. It's funny because when I tell my kids that story, they say, "Dad, you're so lucky that you knew what you wanted because we had to struggle to figure out what we want." So I think I was fortunate. I was fortunate that I had a sense of direction all along. I really wanted to devote my life along those lines, and I think it made a huge difference for me.

MG: So it was this professor that really showed you and shaped your trajectory towards oceanography from environmental sciences and chemistry.

RF: Yes, he did, because he had this incredible broad view and broad vision for environmental science. This was a general course. He had this great perspective of how you can see the interaction between the atmosphere and land and then the land and the oceans. Of course, he had a great perspective, the long-term geological perspective, on that. Geologists, quite frankly, really do have a broad perspective of the long-term changes that occur on earth. That's a critical perspective that you need; things occur over millions of years or hundreds of thousands of years. You have to think along those lines, and he would inject those ideas, so that we can see that large-scale processes sometimes can be very quick, such as a comet hitting the earth and causing a major disaster occurring, such as when all the dinosaurs were killed, or a long-term event that lasted millions and millions of years. He gave you that perspective, and you began to appreciate how the Earth systems works. That really opened my eyes quite a bit about how to think about science from an environmental perspective. I didn't have that before. I just knew chemistry; I just knew biology at the time. He made a huge difference in my life. It was a great way to start my course of learning about oceanography.

MG: I'm also interested in your experience of student life and campus life during those years. These were interesting years on college campuses. I don't know to what extent the anti-war and the Civil Rights movements of the time made their way onto St. Thomas's campus, but I was curious if you could speak to that period.

RF: There were a lot of interesting things that happened totally serendipitously but had a huge influence on me. Growing up in Minnesota, you had very little connection with different races. We were pretty much mostly white races. There were Afro-American people in St. Paul, but they were localized in parts of St. Paul that I very seldom went to. I had very little experience with racial differences. Certainly, growing up in an Irish Catholic family, you learn that it's important to treat everybody equally. But you didn't know what that meant until it hit you in the face. One of the things I struggled with when I was in college was calculus. I had to seek out help in calculus. My calculus teacher was a Black man, who was a very good teacher. He was a fellow student, as well. He taught me: let's set everything aside and learn from each other. If you don't worry about anything race-wise, you can learn a lot from each other. It was my first experience, but a very strong experience if you just need to meet people face to face, one on one, and meet them as they are because we're all human beings struggling to make things work. I really was impressed by that, particularly when I moved to Texas. Everything was quite a bit different when I moved to Texas. My wife and I were both extremely shocked and faced with racial differences when we moved to Texas for the first time. Then we realized how real the situation was. I think my political awareness, if you will, of the differences between racial groups and the differences in thoughts, particularly politically, really stemmed from my experiences in Texas because you

went from a simple life with people of similar backgrounds and experiences to a culture that was totally different than yours and a culture that had strong opinions –in Texas – that you were not brought up with that vision. So it actually challenged you in ways that you were never challenged before. That was really eye-opening for me. You had to think about what people were saying, how it impacts you, and how it impacts your life. My wife had to deal with it every day because she was an operating room supervisor in a small town, where these situations come up every single day. I would deal with it when I went down there to visit with her friends and her coworkers and deal with it by the social interactions we had, as well as the both of us dealing with our friends and neighbors in Texas. That’s not to say anything bad about Texas at all. It’s to say we were faced with a cultural difference because of historical background that we had to integrate into our thinking that we’ve never had an opportunity to integrate before. You learn from those experiences. Quite frankly, it made such an impression on us that where we decided to finally end up in our job selection was based on those experiences. I certainly would believe that having our children grow up here in Washington State has had an enormous impact on their lives. I can say that because each of our children have based their lives on the experiences that they’ve had in our state. I’m more politically aware of what it’s like in the mid part of the country because I grew up in the mid part of the country, and I went to school in the South. My children’s perceptions of what it’s like to live in other parts of the country are not as clear as ours were. You begin to see that those cultural differences really do make a difference. You begin to see that your values in life are going to be challenged.

MG: Did you meet your wife in Texas? Was she from there?

RF: No, my wife was from Minneapolis. She grew up in St. Louis Park, Minnesota, which is near Minneapolis. She grew up in a very strong Norwegian Swedish family and with lots of siblings – a very good family. Her mom and dad were just the most lovable people you will ever want to meet. They took me in right away. We were very close. We’ve always been very close with her parents. She grew up in a family that, again, was very athletic themselves. They were very strong swimmers. We met when I came back from graduate school after the first semester. We met in Minneapolis, and I was able to tease her quite a bit during the first date. When we went to visit her mom and dad that night when I went to pick her up, I went there with my best friend, and she said, “Mom, Dad, I want to introduce you to my date. Which one of you, again, is my date?” She would joke with me like that. I picked up on that right away, and I realized she was joking with me. So we went to a party at my friend’s house, and I said to her at the party, “Terry, tomorrow, I have to go back to graduate school. I’m leaving on the bus. I don’t want you to come down to the bus to see me off because I don’t want you to cry.” Now, this is our first date. She immediately said, “You fool, I’m not going to do that.” My nickname was “You Fool” from that point on in life. But we wrote back and forth almost every day. The following summer, I got a job working at the St. Paul Water Department, studying the chemistry of lakes. A wonderful job. My best friend and I lived together. I dated my wife through the summer. By the end of the summer, we were engaged and the following year, we got married in June. Then she came down and joined me in College Station. We spent three years there together in Texas.

MG: I also wanted to ask about the anti-war protests. Were there any on-campus while you attended St. Thomas?

RF: If it had much to do with St. Thomas, I wasn't aware of it because I was so involved in sports in school. But it had a huge impact at Texas A&M University. Texas A&M is a military school, just like West Point. It's the largest military school in the South. We were on campus. Our building on campus was right next to the Student Union. All the cadets went to the Student Union right next door to us. We would see them when they had parades right there. We would see all the interactions with Texas A&M. We would have strong discussions amongst the graduate students that I suspect were a different viewpoint than the undergraduates. The undergraduates were all – because it was a military school – pro-support for the military. The graduate students just, I would say, had a broader viewpoint. A lot of us had to deal with that in a very real sense because, at that time, we could go into the military at any point in time. There was a lottery at that time. Depending on your number in the lottery, you could be pulled right out of graduate school and join the military. It was very serious. You would go right to Vietnam as soon as that would happen. There were very strong opinions and viewpoints. I remember one particular day. I had this lab that was my own laboratory. It was way in the corner of the basement of a building. I would listen to the news around noontime. My favorite newsmen at the time was Paul Harvey, and Paul Harvey had this noontime discussion. I would listen to him religiously. I really liked the guy a lot. I liked what he said. He was from Chicago, very famous. He had a lot to say. He was pretty much very strongly supportive of the military. One day, he gave this speech about Texas A&M University. It was very interesting, because he said, "Now, where everybody is rioting on other campuses throughout the United States against the Vietnam War, the Texas A&M students are coming out and having strong discussions, where they were expressing their support for the Vietnam War." All the students supported the Vietnam War, and that was his point that he was making. We thought about that a lot. We weren't quite sure that that was universally true. But that was what was said about Texas A&M at the time. I went home that night and the place where I was renting an apartment – the town judge was the owner of the apartments, and I had to pay my bill that night. He came to me, and I had to pay my bill. Eddie Bernard was the other person that was in the apartment just down from me. We got to talking about the fact that we were having this parade at Texas A&M because there was a student who was coming from New Jersey, and he was going to speak against the Vietnam War at Texas A&M University. He tried to do that, and the administration said, "No, you can't do that." So he had an impromptu presentation on this parade ground right next to our building. Of course, what they immediately did is, because he didn't do it properly, they arrested him. I'm talking to the judge, who is the leading judge in the city and the magistrate, and he said to me, "Boy, I can't wait till this kid comes before me. I'm certainly going to throw the book at him. We can't have any of those foreigners come to our state and ruin our people." I said, "What do you mean 'foreigner?'" He says, "Well, he's from New Jersey." I thought, anybody outside of Texas was a foreigner to him. He says, "Hey, you have a funny accent? Where are you from?" I thought, Oh my gosh. I'm on the spot here for sure. I said, "Well, I'm from St. Paul. It's a little town north of Dallas; you may not have heard it." He laughed. I think he understood what I was saying, and we got along just fine. But it did show you there was a cultural feeling at that time, and it was extremely strong. They were either for the war or against it. Sometimes it had a large impact. Certainly, this is an example of that.

MG: So you didn't receive a deferment? You were part of the lottery.

RF: I was part of the lottery. It was interesting because one of the things that I did when I was in high school – because the lottery actually started when we were in high school – is I applied for the Naval Academy. St. Thomas Academy was a military academy, so I could get into the Naval Academy through St. Thomas Academy, or through my local senator, who, by the way, was Hubert Humphrey, a very famous senator from Minnesota, who ran for president. He was our senator at the time. We weren't sure how things were going to go. It turned out that my lottery number was 365. I was not going to be asked to go into the military, which allowed me the opportunity to go to college and graduate school. It turned out that I did not get into the Naval Academy for medical reasons that occurred at the time. Later on, my professor, who was a colleague at Texas A&M University, was a former teacher from the Naval Academy. He said, "Well, you had a better opportunity to pursue your career in oceanography at Texas A&M than you would have at the Naval Academy." So sometimes, things turn out in unexpected ways that are to your benefit. I really believe strongly that things work out for the best in the end.

MG: I have a number of follow up questions. I also want to ask you in more detail about your graduate school experience, but I want to check in first and see if you need to take a break. We've been talking for an hour now.

RF: I'm doing just great.

MG: Okay, good. Me too. Forgive me for jumping around. But I wanted to hear a little bit more about your mother's education. Did she work outside of the home before pursuing her education and career as a chaplain?

RF: No. She was a stay-at-home mom. Of course, she had four boys to deal with. To her credit, she stayed at home, took care of us, and then, as soon as we got into college level, she said, "I'm going to finish my degree." She had gotten through three years of college at the University of Miami. She went back to St. Thomas to get her degree and be a chaplain. As soon as she got her degree, then she went to work for various hospitals around the city of St. Paul.

MG: What was her undergraduate degree in? Was it theological counseling?

RF: Her undergraduate, she was moving towards a biology degree. So that's the direction she had when she was an undergraduate. But she actually left because my dad and she got married, and they had to move to Texas. When she picked it up again, she picked it up in religious studies.

MG: Did she ever talk to you about her work and going into hospitals? What was that like for her?

RF: Well, she had a wonderful job that impacted her perfectly because she's probably one of the most empathetic persons that I've ever known. She had this ability to sit with the person and listen to them, and to help them in ways they needed at that time. She was very good at that. She was very good at talking about personal issues and religious concerns and providing a religious perspective on life's problems. So being a chaplain was a perfect job for her because when you're at that stage of your life, or you're near death, in many cases, she was the kind of person you'd want to be talking to. Her friends would come to her and seek her console naturally. She

was very good and skilled at that. It was a very good fit for her, and she kept doing that work into her seventies. They kept wanting her to continue working because she was so good, until she finally said, "I have to retire."

MG: Were there a lot of other female students in this program at St. Thomas and in this profession? I was curious if any of these decisions were influenced by – this was the period of Vatican II, and more opportunities opened up for women at this time. [Editor's Note: The Second Vatican Council (Vatican II) was opened by Pope John XXIII in October 1962 and closed by Pope Paul VI in December 1965. The Council focused on issues related to the Roman Catholic Church's role in the modern world.]

RF: Yes. One of the things she would talk about is she'd take these courses over the course of two or three years. She got her degree, but she spent three or four years on it. She would take one course per semester. She took her time in doing it. But she would ace every course because she could focus all her attention on the one course. She would interact with the professors. Her term papers were so good they would want to share them quite a bit. As I said, they had study clubs, where they would talk about these kinds of Vatican II issues. So that was a major part of the discussions that they would be having at home with us and with their friends. I remember that quite well. She was one of the lead speakers; – sometimes she would disagree with their professors, and she would bring that up. Her presentations were so good, and her papers that she wrote were so clear that they would take her seriously in what she said. She would allow us to read them, and I spent a lot of time reading them. It certainly shaped my thinking over the years. I often think about my parents, about what views they would have through the politics of the last decade, and particularly the last four years. I often think I would love to hear what their thoughts are now because human interactions and taking care of your neighbor were the central focus of our entire family thought process. I believe that today would be very interesting for me to talk with them, as well as my wife's parents. My wife's parents had the same general perspective but from an opposite political position. So it'd be very interesting. They were also very loving people that cared for their neighbors, and their neighbors all knew that. I think it'd be interesting to hear what they would have to say. We learned so much from them in the past, and I think we would learn from them in the future.

MG: I was also curious about your wife's education, and then how and when she made the transition down to Texas with you.

RF: She grew up in Minneapolis and got a nursing degree. She went to St. Cloud University in Minnesota and then went to Methodist Hospital for her RN [Registered Nurse] degree. She was working in hospitals at the time when we met and were dating. When she came down to Texas A&M, she was immediately sought after because of her strong nursing abilities. She had no problem getting employment working at the hospital in Navasota and became the nursing supervisor for the operating room. She also worked as the lead nurse for the local area nursing homes. She had great opportunities there. Then, when she came to Seattle, she had to work for about a year in part-time positions. Finally, one of those part time positions ended up in a full-time position, working for King County Health Department. She worked for the King County Health Department for about forty years and became the nursing supervisor for the child and youth clinic for the King County Health Department. Again, many of the issues she had to deal

with is putting her patients first and taking care of her patients. We talked a lot about that. I remember one time when her car broke down in the middle of an intersection. She called me up and said, "Can you get down here right away? Because I'm in a busy intersection, and I'm scared." I got in the car, and I drove down there. The police were there, but they wouldn't do anything. All her patients saw her, knew who she was, ran out in the middle of the street, and pushed her car aside. I thought, "You have a great community, and they really care about you a lot." That was great to see. You understood what role she played in that community. It was amazing. She then went on to the University of Washington, got an BSN (Bachelor of Science in Nursing) degree in nursing there. She and I worked together every night on her papers. That was a major effort. That was the same year my daughter was born. We had co-duties of getting ready for my daughter at the same time as finishing up her courses. That advanced degree was very important to us because if she wanted to be a supervisor, she had to have that advanced degree. She got that in 1979. She was there right up through retirement and has done a fabulous job. They all loved her.

MG: What year were you married?

RF: We were married in 1971.

MG: That was the same year you earned your master's degree.

RF: Yes, I was pretty busy. I think I showed up to help out with the wedding ceremony maybe a week before we got married because I was doing graduate school. I wasn't supposed to be getting out of graduate school. So we got married and had a quick honeymoon. Our honeymoon was out to Seattle. We took the honeymoon out in Seattle because she wanted to visit Seattle. I said, "Okay, I will go visit some oceanographers in Seattle and look for jobs." As it turned out, because I did that and stopped in, I was offered a job three years later. So she helped me find the job in Seattle.

MG: Can you tell me a little bit more about your graduate experience at Texas A&M University, the classes you were taking, the professors you had, and then meeting Eddie Bernard? [Editor's Note: Dr. Eddie Bernard attended Texas A&M University, earning his master's and PhD in oceanography, before joining the NOAA Corps in 1970. In 1976, Bernard was appointed the Director of the Pacific Tsunami Warning Center (PTWC) in Honolulu, Hawaii. After Dr. Bernard resigned from the Corps in 1980, he was selected as Director of NOAA's Pacific Marine Environmental Laboratory (PMEL) in Seattle, Washington. He directed PMEL for thirty years. He was interviewed for the NOAA Voices Oral History Archives in 2020.]

RF: We started out in graduate school in 1969. My major professor was Professor Bill Sackett, who was a very famous geochemist at the time. He took me in right away. We liked each other a lot. He was involved with sports. He liked sports, and I like sports. We got along really well. He was probably one of the smartest men I've ever met. But his major thing for him was students. He really cared about students. I was very fortunate to have him as my professor. He would give a student a project and then let them run with it. If they did well, that was great; then he should go on. If they didn't do well, they shouldn't go on. So he gave me a project to work on. I loved the project I worked on. Then, for my PhD, I had to pick out my own project to work on, which I

did under his guidance as well. It worked out well because I was entirely on my own and could develop the project on my own. I actually had to defend the project in a review on my own. He allowed me the opportunity to do that. So I was really pleased. I met Eddie Bernard right away. Eddie Bernard was in my classes, and we got to be friends right away. It turned out we were two doors down in the apartments that we lived in, and we got to building cars together. We were repairing cars together. I had bought a car, and he helped me repair it. So it was a lot of fun working with him. He used to tease me incessantly, as he always felt that I could be teased. He could figure out a way to tease me every chance he got. Because I had three brothers, I was pretty used to that. So I'd tease him right back, of course. He was a physical oceanographer, and we were chemical oceanographers. He would point out the differences between us, which were quite striking. Physical oceanographers, you had to have all the data in front of you, and you had to interpret all the data.

Where, with chemical oceanographers, you never had enough data in front of you because it was so hard to get the data. You had to interpret the data as a chemical oceanographer with a great deal of speculation, and he would laugh at us for the amount of speculation that we would have to apply to our data because it would take you years and years to maybe get a hundred data points. And he would be looking at a physical oceanographic data set of ten or twenty-thousand data points, collected with a CTD [conductivity, temperature, and pressure] or something, and it'd be easy to interpret his data. We had to speculate about what our data meant. He would tease me a lot about that, and we would go back and forth. He was very athletic, and I came from a sports background, so we played a lot of sports together in graduate school, as well. But we were just equals and partners and close friends. We had dinner together many times. My other professors were very helpful to me as well because they taught me how to think. At the time, I would say anything that came to my mind. I was very boisterous. They would say, "Well, wait a minute. Is this true? Is that true? How can you say this? How can you say that?" They were teaching me how to be a careful thinker and a careful scientist. Eddie Bernard was teaching me that you got to only talk about the amount of data that you really have, and you should only speak about that, and you must have the data to back it up. So I was getting really good, informative instructions about thinking about data and about thinking about how I express myself about these data sets in going forward. That turned out to be probably one of the most critical things for me is critical thinking itself. I really developed that because of my professors. They were often very striking and provided very carefully stated statements to me because they were very forceful at times. These were members of my committee, and also very good friends. To this day, we're good friends. But when you're there, you're their students; they would forcefully say, "You can't think this way. You have to think that way. I feel you are wrong, and this is why you're wrong. You need to think harder." Those were important times to have that discussion. They were good times because you knew they were your friends at the same time. You knew they were trying to help you think better. You knew that, and it made a big difference. They were characters in themselves in many ways. They were all excellent scientists. They taught me to be a scientist, and I really appreciated that. So much of my training stemmed from them, teaching me to think hard about what I was doing.

MG: Tell me more about your research focus. What did you write your thesis and dissertation on?

RF: This is another reason why I was unique. My professor gave me some samples that he had collected ten years earlier and needed to have somebody work on the samples. But at that time in chemical oceanography, the first thing you had to do was develop the technique before you can work on the samples. He gave me this technique that he did ten years ago when he was at Scripps and said, "You work on it." So I did. I wrote up my master's thesis using the technique he had for me. Then, when I went on for my PhD, I said, "Professor, I'm never using your technique again." Because there were so many issues that I had to deal with in making that technique work. It finally worked, but it was very hard. So he said, "Well, what are you going to do then?" I said, "I'm going to work on this PhD work." At that time, my PhD was about understanding how sediment dynamics worked in the oceans so that there would be this big bottom layer of particulate matter called a nepheloid layer in the oceans. Nobody understood why it was there or what was occurring. So he suggested that I analyze the samples that we collect from the bottom ocean and determine what it is and then figure out why it's there. Why do you have this big cloud of material at the bottom of oceans? So I had to do the chemistry. I had to analyze the material. I had to do modeling to model the processes that were occurring. I had to develop all the techniques for that. For every measurement I made, I had to develop the technique. We did that, and we found out that the material that was rising off the bottom was sediment that was flowing down the slopes of the Gulf of Mexico. It's a very common thing, you would think. Right now, everybody understands it. But at the time, nobody knew what it was. All they knew was it's this cloud of stuff that was at the bottom of the ocean. So we did that. My professor was worried that after I got out of graduate school that I was so specialized about nepheloid layers that I'd never find a job. That never bothered me too much at all because I figured that I'd find a job, and I will do whatever they're going to ask me to do, and that's what I'll do. So when I went on to work for NOAA, I just started with whole new directions and did things that were different. I think that it was a good thing to do things that are different because then it allows you to explore what you like to do and what you want to do. I think having that opportunity to do that is very important.

MG: Was this your first research cruise that you went on in between your master's and PhD programs?

RF: Yes. We went on about three or four cruises there. As I said, I did all my own work. Then I went on some colleagues' cruises, so I developed relationships from working on my colleagues' cruises. By the time I finished my PhD, I had four or five cruises under my belt, which is a lot for a graduate student.

MG: Were they all in the Gulf of Mexico? 36

RF: Yes, everything was in the Gulf of Mexico. A little bit in the Caribbean as well. I basically was able to describe the chemistry of the material throughout the entire Gulf of Mexico.

MG: These research cruises were related to the research you were doing, specifically?

RF: Yes, some were. Some I just joined other people's cruises. You had to be quite creative and meet people and join their cruises. Then you were on some cruise. My professor had major cruises that he was conducting, and he allowed me to be on his cruises. We worked it out quite

well. Part of the material I studied was all the sediment that comes down the Mississippi River, which is very important for understanding that process and seeing how the nepheloid layers worked in the Mississippi River plume. I was able to describe that as well. When I started at NOAA, I started working on sediment plumes in the Gulf of Alaska because the sediment there was grabbing up all the oil. They were concerned about oil leaks in the Gulf of Alaska. We did a lot of research on oil uptake by sediment. I was the principal scientist that understood how to study sediment.

You take your opportunities as they come, and you take your experiences and run with them.

MG: You mentioned you got sick on your first cruise, and I didn't know if you meant that you caught a cold from the weather or you were seasick.

RF: I was very seasick. This was the Gulf of Mexico in the wintertime during a major storm. The seas were like twenty, thirty-foot seas right out of Galveston, Texas. My job was to go up to the bow of the ship and put a sampling system on the bow of the ship. The bow of the ship, of course, is bumping up twenty, thirty feet in the air, and I was sick within probably ten minutes.

MG: Did you eventually overcome seasickness?

RF: Yes. What I learned about myself is that when I go to sea, I'm going to get sick, but I'm going to get better in a couple of days. As long as I can put up with being sick, I'm going to be better, and I'll be fine. Then sometimes you would – if you're on more than one cruise per year, you don't get sick that second cruise. I had to learn that you can live through it.

MG: I was curious about the offices you visited on your honeymoon. What inspired you to visit NOAA? Were there other agencies you informally interviewed with during that time?

RF: Well, on my honeymoon, I wasn't going to NOAA because I didn't know that even existed there. I was going to the University of Washington because I had colleagues that worked at the University of Washington. But my name got spread around, so when the folks at NOAA were looking for somebody to hire, they went over to the University of Washington and said, "Hey, do you know who's looking for jobs?" They said, "Hey, this guy's looking for a job. Why don't you contact him?" So that's how it turned out. At that time, you had to write letters to get jobs. There was no internet. The internet didn't exist at that time, so you had to write letters. I wrote over a thousand letters applying for jobs and ended up having probably about five or six interviews and two job offers in the same week. I was really fortunate. One job offer was to live in Galveston, Texas, and work at Texas A&M at their auxiliary facility in Galveston. The other one was a job offer in Seattle. Well, my wife and I really liked the environment in Seattle and weren't too keen on the environment in Galveston. For us, the weather was nicer in Seattle. So we said we'd go that route. Plus, I was very intrigued by the job at NOAA as well.

MG: What did you know about NOAA before you came on board?

RF: Probably not a lot. But I really was fortunate enough to have one of the scientists from PMEL, Dr. Jerry Galt, a very close friend of mine who was a modeler, get in contact with me

and talked to me quite a bit. He was the group leader for the group that we eventually were a part of. He was a modeler, and he was impressed that I was not afraid to do modeling in my PhD work. That impressed him a lot, and the fact that I was wanting to do environmental chemistry, which is what they needed. Consequently, I fit in nicely with what their needs were. I learned much of it from him. Of course, I looked it up right away and understood that, and they were trying to establish a new laboratory. Back then PMEL was known as POL, Pacific Oceanographic Laboratory. It was a geophysics laboratory, and they wanted to convert it to an environmental laboratory, so they changed the name to PMEL at the time and wanted to hire environmental scientists. They hired four of us to join, four scientists: Stan Hayes, who was a physical oceanographer and was a little older than the rest of us; Jimmy Schumacher, who was a physical oceanographer who was a specialist in interdisciplinary environmental physical oceanography; Joel Kline, who was a geochemist involved with oil; and myself. We all came within a month of each other. Three of us sat in the same office together on the University of Washington campus. Stan Hayes eventually became our boss. It turned out – he's a little bit older – he was our boss. Those four people had a very strong feeling that they wanted to do interdisciplinary research. That was the reason why they came there. They wanted to do environmental research, very much so. Many of the programs that are still existing in NOAA today had their original derivation from the thoughts and ideas and discussions and research approaches that we developed in those very early days in the early 1970s. Around 1974, 1975, Stan Hayes started the TOGA [Tropical Ocean Global Atmosphere]/TAO [Tropical Ocean-Atmosphere] array, which is the largest array of moorings throughout the Pacific, and which Mike McPhaden maintained until recently. The moored array that we have throughout the world stem from that TOGA/TAO array and started out with just a few moorings. Now, they have moorings in the Atlantic, Pacific, and Indian Oceans. These moorings were critical to our understanding of El Niños. Stan Hayes was an El Niño scientist, and he started that. Jim Schumacher was a physical oceanographer who was interested in biogeochemical and biological interactions. He started the EcoFOCI [Ecosystems and Fisheries-Oceanography Coordinated Investigations] program in Alaska. That program is ongoing today under the direction of Dr. Phyllis Stabeno. It really is one of the premier programs to study climate change and ecosystems in our nation's largest fishery region within the United States. Joel Kline was a chemical oceanographer, and he was interested in understanding how carbon dioxide and other tracers mix into the oceans. So he developed the tracer program at PMEL. He developed the program to study freons and other chemical tracers. Those programs exist to this day. It was supervised by Dr. John Bullister, who recently passed away. That program now allows us to understand water mass movements in the deep ocean and how carbon dioxide and other chemical species that penetrate into the deep ocean and spread out throughout the oceans. I worked on carbon dioxide and understanding how carbon dioxide goes from the atmosphere to the ocean and into the deep ocean. So that group of scientists working together at the age range of between twenty-seven or twenty-eight years old and up to maybe thirty-two or thirty-three years old – just amazing work together and started many of the programs that we at PMEL are so famous for today. They were all dear friends. Stan Hayes passed away years ago. Mike McPhaden took over all his work. But much of the research that we do today stems from those in early interactions with these key colleagues that came to PMEL right at that time when PMEL was changing its focus.

MG: I'm curious about that transition. What did it look like before you four came in? What were the areas of focus?

RF: Well, before we came there, they were only doing geophysical work. They were studying bottom water processes, geological processes, primarily. But they realized that for NOAA to expand, they needed to expand into climate research and environmental science, and they needed to have a different perspective. But we were starting from scratch. When we came in, they said, “You need to start these programs. You need to write the proposals. If the laboratory is going to be successful, it’s going to be based on the proposals that you write.” So that was a tremendous responsibility. They gave us a year to do it. We all worked very hard, wrote lots and lots of proposals. It really started us off working together. That was the main thing, is we were all working together at the time and started off in the right direction. But we didn’t know how the laboratory was going to end up. We had no vision of what the end was going to be. We only knew that we were the ones that had to get it going in the right direction. That’s all we knew.

MG: Was this when the Boulder Lab was established or did that already exist?

RF: The Boulder lab existed. We started working with the Boulder Lab right away. They existed. OAR [Oceanic and Atmospheric Research] used to be called ERL [Environmental Research Laboratories], and that was the Boulder lab. So it evolved over time. We were within the Environmental Research Laboratories, and that became OAR afterward. So Boulder was the central focus for that part of the organization.

MG: For the record, can you remind me what your first title was and the name of the office you worked in?

RF: My first title was chemical oceanographer. We were in a program called Marine Environmental Quality. We were conducting chemistry and biology studies together. That program was called Marine Environmental Quality. Our job was to understand the interactions between chemical pollutants, such as oil and marine organisms.

MG: I think you mentioned the other day that this was when you were looking at contaminants in Puget Sound and Alaska. Can you talk about those research efforts?

RF: Yes. In Alaska, it was all focused on oil development, and if they developed oil in Alaska, how the release of oil into the environment would be impacted by the environment itself. So my job was to study how sediment would sink oil, how it would collect on the sediment and sink to the bottom. All the work I did for my PhD was very appropriate work there. So Joel Kline and I, Joel was an oil person, and worked on studies where we mixed oil with sediment to see how quickly it settled and how it got to the bottom of the ocean. Then Joel went on in the direction of studying gas production in Norton Sound, in the northern part of Alaska. I continued on with the sediment work. In the Puget Sound region, we were concerned about all these metal contaminants in Puget Sound because there were a lot of factories, and there was an Asarco plant. Asarco was putting out toxic metals, and so we needed to have an understanding of how toxic metals were distributed within Puget Sound. So we developed a study of toxic metals in Puget Sound. At that time, there was so much lead in the sediment in the area and in the water and in the bottom that people were bringing that lead home in their clothes, and their kids were having lead build up in their blood. So it was a major problem. This was because there was a lead factory in the area, and they had to clean up the lead. They had to bury the lead and cap it.

The lead was in concentrations of thousands of parts per million, which was highly toxic and they also had had arsenic problems. There were very serious problems, and there was no accounting for trace metals in Puget Sound until we started that work. So we worked on that for about five or six years. About that time, we started worrying about deep-sea vents. So the next part of my life, I started working on deep-sea vents. It was called the NOAA Vents Program, and we started that from the beginning. It was geologists and chemists working together on deep-sea hydrothermal vents. We discovered many hydrothermal vents along the Juan de Fuca Ridge, the Explorer Ridge, and the Endeavour. So we got to go down in submarines and collect samples right at the vents. I naturally studied all the particles and determined the chemistry of the particles, how they were generated. So put sediment traps around the vents and modeled the output from the vents. So that was a lot of fun. That was very exciting research. You go out on a cruise, and you would get to dive in submarines like Alvin or Pisces to the bottom. Every time you went down, you discovered something that nobody else has ever seen in their lives. It was either a new animal or a new vent system, and the chemistry was different. So you got to really understand how the chemical changes affect the environment. Every single time we came back from a cruise, it was a major press event because you got all these new animals to describe. So it was very exciting research. I did that for about ten years, and then I began to be concerned about carbon dioxide and climate issues. NOAA was thinking about having a carbon monitoring program and the ESRL laboratory was leading that effort for the atmosphere, and they needed an oceanographic component to how the carbon gets across the air/sea interface. They asked me to write the plan for the marine component of the carbon-dioxide program, and I did that. We started that research effort. At that time, it was only PMEL, but we realized very quickly that if we're going to do global carbon dioxide research, and we had to have help. So we asked for help from AOML [Atlantic Oceanographic and Meteorological Laboratory], and the AOML group saw the opportunity there as well. We hired Rik Wanninkhof for AOML, who was my counterpart at AOML. Together, Rik and I started the Marine Carbon Program at AOML and PMEL. We worked through the program absolutely hand in glove together. Every decision we made, we made together. We developed a global marine carbon program and linked it up with the National Science Foundation [NSF], and then linked it up worldwide. So now we have the international GO-SHIP [Global Ocean Ship-based Hydrographic Investigations Program]. That international GO-SHIP program does cruises throughout the entire world, and NOAA and NSF share responsibilities for that. That's been going on now for close to thirty years. We're in our fourth decade of observations. We added that to that underway and mooring programs – underway measurements in surface waters onboard research vessels and container ships, so we could look at air-sea exchange of CO₂. That has developed into a major international program again. We still were not happy about getting enough information. So we developed a mooring program. The mooring program now is up to thirty-six moorings throughout the world, where we have CO₂ sensors on the moorings. They're all devoted to understanding how carbon gets released in the atmosphere from human activities and how it exchanges across the air-sea interface, where it goes in the ocean, how deep does it get, where does ends up. Then I began to worry that the carbon dioxide that's getting into the oceans really can affect marine organisms in a serious way. We began to speak up about it. I wrote a few papers about it. In 2004, Dr. Chris Sabine, who became the laboratory director, and I wrote two back-to-back papers in *Science*. He wrote a paper about the global distribution of anthropogenic carbon in the oceans. I wrote the paper about how carbon dioxide is affecting marine organisms. It was a very strong political year at that time. There was a presidential election going on. So when we wrote these two papers

back-to-back in *Science* the chances of getting both papers published in *Science* is about less than one percent, so it was unheard of. But submitted them anyway, and we were successful. We ended up getting the cover of *Science*. Based on that work and the follow-up work, from there, we started the NOAA Ocean Acidification Program. For that program, we wrote the strategic plan for that in 2009, and we presented that through Congress. I was able to testify before Congress on behalf of NOAA. We were able to get the NOAA FOARAM Act [Federal Ocean Acidification Research and Monitoring] in 2010. The NOAA Ocean Acidification program started in 2011. Through that process, we were able to initiate and start a national program on ocean acidification in which we now have thirteen or fourteen federal agencies working together on ocean acidification issues. We went international with that. There were similar programs in other countries. We started the international GOA-ON, Global Ocean Acidification Observing Network. That observing network now has close to a hundred countries and probably about five-hundred scientists working on that. We did that by taking the assets from the carbon programs and adding to those assets. We did not replace anything, we just added to it, and that's the way you grow a large observational network. To this day, building on each of those programs along the way has developed the capability to have the observing system that we have at NOAA today.

MG: We will dedicate our next session to really talking about ocean acidification. But I have a couple of follow-up questions before we wrap up for today if that's okay.

RF: Yes.

MG: I meant to ask you about your dive training. Was that when you were in Texas? What was that experience like for you?

RF: When I was in Minnesota, we used to do a lot of swimming, no real diving, but I was very interested in being a diver. I had a real need to learn to be trained. When I went to Texas A&M, they had a good dive training program, a very rigorous program. What you do is you would start out in a swimming pool with all the dive equipment, just like almost every other dive training, but you would end up diving in the Gulf of Mexico or the Caribbean Sea, and you had your final test there. So that was very exciting for us. What we would do is that we would extend that training into the open ocean. But none of us had much experience; at least, I never had any experience in the open ocean. For me, that was going to be a major episode. What happened is that the divemaster also was a scientist working in biological oceanography. When we did this survey of the Gulf of Mexico and Caribbean organisms as part of the International Decade of Ocean Exploration, IDOE program, our job was to collect fish so that we could do trace metal analysis under Bobby Joe Presley for the fish. So that was very exciting that we got to do that. That's when I had the episode with the shark. We were collecting these organisms, and on retrieval of the organisms, we had a shark come up after us and I barely got away in time. I still loved diving, so I continued that, and that was good. I since then have given up diving. I still do a lot of snorkeling. I gave up diving because my ears hurt too much. I found that going down too deep turned out to be too painful. I decided that snorkeling is good enough for me, and I still do that to this day.

MG: I was curious if you could say what hydrothermal vents are and when they were something you and your office looked at?

RF: Well, hydrothermal vents were first discovered by scientists from MIT [Massachusetts Institute of Technology] and Oregon State University in the late 1970s. They discovered them on the East Pacific Rise. We had the opportunity in the late 1970s to extend that work just off of our coast in the Pacific on the Juan de Fuca Ridge, Explorer region. Within our group were Dr. Bob Embley and Dr. Steve Hammond. They were the leaders of the mapping of the geological structures on the Juan de Fuca Ridge. We were working together with them to combine the understanding of the geology, which are really huge ridge crests in the oceans that have a central valley. Inside the Central Valley were all these deep-sea events. We established a program where we would go down in submarines to the vents themselves, discover the vents in most cases, and then develop techniques to sample the vents. The chemistry portion of the program was actually to stick titanium tubes into the vents, and the water was up to 400 degrees Celsius. You had to develop the technique for sampling the vents, bring those samples back and study the water. Then my job was to collect the particles that were spewing out of the vents and explain why the particles were generated, why that was occurring, and where they were going. So I had a very unique job in that. As it turns out, that vents program got started in the late 1970s, and we made discoveries everywhere along the way. We added in a very famous geologist, Dr. Edward Baker from PMEL, who was a specialist in physical oceanography and geology; he had combined expertise. He would be able to use physical oceanographic observations such as temperature and salinity and particle concentration to identify where the vents were. What you would do is you would do a cruise along the surface, basically yo-yo a CTD up and down the water column. Every time you found hot water, or a larger concentration of particles, you would therefore be able to find the vents. As we were learning to do that, Ed Baker and I and Gary Massoth, who was one of the chemists on board, found a plume of particles and hot water that was in the water about a thousand meters above the vent. That plume of hot water was so hot and so extensive that it had enough energy to light New York City for a year. It was called a “megaplume.” Now, we had no idea what these megaplumes were all about. When I studied the particles in the megaplumes, the particles that were coming in the megaplume a thousand meters above the bottom had particles in them that had to be generated in very hot water, above a hundred degrees C. We knew this was some geological event that would release an enormous amount of hot water and put it high up in the water column. So we did a lot of research on that. Well, this turned out to be one of the biggest megaplumes that had ever been observed, at least at that time and since then, as well. It turns out that it was an observation of a deep-sea volcanic process, an eruption that was occurring in real-time, and it had so much energy that it could push the water up a thousand meters above the bottom, and then spread out there and form this huge megaplume, and we discovered that. Well, before that, nobody knew what megaplumes were all about at all. Now you go, and you look for megaplumes because you know that’s how you’re going to find the eruptions that are taking place. Ed Baker was the leader on that work, and he made his reputation on being able to be the person to identify these megaplumes. Since then, we have identified many megaplumes. We put that into a geological context. Well, over that timeframe, we studied mostly deep-sea hot springs in the ridgecrest system throughout the world, and that had been able to quantitatively determine all the heat that’s generated into the oceans from these deep-sea sources. So from the start of some very simple observations, we’ve been able to progress to the point of the present work that we do today. Now, we have the Axial Seamount on the Juan de Fuca Ridge, which we have monitored now for the last twenty years with continuously measuring instruments that measure heat there. Allowing to understand how the expansion of the venting system occurs over

time, to the point that you can actually predict when the next eruption is going to take place, a tremendously enormous discovery. Bill Chadwick of PMEL developed that work. So again, the geologists, led by Steve Hammond at the time, and the chemists were working together to develop a tremendous ability to understand deep-sea processes. Then, Joe Resing from our laboratory came along a little bit later, joined our group, and his experience was studying manganese and iron distributions in the oceans. What it taught us and showed us is that the iron that comes out of these deep-sea vents can get high enough in the water column that it can affect productivity and have a major impact on marine productivity. So now we've linked the deep-sea floor with the productivity of the oceans and the carbon cycle. PMEL has always taken advantage of the skills of the people that we brought together to work together and do the science together and come up with important discoveries based on integrated research.

MG: When was the Vents program established at PMEL?

RF: The Vents Program was established at PMEL around the timeframe of 1978, 1979. I think we did our first deep-sea explorations on Alvin in 1979.

MG: Eddie Bernard came to PMEL in 1980? Was that a coincidence, or did you help connect him to there? I'm curious to hear about your reunion.

RF: The scene of the reunion of Eddie and I was something that will forever stick in my brain, and he and I joke about it often. At the time, the laboratory director was John Apel. John Apel was a physical oceanographer, and he really needed an associate director. Eddie Bernard was leading the tsunami laboratory [Tsunami Warning Center] in Hawaii. John Apel met with Eddie Bernard and asked him if he would consider coming to PMEL as his associate director. He really needed that. So this was kind of unbeknownst to a lot of us. We moved from our facilities at the university out to Sandpoint in the interim. In 1975 and '76, we moved there. We had a building inside one of the hangars called the Red Building inside the hangar. I was coming out of the hangar to go to my car and in drives up John Apel. They come out of their car, and John Apel says to me, "Hey, you know Eddie Bernard. Here he is." I said, "Eddie, so good to see you." John Apel says, "By the way, he's going to be your new boss." I said, "Him? He's going to be my boss? No way." In fact, he was my boss, and he was my boss for twenty years.

But for the fact that we were such good friends in graduate school and good friends ever since, that relationship between Eddie Bernard, my boss – and he became the official lab director two years later – really was a tremendous relationship because we would work together so well. He would go on to direct the laboratory, and he helped us develop the vents program and encouraged us to work on that, and helped us develop the carbon program, and encouraged me to work on that for many years. By working together with him and getting encouragement from him and getting opportunities that he could provide for us as laboratory director, we advanced both programs simultaneously. That went on for another twenty years, until the 1990s. We went from the late 1970s to the 1990s. Then, in 1990, it was pretty clear that the Carbon Program was going to be very important in NOAA, and it was going to have a major influence at NOAA. I asked if I could hire Chris Sabine, and they said yes. So I brought Chris Sabine in, in that timeframe. And Chris Sabine helped me put together the Carbon Observing System. We worked on that together. Eventually, what happened was that I had to make a decision whether or not I could continue to

work on the Vents Program or spend my time full-time on the carbon program. I made the choice with Eddie's support and help to change to be fully focused on the Carbon Program. That was a very important decision. I agonized over it. But as soon as I said, "Eddie, okay, we'll do it," the next day, he said, "Okay, he's the carbon person from now on. "We're moving forward." He was very quick to make those decisions and move very quickly. Basically, the carbon program took off from that point onward. I was fortunate enough to bring in Chris Sabine, who helped me immensely get the program started, and then he rose through the ranks so that when Eddie retired from PMEL, Chris Sabine took over as the director of PMEL. So each time, I had close friends as laboratory directors over the span of more than thirty years.

MG: And what was that like for you?

RF: I think it was wonderful, absolutely wonderful, because in both cases when I had a concern for the laboratory or a need, I knew I could go up to Eddie's office or Chris's office and talk to them one on one and knew that I would get heard. They didn't always agree with me. Many times, they did not agree with me. But I knew I would get heard. For me, it was important to be able to express my feelings and get heard. I will say, in both cases, I think we did great work together and accomplished many, many things together. It was a hard time for me when Eddie retired because I was so close to Eddie. But I was very happy that Chris took over and felt good about that. It was an extremely hard time for me when Chris chose to go on to the University of Hawaii. I was so close to Chris; that was hard for me. But Michelle McClure took over, and that's been a wonderful relationship with her as well. In each case, even when things happen that you don't necessarily want to see happen, life does go on, and you learn to move forward in a positive way with people that are usually great to work with. So I've been very fortunate through my career working with great people all along the way.

MG: Can you say why this was a tricky decision for you to move to the Carbon program?

RF: Because the Carbon Program was at a very infant stage. Anything that's at an infant stage, it's a great idea, but you don't know how it's going to end up. It may not be funded adequately. It may be something people want, but you're not sure how much they want it. I was doing really great work in vents research. I was really enjoying myself. If you get to go on down in a submarine, it's so exciting. It's so wonderful to have the experience of everything you collect and samples brand new, and people really are excited about that research. So that was an extraordinarily difficult problem. I agonized over it for a long, long time. But I began to realize that I can't do both projects simultaneously with all the requirements that are needed to do them well. I couldn't continue to do them well. I had a feeling that the carbon program was going to be something of major consequence to our country. I felt that my understanding of the geochemistry of carbon was where my heart was. I've always told my students, and I really believe this, you have to conduct the research where your heart is. So I finally decided that my heart was with carbon research. With a lot of great encouragement from a lot of close friends, I made that change, and it probably was one of the most important professional decisions I made in my life. But it was clearly because that's where my heart was.

MG: And that's what Eddie encouraged you to do, too, to follow your heart.

RF: Yes. He also encouraged me to give it everything. He basically would tell me that if you're going to do something, give a hundred percent, and that's why he recommended I make that change.

MG: What was the other thing he said to you about, "We are NOAA?"

RF: Oh, yes. When we were discussing this decision, the question came up of whether or not NOAA was going to do this and whether or not this was an important role for NOAA. Eddie and I would discuss this at great length. Eddie would say to me, "Dick, you have to understand that *we* are NOAA. *We* provide the science direction for NOAA. What you want to do and how much we proceed along those lines is very much involved with what your research vision is all about. When we make these decisions as a laboratory or as scientists, that becomes part of the NOAA science portfolio, and that means we are part of that." If you look back and think about everything that we have done in NOAA, it is key scientists who are willing to step out and make those leaps of faith – and they're truly leaps of faith – and say, "I think this is important. I want to go ahead and pursue that," and then have the energy to pursue that, not just within your own laboratory, but within your agency and with Congress. It means making the presentations. It means making presentations to your congressional staffers and to your congressmen, showing what the national importance of it is, and showing the international importance of this, and then making the commitment to participate in all the meetings, and write all the strategic plans, and write the reports that go with it. It's a huge, huge commitment that you're making. But if you truly believe what you're doing is important, it's worth the effort. Now, the beauty of that is, in the process, you get to participate with the world's leading scientists throughout the world. Through the beauty of the internet, these scientists become your friends and your colleagues, and you get to write papers with them. You get to participate in the development of the international exercises. I have been involved with the international efforts for ocean acidification and the international efforts through the IPCC, Intergovernmental Panel on Climate Change. You get to see the entire process from beginning to end, from science to intergovernmental panels to the assessments that take place. Right now, I'm involved with the IPCC's sixth assessment. It's very fulfilling to see your research and your efforts being part of these international assessments. A lot of that keeps you going because you realize how important the science that you do is to society.

MG: What year was it that you transitioned into the Carbon Program?

RF: Well, we started the Carbon Program right around 1980. That was the start of it. We wrote our strategic plan about that time. Towards 1988, '89, we started what is now known as the GO-SHIP program. We started that then. The first series of large-scale ocean surveys started with the WOCE [World Ocean Circulation Experiment] hydrographic program, and that was in the late '80s, early '90s. So the first decade of ocean observations occurred in late 1989 and all the '90s. We coupled that with the JGOFS [Joint Global Ocean Flux Study] program, so we combine the two in the international JGOFS. So biogeochemistry was JGOFS, and physical oceanography was WOCE hydrographic program. We coupled those together. So, for the first time, we had the first carbon survey on the WOCE hydrographic surveys. Those carbon surveys were NOAA/JGOFS. I was able to work with Dr. Peter Brewer and establish that. We were able to get that international program off the ground. From there, we extended on to the surface ocean program that Dr. Rik Wanninkhof leads now.

MG: You mentioned those two papers you wrote in *Science*. Remind me of the year they were published.

RF: They were published in 2004. It was interesting because this was such a new a concept that we had to provide our leadership at NOAA with copies of that *Science* article, so they knew what was coming their way. They had a great positive response to that, which was great. They allowed me to go before the NOAA Research Council at the time and speak about ocean acidification to the Research Council at the highest levels, which led to the development of the NOAA Ocean Acidification Program. Having that cover story in *Science* carried a lot of weight, and we were able to do it that way.

MG: You mentioned when we spoke the other day that NOAA had been doing atmospheric carbon research. Was that with the Air Resources Laboratory [ARL]?

RF: Yes, under Lester Machta. He was the lead of that. We started out under him. He gave Joel Kline and myself fifty thousand dollars to start the Ocean Carbon Program. You have to start small, and he was very helpful. He was very encouraging. What we immediately did was start the surveys. We had the *Oceanographer* and the *Discover* and were able to do these large-scale surveys right from the start. Because we had the surveys and because we had the ships, we were able to join efforts with NSF and the JGOFS program.

MG: Is there anything we're missing up to this point? I think we'll have to dedicate the next session to really exploring the next chapter and the Carbon Program.

RF: We'll have to readjust things because the timelines got mixed up a little bit. MG: Sure. Do you want to take a minute to clarify that now?

RF: Well, a lot of stuff we had talked about with respect to the timeline for these events, I think we're going to have to reorder them a bit. The stuff we talked about with Eddie, for example, should be put together into one story and not multiple stories. I've done that throughout this interview. It comes to mind a little bit later to bring that up, and then we ought to reorganize where it goes. So that would be the one thing. Sometimes I got some names wrong that I want to cut out, but I think we got the names right in the end.

MG: Okay. For next time, we'll really dive into ocean acidification, its background, your research in it, how that program evolved at PMEL, and the research cruises. We'll probably need another hour if that's okay.

RF: Yes, that would be a good idea. I needed a chance to rest a little bit. We can probably do a little bit of history on that. So let me look up some stuff. If we're going to focus on that, I'm going to look up stuff. I want to make sure I get the dates right. Everything started in 2008, 2009. The FOARAM Act was 2009. There are lots of stories around the FOARAM Act itself, which is interesting because I didn't know how much behind the scenes actually occurs. So we can talk about that a little bit. Then, the scientists brought together that strategic plan, so it was completely ground-up. Libby Jewett and I and several of the lab directors at the time put that together, that plan, and then just presented it to NOAA, and then they approved it. So it was not

top-down; it was ground-up. So that's something. Then, we developed the program office in 2011, and Libby Jewett took that over and took that on, and we've been growing ever since. We started out with about three million dollars. Now we're up to around eleven or twelve million dollars, so slow growth and steady growth. We can go through all that, including the [Ocean Acidification] Blue Ribbon Panel, which was Bill Ruckelshaus. Bill Ruckelshaus was the leader of the EPA [Environmental Protection Agency] for two different terms. He's just one of the most amazing men I've been able to have the good fortune of working with. There are some wonderful stories about that and the effort that we did on the West Coast, particularly in Washington, led the rest of the country. The Blue Ribbon Panel Report was the blueprint for the rest of the country. California has jumped on the bandwagon. Oregon has jumped on the bandwagon. The West Coast is a major hotbed of research. The East Coast programs now have followed suit from the West Coast, and they've interacted with us quite a bit. The whole history of that, I think, is fascinating from a scientific sense and political sense. But the upshot of it, by working with our senators, Jay Inslee, Maria Cantwell, Governor Christine Gregoire, we've been able to affect a major impact here in Washington, and because of that, the entire West Coast and because of that, the rest of the country. Again, things start small and sometimes go big.

MG: Well, I'm really eager to hear about the next chapter and everything else. Thank you for spending so much time with me today.

RF: Okay, take care.

MG: All right, you too. Bye-bye.

RF: Bye.

-----END OF INTERVIEW----- Reviewed by

Molly Graham 2/3/2022

Reviewed by Richard Feeley 3/9/2022

Reviewed by Molly Graham 3/11/2022