NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
VOICES ORAL HISTORY ARCHIVES

IN PARTNERSHIP WITH
NOAA HERITAGE AND THE NATIONAL WEATHER SERVICE

AN INTERVIEW WITH HELEN WOOD
FOR THE
NOAA 50th ORAL HISTORY PROJECT

INTERVIEW CONDUCTED BY
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Molly Graham: This begins an oral history interview with Helen Wood for the NOAA [National Oceanic and Atmospheric Administration] Heritage Oral History Project. Today's date is November 16, 2021. The interviewer is Molly Graham. This is a remote interview with Helen in Bethesda, Maryland, and I'm in Scarborough, Maine. I wanted to pick up today with being recruited to NOAA by Tom Pyke. Before we started recording, you mentioned your involvement in the IEEE [Institute of Electrical and Electronics Engineers], so I was just going to have you connect all those dots for me.

Helen Wood: Great. I'm sorry for any background noise. I hear chairs rolling around upstairs. I'm sure that will stop eventually. It must be the cats. So, Tom left NIST [National Institute of Standards and Technology] and went to NOAA a year or so before I did. It may have been two years. Time flies. He called me. We stayed in touch because I had worked either with him or for him for quite a number of years, and he had always been very supportive of my career. Only years later, someone said, "I guess he was a mentor." I said, "Gee, I guess he was." Not in everything, but he certainly was very – his guidance and his insights were very helpful to me in my career, and I guess that's what a career mentor is. In any event, he called and wanted me to apply for a position that had opened up in NOAA, reporting to him. I was, of course, flattered, and I was very interested because I think I had kind of topped out where I was at the National Bureau of Standards. I was looking for new challenges, but I was reluctant to go, initially, because [it was a] different agency; it wasn't pure science or technology. It was in a field where you applied science and technology to solving problems. Knowing that weather forecasting and the like were the focus, I said, "Well, I don't have any background in that. I'm not a meteorologist or atmospheric physicist, and would I even be accepted and be effective there?" He said, "No, no, you'll learn about the application, but it's the knowledge of technology and the ability to tackle problems, organizational problems as well as technical challenges, and managing programs and working with people. That's the skill set you would bring." We talked more about it, and he said, "All right, let me tell you how I see this." The traditional way this position had been managed in the past was you simply focus – simply [laughter] – you focus a hundred percent of your energy on the day-to-day job of collecting satellite data, weather satellite data, turning it into products, and feeding it to the weather service. So basically, the director, which was senior executive level, would be overseeing [and] getting reports on how things were going in this. Of course, you had a team of contractors and government employees, about equally divided, so it's about three hundred total. You're kind of up there, seeing how it's going, and maybe tweaking a little here, helping them solve some budget problems. Tom envisioned it differently. He said, "I see this as about a third of your time focused on the status quo and managing the enterprise, which does take time. Being there for them, and so on. And about a third of the time working at the NOAA level, trying to improve their management of data across the agency. And then up to a third of the time working in the profession as a whole. So, the external." Well, that was really great because, with Tom's support, I had started getting involved back at the Bureau in the Institute for Electrical Electronics Engineers Computer Society. With his agreement and support, I had become an officer in this international body. He had told me – he had been active previously himself, but his former director had told him he could not do this, that it was not part of the job. This was back at the Bureau, and yet, she went on to become on the board of directors of the American Association for the Advancement of Science. So it was like, "Not for you, but okay for me," and so he had regrets. He said, "I know this is important for you. It's valuable to the field and the profession, and it's good for our agency to be visible.

So, do that." So, that was great, and I applied for the job, got the job, came over, and hit the ground running. I stayed there in that particular job for about sixteen years. During that time, if I look at the IEEE or professional society involvement aspect, I went from being the treasurer to being the president of the IEEE Computer Society, which had at that time about a hundred thousand members worldwide. So, as professional associations go, it's pretty big. It was part of the IEEE itself, which had three hundred thousand members worldwide. So, a large reach, and a marvelous way of keeping in touch with advances in technology, but also learning to work more effectively, collaboratively, with peers because those that were able to work at that level were generally faculty, usually tenured faculty at universities, senior-level corporate, and very few government officials, unless you were in a science and technology field. So, that meant I was exposed to all of these other people of other backgrounds. You're working together as peers, so even if you were "president," you don't get to tell anyone what to do. Everything is a matter of team building and persuasion and collaboration and shared vision, not to mention the public speaking opportunities that came along and benefited me greatly from an early stage, back when I was first giving papers at conferences. So, I do believe that not only enriched my experience and my career experience – I guess I should say – because it was fun and challenging, and I have lifelong friends, as well, from those days, but also helped me be more effective as a champion and advocate for my organization and my operation, and in building collaborative processes and tools to help my agency.

MG: I want to go back and ask a few follow-up questions. Did Tom find that NOAA was more supportive of his engagement in the IEEE, and therefore NOAA was supportive of your engagement?

HW: No. NOAA was supportive of engagement, period. And people could take it out of their hide if you will. You were involved in the American Meteorological Society if you were a meteorologist. That was a big part of being a NOAA meteorologist. It was the big meeting each year and the refereed papers and the journals, so they didn't question that. It was more just part of the culture, but Tom didn't try to be involved anymore himself. As the assistant administrator, he really didn't have the time but made more room for me to take on a bigger role in a bigger professional association than probably anyone else got to do in NOAA. If you look at those who became presidents of the American Meteorological Society, or board members, they were – it's much smaller organization – ten thousand and fewer journals, fewer conferences, and fewer – still could put a lot of energy in it, and enormously valuable, but it just didn't take as much time, or they couldn't give as much time. But I think it was more a case of the activity didn't require or demand as much time and attention.

MG: Had you joined the IEEE before you came to NOAA?

HW: Yeah, first I was a member while I was in college and then after, of the Association for Computing Machinery, ACM, which is, I would say, a more computer science-based organization, very heavy with faculty in computer science departments and more mathematics and problem-solving origin, not engineering. I started getting involved as a mid-career professional, giving papers at their conferences as well as the IEEE's. But I found I had more of an affinity for IEEE because there was a more engineering, computer engineering, electrical engineering foundation. The conferences focused a lot on applications, so it was more relevant

to my work and my interests. I didn't mention it, but one of my career high points that I am still so proud of is when I became a fellow of the IEEE for my contributions to engineering management. Not a lot of women fellows, good fellows, in an engineering institute, but also now, I'm old enough that I'm considered a life fellow. That's pretty cool. Once you reach a certain age, you become a life member of IEEE.

MG: When were you selected as a fellow?

HW: I guess it was around '91 or '92, somewhere in there.

MG: Can you just say a little bit more about how the IEEE started and what is its focus?

HW: Yes. So, IEEE grew out of two institutes back from the 1900s. One was more radio technology and the other more engineering-focused. I used to be able to give a long history on that, but I can't anymore. But [it] had your [Thomas] Edisons and all of those types who were members of the predecessor organizations. The computer part is much younger. It, I guess, dates from around 1950, post-World War II, when specialized machines that had been used to crack encrypted communications and to plot trajectories were being turned to more civil applications, like supporting the census, the handling of census data, and so forth. So, in that respect, as part of the IEEE enterprise, the computing part was the young upstart. Nobody is sure really where it fits – "Aren't you just like there to help all the rest of us? Do you have any work or developments or discoveries in your own right that merit being a society?" So, if you talked to the power engineers, that's your electrical and electricity-generating and nuclear engineers, they definitely saw computer types as being in a support role, purely there to serve. So the computing associations – I don't want to say we had a chip on our shoulders, but yes, we were all constantly having to prove ourselves, but now, there's really no question. If you look at the ubiquity of computing and computing technology, the role that computer networking, which was my field, and network security play in our day-to-day lives, there is no question; it's essential to life.

MG: You started to see that shift in the IEEE, where more focus and more representation came from the computer engineers?

HW: I would say I helped to drive it. Certainly, the past presidents and leaders that I understudied with and learned from were pushing and plugging away at things like setting up accreditation programs for university degrees as you see in other fields, [and] having more conferences and more journals to deal with the increasing variety of areas of research and development. So, on that, coming up with that growth, then, my focus was more on growing the organization internationally. So, under my leadership, we set up offices in Brussels, in Belgium, and in Tokyo to help support members in those regions and build partnerships with non-US – we were international but had a strong US bias if you will, or focus, so we built stronger partnerships with universities and with associations in other countries. That was very gratifying to see that happen. Inevitably, you learn a lot when you broaden your horizons.

MG: Were these shifts and expansions in focus and purview met with any resistance from anybody within the IEEE?

HW: Oh, absolutely. Again, we were upstarts. We were trying to reach out more to computing professionals. The tradition of IEEE is you're an engineer first, and anything else is secondary. It's like the bioengineering side; if you went after lots of biologists or those involved in human factors, well, you might be moving away from the engineering support to those fields. That was the tension. And the fact that, at one point, the Computer Society was roughly a third of the size of the IEEE itself created a lot of, I guess, dynamics that weren't always the most positive. But look, we were all volunteers. So volunteers come into this. Some are coming for self-actualization, others to drive the profession forward. Some feel that this is something I've earned through my career, and not everyone brings the same skill set, nor goal set, mindset of building and supporting, but it may be more of a "who do you think you are?" ego dynamics, just like anyplace, which was good experience, I guess, to have. Because if you can work in that kind of an environment, you can probably work in most. So yes, there was a lot of resistance and pushback, and in subsequent years within the IEEE, they forced the Computer Society to pull back on a classical affiliate membership, which allowed those who had degrees in mathematics and computer science who were not interested in the engineering elements to – they basically were no longer being recruited. So now, both the Computer Society and the IEEE are much smaller and narrowly focused. Then again, in this day and age, with journal content being more available online and conferences, as we've seen, more remotely attended, not just for the pandemic, young professionals see less need to get physically involved and even to join these old staid organizations. So, a lot of organizations are having trouble figuring out how to retain membership, get new members, and be relevant for the long term.

MG: Can you trace how you went from member to treasurer to president? What motivated you to take on these leadership roles?

HW: Since first, I started attending conferences, local, regional, and national conferences. At the Bureau of Standards, you were encouraged to publish. So, I published, and that was fun. It was exciting and challenging. I published in my field in networking, computer networking, computer security, and often with an element of standardization of practices mixed in. But also, I was asked to – invited to publish in addressing women and minorities in computing. That was kind of a snapshot look that I talked about doing in the '80s, based on the work done by the National Science Foundation and Bureau of Labor Statistics, and others. So I went from presenting at conferences to then getting lured into organizing them. Well, it's a slippery slope because you do that, then you're asked to do more, and gradually I was invited to run for office in the IEEE section, the regional section of IEEE, which I did. Then, through a combination of that and work and conferences, I guess my exposure was broadened, and the first woman elected president of the IEEE Computer Society, who by the way was the first woman elected later president of the IEEE, had met me, and she asked me if I would join her board as treasurer. That was when I was at the Bureau of Standards, and I asked Tom Pyke , and that's when he said, "Oh, I would have loved that myself. Absolutely, I will support you doing that." So, I was brought in as someone who didn't know the ropes, had not worked at that board of directors level and put in as their treasurer. This was a non-profit organization. I guess it's somewhat similar to the government. You spend your money; you're not ever supposed to spend more than you have, and there are limited ways – and in the government, you are allocated and appropriated the funds. In a professional association, you raise funds through conferences, journals, and

memberships. I had a lot to learn, and the board of directors, for the most part, were very welcoming, very helpful. I learned so much. I found it so energizing that later, I was asked to run for the board of directors itself. I'm not sure I actually got elected to the board of directors – board of governors, they called it. I was elected second and first vice president, and then, well, they ask you to run for president-elect, so I did that. I loved those days. It did take a lot of my – it took all of my free time – a chunk of my daytime, but all of my free hours to work with this organization, and I loved every minute of it. After that, I was elected director – a director to the IEEE Board of Directors. I served in that for two years, and then IEEE asked me to run for vice president of publications, hoping that I could help them move to more electronic dissemination and better computer-supported production of their magazines, as the Computer Society had done. Then I moved to their – I declined to run for re-election because, frankly, it took more time than I had and more energy than I had, and it was no longer as directly related to my technical interests and my work. So, I basically phased out. I said I peaked early, and I phased out.

MG: What's your involvement today? Are you still an active member?

HW: Oh, yes. As I said, I'm a life member of the IEEE, so I'm a life fellow. I get their magazine, and I look at it. I'm a life member of the Computer Society. I have been involved in their awards programs at the Computer Society level. I actually rallied all of the living past presidents at one point to support a particular award in honor of a longtime staff member, our former executive director. So, we stay in touch. There's sort of a clique of former presidents and other senior volunteers, if you will, who stay in touch. Now, mostly, we hear about deaths or falls, but there's still this collegial feeling that is very meaningful. I dropped my membership in the Association for Computing Machinery years back. As I moved up in the IEEE, it was hard to maintain active involvement. I was a member of the American Meteorological Association because it was directly relevant to my work. They had a special interest area on information technology, and I gave some papers in that. Then moved out to some other organizations dealing more with space applications but never got as involved in any of these other organizations to the extent I did in the Computer Society.

MG: Getting back to the transition, can you say in what capacities you had worked with Tom Pyke before at the National Bureau of Standards?

HW: Yes. So, we were both there, and it's funny, we both grew up at the National Bureau of Standards. Tom's a few years older than I am. He started there as a Westinghouse scholar out of high school, I think, and then he came back after grad school. I went there while I was an undergrad and then kind of worked my way up. So, at one point in my career – I think I told you before about the time – it was a pivot point when I was asked to have one of my staff go and work in devising new approaches to automating jet engine fuel control test environments, and I said, "No, I want to do that," because I wanted to learn something new. So, I took that job, and when it was wrapping [up], winding down, they didn't have a place for me back in the old organization. I didn't want to go there. I talked to Tom, and he interviewed me and hired me. So, that was my first position for Tom Pyke. I worked in a section just as a project leader. I worked like a – I was a team member, a programmer, and developer, doing ARPANET R and D [research and development]. Then Tom moved up to division head, and I had a series of managers in between Tom and me, but we were always friendly, and it was a friendly

environment. We socialized. We had parties. But I do remember one story I wanted to convey, being such a shy and retiring type, when one of the – when a branch chief was hired to replace Tom Pyke, I reported to the branch chief. It was evaluation time for performance, and two things stand out. One is he had been my supervisor for a few months, and he wrote in my assessment that I was assertive but not offensively so. I mean, this was very subjective. I immediately responded, "What the hell do you mean by that?" He said, "That." I said, "Explain yourself." He said, "Well, you're really assertive." I said, "Yeah, and is that a bad thing?" He said, "No, but I'm not putting you in for promotion because you haven't worked for me long enough." I said, "Well, okay, so here is the problem. I've been moving up from an entry-level professional. You generally move up every one to two years. I'm on that cycle. My performance has been at that level, and your lack of experience here really shouldn't stand in the way of my career advancement. So, I encourage you to talk to your boss, who was your predecessor, Tom Pyke." He did, and Tom said, "Yeah, she gets the promotion," so I did.

MG: Do you think some of these folks just hadn't encountered a woman like you before, and maybe they weren't used to –

HW: Right. Absolutely the case. They worked in industry or – well, they had worked in industry or at other agencies – not a lot of women in computer science and engineering. Yes. I was in an environment where, as we talked about before, they were very supportive, encouraging, and if you had some chutzpah, that wasn't a bad thing, as long as your technical work was up to par. Then there's more room for that kind of energy. So yes, it was – and plus, to be fair, that section chief was not a – this fellow was very new to being a supervisor, and I think he just thought, "Well, somebody's got to work for me maybe a year or two before I really can decide how they're doing." I couldn't wait around a year or two.

MG: Tom had left in 1986 to go work for NESDIS [National Environmental Satellite, Data, and Information Service]. Is that correct?

HW: Yes. So, from branch, he went to division chief, then he became a center director. There were two centers in the old Institute for Computer Sciences and Technology. After a few years, then, he got recruited to go to NOAA. I was the division chief by then. You had asked how else I had worked for Tom. I was a project – I was an individual contributor, a team contributor, a project lead, and then I went to the program office for the Institute for Computer Sciences to help them. You are basically preparing legislative proposals, or you're responding to inquiries, you're reviewing programs, you're helping communicate to higher levels in the agency and in the department the benefits and accomplishments of your programs. It's a great kind of proving ground for those who want to move on to higher-level management. It's a broadening experience, especially if you've been an individual researcher. It gave you a fire hose kind of exposure to the rest of existence. So, from there, Tom hired me back to be a division head. He had been moved, a few years later, to head the other center, and I moved up to replace him. Then he left, so then I replaced him at his old job too, as acting, and we combined those positions and created a deputy director position because frankly, we weren't big enough to need two senior executives at that level. That freed up some resources for other work. So, I did that for a few years, and then after a couple of years, I guess, he recruited me to come over to NOAA and be the director for the Office of SDPD, Satellite Data Processing and Distribution.

MG: I think that the National Bureau of Standards became the National Institutes of Standards and Technology in 1988, which was the same year you left.

HW: Yes.

MG: But I was curious if there were other changes afoot.

HW: The draft legislation had been worked on for months prior to my leaving. We were down to haggling over the name, was it National Institute or National Institutes, was it "of" or "for," and it was just coincidental that they changed the name right after I left. I said it was so that I could never go back. But there was another change there. They were changed to report to a political undersecretary for something or other – science and technology, I guess. Maybe it was for science. I can't remember. But a new undersecretary position was created for the Bureau to report to. I guess that meant the Bureau head became an assistant secretary, so that also became essentially a political position. That took some sorting out for them, but I was no longer there to deal with that. I did maintain connections in contact with my colleagues, and on a couple of occasions, I brought them over to NOAA to give briefings, and I think we even hired them on an interagency type agreement and paid for some technical expertise to help us with our particular computing challenges.

MG: Did you consider any other positions or organizations besides NOAA at this point?

HW: I didn't at that point because it was – well, in fact, I never really did because NOAA was so much fun. Before I went to NOAA, I did have some interviews outside of government. Headhunters would contact me. I did have another part of NOAA, in fact, that contacted me about becoming essentially their CIO [chief information officer] before there were CIOs. But it was just such a great agency to go to work for, and the mission is so relevant to life that I had no second thoughts. I did after I was there about a year – the man who was the deputy director of what became NIST went down to the department to become assistant secretary or deputy assistant secretary under the NOAA administrator, and he called me and asked me if I would come down and be his chief of staff, which was very flattering. He figured he knew me from the Bureau of Standards. He knew that I had learned a lot about NOAA. He felt I could be very helpful to him as he tried to get his arms around his responsibilities at NOAA. I think he never forgave me for saying no, but I told him that's not the career path I want, and I am still so challenged here that I just can't walk away from it for a staff job, basically.

MG: Can you say who that was?

HW: Yeah, it was Ray Kammer, K-A-M-M-E-R. So, he went back and, for a while, I guess he was actually the head of NIST as an English major. That was pretty cool. Very, very good student of organizational behavior. He was really effective in advocating for resources and winning them for the programs.

MG: Well, tell me about the position you came into at NOAA and the office you were in, the Office of Satellite and Data Processing and Distribution. I have to admit, the work and purview

of NESDIS is not always something I understand well. So, you might need to put some things in layman's terms for me.

HW: Sure, sure. Glad to. In fact, delighted to. If you want me to do sort of an organizational primer, you've got the NOAA level, with fish, fish people, Fisheries, Ocean Service – you know that very well – the Weather Service, and the Office of Atmospheric Research, OAR. Then you also have the NOAA Corps, the officers, the uniformed service, the smallest of the nation's uniformed services, essentially broken off from the Navy so that they could develop expertise in NOAA's mission in oceans and atmosphere, and not get then sent off to war somewhere or staffing on a ship or whatever. Of course, we have our own ships. I say "we" because I strongly identify with the agency – own ships and planes. [inaudible] So NESDIS is equal to those organizations – National Environmental Satellite Data and Information Service. They were created out of the Weather Service when we first began to fly satellites to support weather forecasting, something the Weather Service was not at all interested in because they had never done it, didn't necessarily feel they had the money to learn how to use the data or to modify their models to use the data, and so NESS [National Earth Satellite Service] was built. Then there was another floating part of NOAA that managed environmental data, long-term data from buoys, from surface observing stations of the Weather Service, from air balloons, weather balloons, from ships, and so on. They were the Environmental Data Information Service. So they got combined with the Environmental Satellite Service. It created NESDIS at the same level as the Weather Service and the Ocean Service and Fisheries and broken up under NESDIS then were these two parts that had been force-fit together, but actually, in my mind, still to this day, makes a lot of sense to be together. That is, you've got one part that's big because it spends a lot of money building satellites and then a significant amount of money collecting the data from them, managing the satellites and collecting the data, churning it into a form that can be immediately useful – we're talking within minutes – to the Weather Service, and into products that can be useful for other parts of NOAA and for agriculture and disaster prevention and response, and so on – climate change detection. So, it's big because of the money, mostly, but also somewhat unique from other parts of NOAA because of the close working relationship with NASA and with the Department of Defense. Now, the data part had, as I said, all of this archival data and a mission to save environmental data and make it available, usable and accessible for the long term. That meant you had to curate the data. You couldn't just say, "All right, send me all your weather data from every surface observation station in the nation since Thomas Jefferson, and we'll put it all together, and we'll dish it back out." Well, it's not all the same, right? Even if you have the same instrument type at the same time going, there may be some differences in the way the instruments work. So, you've got to calibrate them. So that if I say it's fifty degrees here and it's seventy-five there, you know there really was a twenty-five-degree difference. Similarly, with the weather satellites, you have to do that for the sensors saying sea surface temperature; look how it's changing. Well, is it really? Do we have a different way of measuring it or inferring it? We've got to be sure that we know absolutely what we're measuring and the accuracy of the measurements. So, that was a nice linkage between the environmental data part of NESDIS and the satellite part. And is that managing the underlying data for the long-term? The satellite part collects it, processes it, produces products, sends all of the data off to the data part of NESDIS, and says, "Okay, it's yours. Now make it useful and share it." Well, great. It would be nice if we could intercompare buoy data and satellite data for long-term analysis. So, you get just a lot of opportunities to improve understanding of our planet

in the areas in which we in NOAA have specialized knowledge. In addition, because we have such experience in managing such large sets of environmental data, other organizations have come to NOAA, like the Navy, and said, "Would you like all of our bathymetric data that has been declassified?" So, now you've got the bottom surface of the ocean data. Well, if you get that, and you've got columns of water temperature, and you've got wave action, then you've got the makings of being able to create a better picture of the entire ocean, not just the surface, and to mention glacial ice core data and tree ring data and ocean sediment – drilling down below the ocean and bringing up dirt, soil sediment, to see what was going on in the atmosphere in olden times. My part of NESDIS when I was brought in was considered in the satellite side – collect the data, receive the data, get it through the processing, ensure quality control, and for the data needed in the weather forecast models, it needs to be sent to the Weather Service within thirty minutes. And then you have other products that might be a three-day average, or a twenty-hour average, or whatever. Then we also had a part of the organization – so that's the big data processing part, but with oceanographers and meteorologists involved in quality control. As our science part of NESDIS would create new, improved products, that software had to be migrated into our operational environment, fully logged, documented, so that you could produce a more accurate measurement for the Weather Service, but also keep track of the fact that you've tweaked the measurements, so you can compare the old one with the new. So, keeping track of all that. That put me in the boundary of just straight satellite data processing and environmental data management. Now, Tom wanted me to then use what I learned there to try to help NOAA look across the board at environmental data management. So, along the way, NOAA created – and I helped them pull together the rationale and the terms of reference, if you will – a NOAA-level environmental data management committee, with representatives from every part of NOAA, initially coming together and getting to know each other. "So, what are you doing?" "Well, we've got all of our data in a drawer here. It came off of these charts. And that scientist retired, and we don't know what to do with it." Well, helping create better situational awareness, knowledge about the different capabilities of other parts of NOAA, and the need for long-term archival management of data in a way that you didn't have to figure it out alone each time, that creates agency-level practices, or begs for that, which we did create. I also sponsored an annual conference for NOAA, a workshop inside of NOAA, but we'd bring in experts, and that – I am so thrilled to say – is still going. They are still doing their environmental data management conference. They still have their environmental data management committee, tightly linked with CIOs and with computing acquisition elements and security elements, so you're trying to find a more common way of addressing what turn out to be common problems. Whew. I didn't know I still had all that in me.

MG: Well, it sounds like a good way to get to know the agency, too, to engage with so many folks across the portfolio, get them involved, and standardize these processes.

HW: Yes, yes. Getting to know the agency was key; otherwise, you're working in isolation. So, another very exciting development in my career at NOAA was finding out that other parts of NOAA knew that they could use satellite data, but they didn't know how to get it. They knew they had measurement needs, like ocean color, which helps you see where the nutrients are. If you're trying to manage turtles, protect sea turtles, if you know where the nutrients are, you know the turtles are there, then you don't want the fishing vessels. You want them using the turtle excluder devices when they're in that region. Or, if you can better track fishing vessels,

you can tell if they've gone into areas they're not supposed to be in, not just when you happen across them out in the ocean, but you actually can have the evidence. So, seeing all of these needs or opportunities to expand the use of satellite data was kind of the next step. Then, where can we get it? So, because I tended to work at a high level and collaboratively abroad – I guess, a collaborative base of connections across at least the computer technology parts of government – I got to know people in NASA and in Forest Service and elsewhere. In any event, we were able to strengthen our relationship, our partnerships with NASA and the Department of Defense in areas other than just weather satellite data and build some pilots and some actual sort of beta level projects that in time became – we were able to formalize the requirement for these types of data and say, it's not just serendipity. We really need these kinds of data. You can get them from satellites. Here's a source of those satellites. It might be an international body; it might be the Canadians for radar, the Europeans for something else. We can build a partnership, work together early to put in place the communications, the satellite antennas, the processing capability, the calibration and validation, the science teams to oversee the data. We could really get a lot more benefit for our agency and for the nation. So, I was working on that at an ad hoc level, to – there were lots of cooperation bodies out there, but they weren't so focused on – they were more focused on science. "We'll fund these scientists, and we'll give them our last three years' worth of data, or we'll have a special relationship, and this scientist at the University of Delaware can have access to those data, and in a couple of years they'll produce a paper, and we'll all know how it worked out." I was focused on the near real-time. If we can get – NASA was putting instruments on a Japanese satellite as part of a collaborative effort. The data from those instruments would be used by NASA-funded scientists to understand sea surface winds, in this one case, which helps you understand what's going on at the surface of the ocean, waves, and weather. If we could get that data back in near real-time, it would help with hurricane forecasting, severe storm prediction, and, in fact, it turns out, ice edge detection, because if the wave is going and it stops for no obvious reason, no land, maybe there is ice there if you're in the right conditions. So, I was able to make a case for getting funds to put an antenna in Alaska and partner with NASA, the University of Alaska, to collect data through that antenna, and funded communications to get data back to our processing facility, worked with jet propulsion labs to get their software and ported it into our system, all of this with the blessing of Joe Friday, Director of the Weather Service, who said, "Yes, sea surface wind data would be very helpful to us. We would like to see that." So, that became a documented requirement. Never had that before because there was no obvious way to get those data over an entire swath of the ocean. So, we were figuring it out as we go along. Now, there is a much more robust requirements definition. There are processes in NOAA, a process for determining which satellite data streams are of interest, which ones to go after, how we spread the money, and so on. So, we were really more in the figuring out how we might do it, and now, there's a much more robust collaborative decision-making process for determining what's needed and what the agency goes after, and how it gets the data. But it was a heyday, if you will, of building new highways, or building new roads, anyhow. They weren't necessarily superhighways.

MG: Well, you mentioned Joe Friday. Your tenure overlapped with the modernization of the Weather Service. So was that an opportunity to find ways to adapt these technologies and serve these new opportunities in the Weather Service?

HW: Yes, in a way. Not directly. First of all, I was on the acquisition team for the Advanced Weather Information Processing System, AWIPS. So, that gave me an insider's view on the technology approach and the elements of that aspect of Weather Service modernization. Also, I worked, as a result, more closely with the computing technology side, if you will, of the Weather Service. Before, I had been working more with the Weather Service as a customer or user of our data. The Weather Service, of course, was modernized in phases. Those at the Weather Service who would learn how – be at the leading edge of learning how to use satellite observational data – I'm not talking about for the models, now, the American weather prediction models, but for forecasts in the field – would be the science officers out at the regional and local Weather Service sites, and they didn't necessarily have internet communications early on in these areas. Because why do you need internet? You're never going to disseminate data over that because you can't count on it. The weather forecasts relate to saving lives and property, so you don't want to just hope the internet's working. You've got to be sure you can get the forecast out. So there was this sort of evolution going on in the definition of modernization, to expand it from just putting in this – well, this huge undertaking of communication lines, computer equipment, deployed across the nation, and so forth to, all right, what else is needed to be able to take advantage of new techniques. From my standpoint, I was looking at how can we get more involvement from the regions and even local forecasters, so we can better understand their needs and help to ensure that if we're going to go and secure some data, ostensibly for them, that they really do want it, can use it, and have the means to look at it. Even if they're just doing a side-by-side comparison with what they do operationally for forecasting – they look at this on another screen and say, "Oh, okay, that's really interesting how I can see this here but not there." That's the kind of feedback you need. So, I would say we were kind of growing together.

MG: Are you able to provide an example of how things were when you started to how they were towards the end of your time there?

HW: Yes, so I would say – and some of this was just the changing of the times, but certainly I had been asked, when I came in, to try to build stronger ties to all of NOAA and to, in a way, modernize our way of operating. So, when I came in, I saw most of my organization a – well, they were doing really good work, like volcanic ash detection just from watching and measuring sulfur dioxide in the clouds from instruments on our satellites that were not intended to do that, hurricane intensity estimates, wildfire fighting support. We had these wonderful pockets of expertise and, I thought, just outstanding operations. When it was time to modernize our main computing, however, it was, "Gee, I don't know how to do that. Maybe we'll get our vendor to help us figure out what we need for the future." Well, that's not the way to go. So it was fairly insular, I guess is what I'm saying, and set in its ways. My secretary, when I came into the office, basically sat me down and said, "I just want you to know that I don't have time for any of the things you may want because my job is defined to look at all these other things." "Okay. Thanks. So, I need to understand what these other things are, so I can figure out our needs. It's not my needs; it's our needs, and where do we go forward." But everyone had – there was a sort of narrow definition or fixed and firm definition of what our job is. "We do it this way, and we've always done it this way." By the time I left, I felt there was much stronger, much more effective communication and collaboration across my organization, instead of three discrete divisions that each did their own thing. I, at one time, had swapped a couple of the division directors to kind of stimulate some cross-fertilization of ideas, and I just started seeing solutions

proposed to problems that were not unique, that built upon experience in other areas. So, I would say there was much more looking across the organization and to the Weather Service and other parts of NOAA in collaboration and communications. Again, I can't take credit for all of that because it was an evolution in the agency as a whole, trying to emphasize getting more bang for the buck, if you will, by using common solutions. But yes, not insular, by any means. After I left, however, they did do something that, to this day, I don't fully support, and that was they combined my old office with the Office of Satellite Operations. That was the mantra – the rationale for that was operations are operations. "We'll just put them together." Well, in one case, you're managing the orbit and attitude of satellites twenty-four/seven, and the other, you're actually dealing with the data, and the meaning of the data, and the quality of the data, and communicating with the scientists and the forecasters and then providing for the handoff of the data for the long-term. So, one focuses more on mechanics, I think, and the other more on yes, you're running a twenty-four/seven operation, but it's focused on the application itself. It was really an odd kind of combination. I had been part of a team a few years before that had been tasked to develop recommendations for reducing the line organizations within NESDIS, and we had considered a number of combinations and had recommended a totally different approach of combining the research and applications development with the operational product production and dissemination because there was already a natural linkage there. When you develop a new sea surface temperature product, you're going to hand it off to operations, who then have the expertise to monitor the quality control of that, and then, if there are problems, go back to the science side to try to address them. So, there would have been much more affinity, I think, if you had to combine organizations if you would combine those two. But they did what they did, and then we continued to – and I guess the nature of organizations is reinvention, trying to make things better.

MG: That was in 2011?

HW: Yes, it was after. Yes, a few years after.

MG: What else stands out to you from this period and this position you were in for about fifteen years, was it?

HW: It was sixteen years. As I said, we went from day-to-day focus on operations to much more collaboration, interaction, and really a recognition, I thought, of the broader role of the organization – not just running computers – using more data from other US and international partners to understand the value those data might provide to NOAA's missions and improving our long-term data management practices. Around 2001 is when I had my multiple sclerosis [MS] attack, and after that, I was never able to command the energy, the physical energy, to commute to Suitland from Bethesda every day, a commute that was becoming longer and longer due to traffic, and to basically do the whole job. That was another key pivot point. I felt that – I may have said this before – my physical health was not great. I started to take disease-modifying drugs, which are sort of like chemo, and they affect your immune system, so they make you more vulnerable to infection. My energy level was greatly diminished. My father had a hemorrhagic stroke, and my mother had Alzheimer's. So I had moved them up to Maryland so I could oversee their care. I talked to my boss and said, "I'm really going to need to retire early." I'll never forget, she said – and this was Mary Glackin. She went on to become – she became

our deputy undersecretary, in fact, in time. We were friends, but we were sometimes maybe oil and water or more abrasive; we might have irritated each other, just our style – both pretty assertive. I admire her greatly. She said, "How about coming to our headquarters in NESDIS, and we can put you in a staff position there and see how that works?" I said, "Oh my god, a shelf. I get to build a shelf. I've heard about them. What would I do?" She said, "We'll figure it out – special projects." So, I did, and we figured it out pretty quickly. I became acting CIO, which I didn't care for, but learned a lot about that team of people in headquarters, and I hope I was able to help them get more recognition for the work they were doing. I was working on NOAA-wide environmental data management. I brought that with me. I brought the NOAA-level environmental data management responsibilities with me. So, I had plenty to do. I was on a couple of NOAA-wide committees with other SESers [senior executive service], looking at things like homeland security, how we might better support preparedness and the like for NOAA. So, that was great. Then, when Admiral [Conrad] Lautenbacher was head of the agency, and Greg Withee was the head of NESDIS, they agreed and really teamed to push through this idea of not just national-level cooperation on earth observations, but international, intergovernmental collaboration on earth observations. Not just for weather forecasting, there was a lot of collaboration for weather forecasting among nations and coordinating satellites and sharing of data, but across the board for other applications. Then the Admiral asked me if I would lead the – when this took off – lead the ad hoc secretariat for this organization. Basically, representatives from agencies around the world come together to agree on ground rules, planning documents, targets, statements of purpose, and all of this. So, we did that. I had a weekly 7:30am (ET) telecon with at times up to twenty-two countries represented. The Japanese would go out to have dinner and drinks and come back to their offices and call in. If somebody was in California, they would be up at 4:00 AM, trying to get on the phone and so on, all the way around to Australia, which I guess was as far as we got because it was simply too – New Zealanders didn't stay up that late or get up that early or whatever. But it was wonderful. Again, collaboration, working together to build something, and it worked. It flew. In three years, by that time, I was retired, but I was back as a rehired annuitant, they call it, basically, a temporary government position, and then for a couple of years half-time, and then a contract position to finish wrapping up the work for that. That organization is still going, and they've got – I don't know – a hundred and something countries cooperating, and they've gone off in directions I never would have predicted. Actually, I've stayed in touch with them, with the directors of the permanent secretariat, which – I think I mentioned before – I set up the offices in Geneva, Switzerland at the World Meteorological Organization. We developed all the agreements, paperwork, outfitted the offices, and hired staff to work there. It's still going strong. Full circle, by the way – that organization, the intergovernmental Group on Earth Observations, is sponsoring their first art competition, and I submitted a painting to be considered as part of that. It's how do we relate to the earth, how do we manage earth resources.

MG: I'd be curious to check that out. You'll also have to let me know how you do in the competition. I want to go back to a couple of things. I think in my notes, I had something about when you came to NESDIS, you were told you'd be moving to Silver Spring anyway for the position?

HW: [laughter] Yes, within two years. That was Tom Pyke. Good old Tom, he says, "Oh, no, come on over here. You'll do great in the position." I said, "But it's Suitland." I mean, I lived

in Gaithersburg, so that was going to be an untenable commute. So, I said, "All right." I bought a home in my old neighborhood, which cut the commute by twenty minutes. I said, "But I don't want to do this forever." He said, "We're looking at changes, so within two years, we can move your office to Silver Spring." I said, "Great." Sixteen years later – it didn't make sense. I could always work in Silver Spring if I needed to. They had visiting senior executive office space and whatever, but if you're not with your organization and you can't walk the halls, you don't really know what's going on. You've got to be accessible.

MG: That was the other thing I was going to ask you about. I understand better the work the office was doing, but what did your work specifically look like? You know, a day in your life?

HW: I actually got followed for IEEE Spectrum for a day in my life, and it was pretty boring. Meetings, committee meetings, planning for performance reviews, budget reviews, staff meetings to get what's going on in each division and what problems are they having acquisition planning. So you are going to buy a big computing system? What are you doing? Where does it stand? Who do we want to get on the committee to do the evaluation? Lots of stuff like that. What I tried to do was carve out some time to visit different parts of the organization, just to see what they were doing. I didn't do that all the time because it can be disruptive for the staff, but I had set up biannual review – not a review, a visit. "Here I am. Tell me what you're doing. Tell me what you're working on. Show me what you're doing. Share your ideas." That was pretty cool. We had an annual, at least an annual, all-hands staff meeting. I could never get everyone because you're running a twenty-four-hour near real-time operation. You can't leave the desk. But they would take turns. So I would get a smattering of folks from across the organization, and we could do rumor control if nothing else. "So, what did you hear? What are you worried about? What's going on that I need to know about?" You don't get to do a lot of technical work.

MG: Did you miss that?

HW: No. No. I was like a sponge. I loved learning about the work that others were doing. I did actually sit in and audit a satellite meteorology class that the research part of NESDIS was holding for new meteorologists who had come into – and also for the Weather Service meteorologists who may not have studied satellite meteorology. So, I audited that until I couldn't understand anything they were saying, but at least it gave me the beginnings of understanding some of the kinds of things that you could learn from looking down on the clouds from above, taking certain measurements, and correlating maybe brightness of the top of the clouds with temperature because if you figure where the top of the cloud is, then you know the altitude it's at, and you know generally the temperature in a column, and then you look at clouds in successive pictures, and you can see, "Oh, that same cloud. Oh, that's moving at this many miles per hour at this level. Fascinating." So that kind of soaking up of that learning was fantastic. I think that my days doing R and D were fun to a point, but I didn't have the passion for the rigor. Well, I like being around people too much.

MG: That was my next question. Who did you work closely with, or who did you work well with during those years?

HW: Closely with? Well with? Gee, there were lots of different levels, different relationships, or different partnerships. I generally worked well with my management. I, you know, at least it wasn't ever adversarial. My division chiefs, I thought were – I say mine, but you know, the ones in my office – were a delight. Just so smart and so dedicated. So, that team was important. I had a front office team of a deputy, a technical assistant, and of course, the administrative staff. Then, I had someone looking at the environmental data. So, I would say we had a really tight team there, but we had tentacles going out into other parts of our organization and the agency. It was very important to have a close working relationship with the Weather Service, and that meant you had to be – you had to truly be there as a partner for your peers in the Weather service. One, in particular, I – there were a number – but Louis Uccellini, who is retiring now as the director of the National Weather Service, was my counterpart for the numerical weather prediction modeling. His passion for the models and for getting the data to feed the models, running the tests, and collaborating with NASA, where he came from, was contagious. But the best thing with Louie was if you wanted to get him talking in an animated, really animated fashion, you asked him about eastern snowstorms. That, I guess, had been a real research interest of his. I knew his favorite storm and so on. So, yes, my peers in NESDIS – we had a generally good working relationship. Not with everyone. Some [were] like, "Don't bother me. I've got my job to do." Others said, "Yeah, let's look at something new." Kathy Kelly was fantastic. She was the head of satellite operations. For a bit, I guess, we overlapped as women directors, so that was pretty cool.

MG: If you're comfortable talking about it, can you tell me a little bit more about what happened when you had your MS diagnosis. There was a lot going on during that time period. I think in your notes, you said it was around the same time as 9/11.

HW: Yes. So, for me physically, I noticed I couldn't feel anything on the surface from the neck down. I had some sensation, obviously, or I wouldn't have been able to walk. But I had trouble holding things. I did have trouble walking; I would stumble. At its worst point, I couldn't feel my feet, so I couldn't drive – profound fatigue. So, I decided to get a diagnosis and get it now. Well, if you've ever worked with a neurologist, you know they are much more cerebral. Maybe it just goes with the profession. "Well, we'll do some tests. We'll look at it. We'll try some of this. We'll see how you do." I'm like, "I want a diagnosis. Is there anything else we can do to find out? I need to figure this out, so I know what I'm up against." I even sent my neurologist a two-page single-spaced typed fax with all of my questions. His staff, when I came in, said, "Are you the one who sent the fax?" It was really funny. But yes, I was panicked. I really didn't know what was going on. They put me on high doses of steroids, which was the normal treatment for an MS attack, where the body, like with rheumatoid arthritis, is attacking the nervous – the immune system is attacking the body. But in my case, it attacked the covering of the spinal cord, which then messed up all the electrical signals from there down. Taking all of the steroids made me very tired, and I couldn't drive at that point. So, here I am, trying to figure out how to support my – I was still the office director. When I did go to work, there was no way I could drive to Suitland, so the management let me use an office in Silver Spring. But I even had trouble with that. As I said, it was around that time – actually, it was a year later, a couple of years later, when dad had his stroke, but he'd had some other problems, so I'd had a number of crises – family health crises – requiring me to go to Florida. Before I got my diagnosis finalized, I guess it was 9/11. It was around that time. No, it was just before – 2000. I remember

stumbling after that and thinking, "Well, maybe it's just the shock of this huge event that so traumatized a generation, at least." Then, I got progressively worse. I always wondered if the shock of 9/11 played a role, but you can never really measure those things. But again, before my diagnosis was finalized, I went to the funeral for each – the funerals for each of two young men who were in a unit that reported to me, a Navy unit they reported to Navy, NOAA, and US Coast Guard. They were killed at the Pentagon when the plane hit, and I was asked to go and be there to represent NOAA and the Department of Commerce at each of their funerals. When I went to the funeral in Delaware, I couldn't feel my feet. I told the commanding officer for that unit that I might need help getting home. They geared up, and they were ready to have somebody drive me, and then resting a bit, I was able to feel my feet well enough to drive home. But, yes, it was pretty bad. I couldn't do my job. That led to some backing off on the tasks I would take on, and eventually then to stepping down, or stepping over, which did lead to a lot of fun. As my energy levels improved, I once again was able to tackle more challenges, and the interagency and intergovernmental work that I was doing gave me those opportunities.

MG: I think you said that you were told you had had MS for maybe twenty years prior.

HW: Right. Yes. So with MS, one of the things you do is MRIs of the brain and the spinal cord, and they found areas in the brain that look like they have had myelin damage. Looking back, we could see there were periods of time where for no good apparent reason, I suffered profound fatigue. As someone who tended to work twelve-hour days by choice, when I got tired, it was odd. But then I'd rally, and everything would get better. So, it obviously wasn't bad, and I did go startup at NIH [National Institutes of Health] in late 2001 in a study there that I'm still in, their history study. I'm in a medication study, not a double-blind, but actually taking the medication to see if it will rebuild some of the myelin-covering nerves that were previously damaged in the optic nerve, the brain, and the spinal cord; those are your areas of damage. So, we'll see. But I'm one of the very lucky ones. I had one very, very bad attack. It did leave some damage, but I'm able to do most anything I want to. I had to give up skiing. I just couldn't get my legs to work quite right. That was my excuse for why I didn't hit the double black diamonds. But aside from that, I've been very, very lucky.

MG: Are you in touch with other folks who have MS? Support groups, things like that?

HW: I tend to not be so much into support groups as fact-finding or sharing facts or data if others need it. But I do have some friends with MS. I have a first cousin who is so disabled that she has totally withdrawn, and none of us are in touch with her, but she was very helpful to me. She shared all of her magazines from the Multiple Sclerosis Society and encouraged me to join that to get the latest information. I do have a friend, a man, who is actually married to my aquatics instructor, who is in a wheelchair now. His mother actually died of MS. He has had MS most of his adult life, and it's getting rapidly worse. So, we had the same neurologist for a long time. In fact, I've switched from another one I had back to his current neurologist. So, yes, we share information on the good, the bad, and the ugly. Seeing him really does help me. It brings home the point that I'm very, very lucky to have had a relatively mild MS experience.

MG: Can you say again what the position was that Mary Glackin and Greg Withee put you in for? How did it help you manage all the things you had going on in your life and with your health?

HW: So, they set up a position called senior advisor for special projects. So it was whatever we agreed to do. It was not in the senior executive service. Each agency only gets a limited number of those slots, so I gave up that slot, which stayed with my old office, and I got a senior leader designation. I guess during the civil service reform of umpty-ump years ago, I guess in the '80s, they created senior executive service, senior leader, and ST, which is essentially a senior scientist or technologist. Those were the breakout of what used to be called the super-grades, which were above your journeyman level, division head levels. So, I moved over to a senior level. There were only two of us in the whole agency. Because we were senior, we were running projects or programs, did not have full-time staff assigned to us, and we were not chief scientist – so, great. It was perfect. Then, the duties assigned were as negotiated, keeping the environmental data management chairmanship, keeping that group ongoing, and working with the CIO council and others to coordinate on planning, and continued overseeing the United States portion of the intergovernmental earth observations collaboration. And I also was chairing the US committee that organized US involvement in these intergovernmental earth observations; [it] was a committee under the White House Office of Science and Technology Policy. So, I was chair of that. No. Yes, I think. Maybe I was co-chair. It was weird. It was hard to know because I had another committee under the Office of Science and Technology Policy, and that was disaster management reduction. We had FEMA, Army Corps of Engineers, Forest Service for forest fires, and other things – any agency with any involvement in disasters, disaster reduction, disaster response, or research related to being able to reduce disaster losses in the future. So, I chaired that committee as well. Committees are good because you're not carrying all the load yourself, but you do have to keep the communication going and the meetings going. Also, I was able to use my sick leave and annual leave as I needed to and even got to the point that if I didn't have any leave, I would just go on leave without pay if I couldn't work the full hours until I regained my strength. So, they were just wonderful. I'd say that, in the end, they got their money's worth because as I regained my strength and the MS was brought under control, I was able to carry the load and more. I still would not have been able to handle the commute to Suitland, though, on top of all of that.

MG: I'm just going through my notes and making sure there are things I haven't forgotten to ask about. I think you talked about the Earth Observation Summit in Washington.

HW: Yes. I talked about the first one. The first one was when the United States proposed to other nations coming together and forming an intergovernmental body to try to promote collaboration, cooperation in both providing earth observations, sharing earth observation data, and figuring out how to use the data for national benefit. That was the one where Colin Powell, as Secretary of State, hosted the meeting at the Department of State. I had not been involved in the planning for that, but a few weeks before that meeting, Greg Withee called me into his office and said, "We've been planning for all of the organizing related to this meeting, the breakout sessions, and negotiation sessions, a draft resolution of what we would hope to see, but if we assume success and agreement, then we need to plan how we organize to go forward. Could you

do that?" I was like, "Sure, okay." So, I did. I got into that meeting for that reason, and then Admiral Lautenbacher nominated me to be the, if you will, the interim chair for the secretariat.

MG: Was that the organization that you called the golden trust?

HW: I didn't call it that, but that's a great name.

MG: [laughter] I have a note – "trying to get governments to work together to share environmental data from all of our instruments that measure earth so that we wouldn't duplicate it. It wasn't as much of a technical challenge as it was a golden trust."

HW: I might have said golden fleece. It doesn't ring a bell, but I may have said that. It was building trust. Building trust was the hurdle, the number one hurdle. And I think we did. I recall in the context of that discussion – I was talking about how the other governments came – the Europeans more so than anyone else saying, "Oh, you Americans, you probably already have decided what you want, and you've got it all scoped out, and you just want us to agree to it, without ever having talked to us about this before." We're like, "No, no, we haven't. We weren't allowed to." We felt that if we came together intergovernmentally that all of us would be able to get our governments' support as they became more aware of the value of earth observations. So, they're like, "Oh, well, that's a surprise." So, that was the beginning of building some trust. Then the secretariat with the teams working together – even creating the name, Group on Earth Observations, that came out of our meetings, developing the first plan, and that was lots of give and take. But we became a – we were a team, and we even got T-shirts. I got us all golf shirts through, I guess, Lands End or L.L. Bean – whoever NASA used for the golf shirts that are worn by the astronauts for each crew. They get their own logo, their own color. So, we ordered a bunch of those for us and showed up at one of the meetings in matching shirts. It was really – it was fun and well-received.

MG: Yes, it's amazing how much you have been able to accomplish, and the word that I keep thinking of is synergy, connecting these different groups, and being able to find solutions.

HW: Yes, together. That's what I do with my homeowners' association.

MG: Oh, good. [laughter]

HW: That's probably why I seem to be president for life because prior presidents, even there, would make the decisions, they would have initiatives, they would decide on everything, and if they weren't so inclined, nothing ever happened. I got a team of folks together, and they had each taken on responsibility. They worked together beautifully. It's just [made] all the difference in the world. Even if we don't always agree on everything, we bring it up to the surface and talk about it. That's amazing how it works.

MG: Is this how Helen Wood Park was created?

HW: Oh, the desire to have an improved forest conservation area?

MG: Yes.

HW: Yeah, I guess so. We now have the county inspector for forest conservation meeting with the head of facilities for the French international school, and I have our vice president, the neighborhood's vice president on our homeowners' board, and another neighbor who is a lawyer who is very interested in this. They are all meeting on Friday, and they'll walk through and get the final plan in place. They have raised enough money from homeowners to buy twenty trees, and the school agreed to plant them. Then the trees will screen our view of the buildings and screen some of the noise from the children yelling in French on the playground. So yes, it's good, and they're carrying it forward.

MG: I also wanted to ask you about your return to art, or how did that kind of come back into your life? Was it in retirement? Did it show up earlier than that?

HW: Early in retirement. As part of planning for the future, I had this list of things I wanted to learn in retirement. One was to learn to draw and paint because my mother was an artist, but I never had shown any affinity or ability for it. I wanted to learn to tap dance, but tap-dancing in retirement is probably not as good an idea as tap dancing when you're young. There is no way I could do – and with MS, there is no way I could do that. There was something else – oh, and play the drums. But hey, I can play the piano. I don't need to play the drums. Those were things that might have been fun for life-long, but really not to add at the end. So, after I retired from NOAA, and took that two-year part-time position, once that finished, I signed up for my first drawing class through our county recreation program and took drawing lessons from a really lovely artist. She is an area artist who teaches children – in her day job, [she] teaches children art. She was teaching adults using the exercises from the book *Drawing on the Right Side of the Brain*, which is like, skip all of those technique classes, learn to see, and learn to convey what you see to paper, and not what you know. So, one of the first things we did was reproduce a drawing of Picasso by somebody, and it was incredibly complex. The way you do it is you turn it upside down and divide it into sections, and just reproduce what you see from your own paper and when you turn it over, it's like, "Oh my god." Martin Luther King, Jr., pointing his hand, so you've got elongation. Things that are closer or bigger. But instead of studying about that, you copy this photo of a drawing and learn to look at what you see and not think about, "Oh my god, how am I ever going to do his arm." Right? So then, after that, I started taking other classes, and now it's been – well, 2012 to now. I just had a painting accepted in the Rockville Art League show, which will start up in December, and I just brought two paintings back from a juried show in Virginia, in Norwood, Virginia. Oh my god, Norwood, out in the middle of seemingly nowhere, in horse country, but they have a wonderful art show every year that I never even knew about, and they accepted two of my works. So yes, I'm having a blast. I'm working on a painting now that's commissioned by a friend of a friend who fell in love with a photograph I took of sunrise over the Blue Ridge mountains and wanted me to try to give her something based on that.

MG: Is this something you're able to focus more on now because of the pandemic and being at home more?

HW: Well, being retired and being at home more, absolutely. With my energy levels still not – and age could be a factor here – I still don't have anywhere near the energy I'd like to think I could have at this age. Sitting and painting is – it does take energy. It takes mental energy. But it's something I can do in a couple of hours when I don't feel like going for a long walk. I don't do a lot – I don't spend a lot of time at it. I spend a few hours a week, and it's more in bursts. If I don't feel like painting, I'll go up and organize my studio, and that's fun – with my files and whatever. But then, other times, I'm downstairs working on the budget for the Maryland Pastel Society or for Conservation Montgomery, where we have a grant from the county to teach home tree care to communities. I've got my upstairs and my downstairs work, and then I keep exercise mixed in with it. I don't know. I think it's a pretty full life, at this point, for someone my age and in retirement. I stopped consulting. A year ago, last April, was my last gig, and I was done.

MG: You mentioned in your notes that you were traveling quite a bit before COVID, so I was curious if you could tell me a little bit about the places you traveled, and then just your life during COVID. This is, I think, a period of time that people will be interested in a hundred years from now.

HW: [laughter] Okay. So before COVID, my work – I traveled a lot with my work. I talked about international collaboration, even before this intergovernmental group, when I would work with, say, the European space agency to arrange to pull data out of their data stream from their satellites, bring it back to the US quickly, to use on an experimental basis for weather forecasting support. I traveled at least once a month abroad, and sometimes twice a month. When you start getting recognized by international flight attendants, you know you're probably traveling too much. And I probably was. I didn't realize it could take a physical toll, silly me, because I just loved what I was doing so much. My travels took me to Japan sixteen times, and all but one of those were for work. Australia, a couple of times. China, way back, but that was a professional association, but also work, so I had a work element to it. And to all over Europe – Norway, the Scandic countries, a lot of France and Germany and England. Belgium, set up an office in Brussels, I mentioned, for the computer society, and another – or I was part of a team setting it up – and also an office in Tokyo. After I retired – oh, and I also went to Russia for work. Moscow. Moskva. One of my first international business trips for the Bureau of Standards was to Yugoslavia, the old Yugoslavia. In fact, [Josip Broz] Tito was still in power. He was their post-World War II dictator, and I saw him in a parade in front of the US embassy when I was there. That was '78 or something like that. So, I got into travel pretty young, in the '70s, and I loved the experience of seeing other countries, other cultures, the food, the people, and partnering with organizations, forging partnerships. In fact, the IEEE fellowship – becoming an IEEE fellow, I mentioned it was for engineering management, but the example was work I did at the Bureau of Standards to build an enhanced national and international framework for government testing of software products for conformance to standards. So, you think of something like Fortran. You want to run Fortran on your computer, you run your Fortran program there, and it doesn't operate the same as if you run your program on another computer. It says it's running the app, Fortran. What's going on here? It should all be the same. I shouldn't have to figure out the differences. Well, that was the basic idea, but we were looking at the internet, running things over the internet, testing functional levels of networking, and so on. So, I got the Japanese and the Europeans and the Canadians involved, and then the private sector, General Motors and Kodak. When I got them coming in on the US side, it's like suddenly, oh

yes, it makes sense to do this. So yeah, I did a lot of travel for that. Once I retired, we have – one of our first trips was to South America and Antarctica. I had been to Argentina and Chile for business prior and to Peru and Ecuador, accompanying my husband on a business trip many years before. But this was down and around South America and with four days around the Antarctic Peninsula, and then landing on King George Island and commuting with the local scientists and technicians who are running research stations, the Russians, the Argentines, and others. So, that was pretty cool. Asia – in retirement, we took a cruise from Bangkok to Beijing, is what they called it even though you can't get to Beijing from the water, but that's where the tour ended up. Then I spent three days on the Yangtze River cruising while in China. Now we're doing river cruises, and also I have for next year, to make up for the last year and a half, we're supposed to start off with a trip to Israel for about ten days. My husband has family who settled in or migrated to Israel, so he's interested in family history there and archeology. Then the Southwest parks, which will be a domestic trip, and then to Norway, starting off with five days in London and then taking a cruise up along the Norwegian coast. A few years ago, we went to Iceland, Norway, Scotland, Ireland. Yes. So, doing a lot of that. We are slowing down. It will be three trips next year, which is one more than I think is appropriate per year or sustainable going forward, but they got pushed back by COVID. In terms of COVID, being retired, working with organizations and committees whose work took well to Zoom, it has – I haven't felt alone because, in fact, I've been able to help art associations that I work with figure out how to use technology for their meetings or recording and then editing and sharing demonstrations, art techniques, conducting classes where you're actually doing demos during class. So, I've had a lot of activity during COVID. At times, it was pretty tiring; it was just a lot. Helping individuals through my friends, like my yoga teacher, a friend of mine, or artists or others who are trying to use Zoom, or use this tool called Padlet for art sharing or get their iPhones to work with their desktops. I know how to do that, so I would never charge for it; I just help them. A friend who was widowed, her husband had left like three email accounts, and she couldn't get any of them to work in order to access contact lists and just get her email going forward because he took care of all of that for her. So, it was good to be able to help. I don't anticipate too much quiet time.

MG: And you have two teenage grandchildren nearby.

HW: I do. They no longer need our help with driving so much day-to-day. He is in a mental health therapeutic center because of his mental health conditions, so that's been very traumatic. They're twins. They are sixteen, almost seventeen. We hope he's doing okay. He at least hasn't been kicked out, which is a good thing. She is a competitive ice skater. I haven't been able to go to any of her competitions. Nobody really can except one parent, but they've been streamed, live-streamed, so she just competed in the eastern regionals for the US Figure Skating Association – USFSA, or whatever it is – and I was able to watch her competitions, which was pretty cool.

MG: Well, tell me a little bit about your daughter and how her life unfolded.

HW: Only child of a mother who was divorced much of the time, and I tended to work very late. So, she learned how to – she was very responsible, very good kid, and she learned how to cook. In fact, she got her stepmother to teach her how to cook because that would give her some

variety in what she ate. I tended to cook for the week and then freeze the meals, and it's like, "Oh no, again?" She was a great student. She competed in a NASA competition for kids in, I guess, in middle school, junior high school then, to propose an experiment for the space station, and she got into the regionals with that proposal, which didn't get selected for the final mission, but it was a great experience. She wanted extra money, so she got up at 5:00 AM and delivered *The Washington Post* in the neighborhood. She had very good friends who were Mormons and Latter-day Saints, and she converted – asked if she could convert from nothing, which is what we were, to Latter-Day Saints. I did some research, talked to the head of the local congregation – he was a chemist at the National Bureau of Standards – and said, "Yeah, if you really feel strongly, I'll support you in that." And so she did, and she stayed in the church until she was excommunicated in grad school for being a lesbian and having come out and told them this in public so they couldn't look the other way. She has her PhD in public policy, social welfare, works at the National Institutes of Health in the National Institute for Nursing Research, coordinates intramural research efforts, and oversees some grants and deals with policy – and sort of like the program office I used to be in at the Bureau of Standards, I think. She loves it. She's got a very supportive team environment, and they understand that she has had a lot of out-of-the-ordinary demands in caring for her son, the son primarily. The children are – my daughter's wife is the birth mother. My daughter adopted them, and they occupy a huge part of all of our hearts.

MG: I'm sure there are things we're missing, but is there anything else you want to talk about while we have the time?

HW: Not that I can think of. I've really talked a lot. I have enjoyed revisiting memories, and I've tried to be somewhat diplomatic at times. You probably caught that. But I think it's good to have perspective. Having stepped away from work, from professional association activities and shifted my focus, I guess I see a common theme through my life of trying to build and nurture partnerships, and it seemed to be a useful solution approach for so many things that – is it because I force-fit it, or because it just is? I don't know. My management style was always characterized as participatory. I learned from the team. Like I don't have a problem making a decision, but I don't want to make it in a vacuum, and it's so much better if you have taken all points into account. I guess I can sit back and see that theme running through life. I wish I had done a number of things differently, but not the big things. There are little things, maybe. I wish I had said this, I wish I had done that or thought to do that, but my career, I'm very happy about the fact that even when I had to change the direction. I'm happy I was able to remarry my second husband, and we're a heck of a team.

MG: Good. Well, I find it all just so impressive. I'm so glad you shared with me the early part of your life and your family history because it's so neat to see all the connections. Your work at NOAA was so important, and all the things you did and touched there. Thank you so much for sharing your story with me and with NOAA. I'll pause real quick and just share the next steps.

HW: Okay.

----------END OF INTERVIEW----------

Reviewed by Molly Graham 2/11/2022
Reviewed by Helen Wood 2/12/2022

Reviewed by Molly Graham 3/2/2022