



The Oral History of Virginia Carter

July 23, 2018

Interview conducted by Bill Wilen
Wakefield, Rhode Island

Oral History Cover Sheet

Name: Virginia Carter

Date of Interview: July 23, 2018

Location of Interview: Wakefield, Rhode Island

Interviewer: Bill Wilen

Approximate years worked with the Fish and Wildlife Service: From 1974-1999

Offices and Field Stations Worked, Positions Held: U.S. Geological Survey as a research biologist ecologist, specializing in the ecology, hydrology and remote sensing of wetlands.

Most Important Projects: Co-author of the Classification of Wetlands and Deepwater Habitats of the United States. Identified and mapped wetlands using color infrared aerial photographs and satellite imagery.

Colleagues and Mentors: Dr. Richard Anderson, Lew Cowardin, Frank Golet, Joe Larson, Ted LaRoe, Bill Wilen.

Brief Summary of Interview: In the beginning of the recording, Virginia Carter talks about her childhood in Rhode Island and her schooling. She recalls taking a biology course in college which made her fall in love with environmental careers. She then talks about her family, and her return to academics in Washington D.C., where she earned her Master's degree and was offered a job at the U.S. Geological Survey as a biologist ecologist with a specialty in wetlands. She also identified and mapped wetlands using color infrared aerial photographs and satellite imagery. While doing this work, she discovered that the maps of wetlands were often inaccurate and mentioned this problem to the Fish and Wildlife Service. She was then asked to co-author the Classification of Wetlands and Deepwater Habitats of the United States which she worked on with Lew Cowardin, Frank Golet, and Ted LaRoe. Half-way through this interview, Frank Golet and Bill Wilen talk about how the National Classification System is important to most Federal Agencies today and how the maps of the wetlands are helpful to contractors and other users.

Interview

Bill Wilen: “This is the oral history for Virginia Carter, Bill Wilen’s the interviewer. Frank Golet will join in later during this oral history. Okay Virginia it’s yours.”

Virginia Carter: “Alright, thank you Bill. I was born in Paris, France in 1934, when my father was the Vice Consul in the U.S. Foreign Service. He and my mother returned home to Rhode Island before World War II broke out, and my father was in the Coast Guard during the war. I spent many of my early years in the Matunuck Hills; a glacial moraine with hills, valleys and glacial lakes in southern Rhode Island. My mother, sister and I lived in Providence, Rhode Island, but I went first to Rocky Hill School in East Greenwich, and then to Lincoln School; a private girls school in Providence. I read voraciously, bicycling to the library at least once a week, bringing home stacks of books. I walked or rode the trolley to school and participated in school sports. I was a good student, highly competitive and eager to learn. In those early days I spent much of my free summer time outside, roaming through the Matunuck Hills with my sister and friends and swimming in the many glacial lakes. My father raised sheep, cows and chickens, and my time with him was very busy. At Rocky Hill, we spent much time out of doors hiking, swimming, sailing, etc. My mother was a private photographer whose sideline was nature photographs: flowers, trees and other things of that sort. She knew the familiar and the scientific names of the local plants and so did my dad. Their love of the outdoors was a major influence on my life. I went to Swarthmore College in Swarthmore, Pennsylvania, from 1951 to 1955. At first, I believed that I wanted to major in math or English, but after my first biology course, I was hooked. I took almost all the biology courses at Swarthmore offered to both regular students and pre-meds, as well as chemistry, organic chemistry and physics. In those days there were many required courses for graduation, so I got a thorough liberal arts education as well as wallowing in science. After getting my BA in Zoology at Swarthmore, I married and moved south to Pennsylvania and Maryland with my husband Page, we had three kids and I was a stay at home and cook and garden mother until my daughter Elizabeth started kindergarten. By then we were living in Bethesda, Maryland, and still spending much of our summers in Rhode Island with my sister’s kids and mine. I returned to the academic life during the Vietnam War, going to American University in Washington D.C. where I earned a Master’s degree in Ecology. I considered teaching, but as I had done my Master’s thesis on the remote sensing of wetlands, I was offered a job at the U.S. Geological Survey in Washington D.C. where I became involved in interpreting satellite and aircraft photographs and data. My major professor at American University, Dr. Richard Anderson, was doing research into the use of remotely sensed data to identify and map wetlands, and I credit him with sparking my lifelong interest in wetlands. I worked for USGS for about 30 years as a research biologist ecologist, specializing in the ecology, hydrology and remote sensing of wetlands. Later in my career I took advantage of the opportunity to get my PhD in Geobiology in 1981 from George Washington University in Washington D.C. I was able to

take courses in ground water hydrology, ground water modeling, stratigraphy and sedimentation, all courses useful on doing research on wetlands. As I worked identifying and mapping wetlands using color infrared aerial photographs and satellite imagery, I found that existing wetland definitions were vague, overlapping, and fuzzy at best. A new system was needed to make any kind of accurate inventory. In 1973 or 74, I went to the Fish and Wildlife Service and complained about this situation and discussed remedies. Soon thereafter I was approached by Fish and Wildlife Service to co-write the Classification of Wetlands and Deepwater Habitats of the United States. Lew Cowardin was asked to be lead author and soon after we started working on the system, we asked Frank Golet to join us. Frank and Joe Larson had done pioneer work of creating the classification of Freshwater Wetlands in the Glaciated Northeast. Later, Lew added Ted Laroe to the author list, as we felt it would be useful to get a broader perspective of coastal wetlands and deep-water habitats. The three of us started by writing a first draft of the classification system and in the fall of 1974, the three of us attended a meeting of wetland scientists and managers from around the country at the NASA Space Flight Center in Bay St. Lewis, Mississippi. This was the first of many subsequent meetings, at which we received much helpful advice and a good deal of unpleasant criticism. As our drafts of the Classification system progressed, we had meeting after meeting with local, regional, and national wetland scientists, some interested in helping us adopt a system, and others more interested in their own wetland perspectives. Some of the meetings were contentious and left me feeling as though we were swimming upstream. Our author meetings were frequent and also a bit contentious, there were many fierce battles over concepts and terminology, often late into the night. Frank turned out to be a ruthless manuscript editor and Lew was incredibly stubborn. Arguing is something I do well, but sometimes emotions interfere with rationality. We found that our knowledge was at sometimes insufficient to cover wetlands in the entire U.S. and since one primary goal was to make the Classification as useable as possible, we took several outstanding trips to wetlands, including the Great Dismal Swamp of Virginia and North Carolina, the Okefenokee Swamp and the Everglades. We eschewed some of the familiar overlapping and sometimes confusing terms such as; bog, swamp, fen, etc. for terms that were more precise. We recognized that most wetlands were evolving with time and their vegetation was dependent on climate and location. We recognized also that wetland soils were often at times diagnostic of wetland conditions, all, therefore of these characteristics: vegetation, soils, and hydrology were critical to classifying and inventorying wetlands.”

Bill Wilen: “Okay, we have restarted Virginia Carter’s oral history, Frank Golet has joined, Bill Wilen is the interviewer, and I’m going to interject somethings in this part of Virginia’s oral history. One fact is that - *phone ringing* - Okay, we’ve started the oral history again, one thing I’d like to start out with is the Fish and Wildlife Service from day one, when Virginia Carter got involved in the classification system through today, USGS has been our partner in a lot of activities and sometimes the people we argued with – sometimes the Fish and Wildlife Service said that USGS was the 800 pound gorilla in the room, but we’ve had a really strong and working relationship with USGS. Some of the things that they had a hard time accepting is when they were making 5 color maps, we were making [black and white] machine hand lettered maps. But even then, they turned around and they had the authority to sell maps so even then, USGS sold our [black and

white] copy maps along with their 4-5 color maps, so we've always had a good history with USGS. But I'd like to ask both Virginia and Lew, how the USGS and how the University felt about having major players spend so much time on the Classification system."

Virginia Carter: "Well, for my part I think that – at that time I was the only biologist in USGS or approximately the only biologist in USGS, and USGS was definitely focused on other things, and I'm not sure that they were paying a great deal of attention to what I was doing. It took a lot of hard work and they were very cooperatives about my doing it, and going on field trips to go look at wetlands and things like that, but this was before – well actually, possibly during the time that I was beginning to do a lot of work on the Great Dismal Swamp of Virginia and North Carolina. And I did work with some older USGS professionals who had done some work on the hydrology down there, and it gave me kind of an "in" I think with USGS, and their ability to accept what I was doing, as actually being research and being of interest to them."

Frank Golet: "I think, at the University of Rhode Island, I was very lucky that the dean's office let me take as much time off as I did, particularly because I had just been hired in 1972, and we were starting to work on the project late in '74. So, it was challenging, as I had said in my own history: it was challenging to find the time and energy to work on this project because it was a big project, it was a nationwide project, and it was just in the beginning stages, and I was in the beginning stages of trying to develop my courses at the University and write grant proposals to do research projects. So, I think maybe it was because I was so excited about doing it and the dean was so understanding. At the same time, I kind of had a feeling he wondered, well maybe we should be getting some financial reward for your time, but as long as Fish and Wildlife Service was willing to pay for travel to different parts of the country, that was clearly the most expensive thing, I guess the dean was happy, I was happy, and we just kept going."

Bill Wilen: "One of the interesting things is that Frank and Virginia are basically from the Northeast and Lew Cowardin was from Prairie Potholes, so how were you able to develop a classification system that had to go all the way from the North Slope of Alaska down through Puerto Rico, and Southern Florida?"

Frank Golet: "Well you know one thing Bill, I'll say right away is that Virginia did the great bulk of the literature review for the Classification, and that was very time consuming, I know, but in the process, she gathered information about wetlands all over the country. And that really was what allowed us to even start talking about this stuff. We had the literature that we could review, we could discuss it, and then you know, there was contact that we made with people in different parts of the country, a lot of times, and already in '76, NWI was doing some preliminary mapping and the people working in those regions were asking questions and we would go out and visit them. I know we went to the Southwest one time and spent a couple days there, very useful, very rewarding, and then the trips Virginia mentioned; [we] went to the North Carolina pocosins, and we met with – what was the guy's name? Rusty... -."

Virginia Carter: “Rusty Kologiski.”

Frank Golet: “Rusty Kologiski, he had done his PhD on ecology of Green Swamp I think.”

Virginia Carter: “That’s right.”

Frank Golet: “In North Carolina, so he took us down there, we walked around, we went to the Everglades and there was another fellow, whose name I probably can’t remember, but he was associated with the University of Miami. He was a Field Ecologist, uh, last name was Alexander, that’s all I can remember. But anyway, he went out with us in a helicopter as we flew over the Everglades, and he told us things about the ecology of the Everglades we never would have known, the plants that were there. If we had a question, we’d go down to the ground and we’d say, “What’s this?” you know, and, “What’s the ecology of this?”. And so, even though we didn’t have that background, I guess you could say we squeezed it out of some other people who were good enough to share it with us.”

Virginia Carter: “And the more we traveled, the more familiar we became with different kinds of wetlands.”

Frank Golet: “Remember Miron Heinselman? Bud Heinselman?”

Virginia Carter: “Just vaguely.”

Frank Golet: “Famous guy, wrote an ecological monograph on – what was it? – it’s a huge bog in northern Minnesota [Lake Agassiz peatland]. At any rate [text removed by interviewee for clarity], Lew and I and Virginia went to a meeting, turns out he [Bud] was there, and he ended up coming to our hotel room, opened his briefcase, pulled out all these aerial photographs that he had mapped. Lake Agassiz peatland [is] probably one of the biggest wetlands in North America, outside of the Everglades, and he sat down and talked to us about how he did his field work in the middle of the winter, and it was phenomenal; I’ll never forget that. An older guy who was probably retired already, was giving a paper at the meeting [and] was good enough to talk to us.”

Virginia Carter: “[text removed by the interviewer for clarity] I went to a meeting in Argentina about wetlands, and how they could manage and preserve their wetlands, and I spent two weeks there looking at some of their biggest wetlands. Very, very interesting. I had the aerial photographs I guess and satellite images to bring with me to show them what we could do with that. And so, I guess USGS was pleased to send me there, and to send me to China as well, on a People-to-People mission to talk about wetlands and what we were doing in wetlands [text removed by interviewee for clarity], not that we met many scientists in China, but we had an interesting visit.”

Bill Wilen: “Another comment I would have about the National Wetland Inventory is that it was an interagency effort from day one. That absolutely day one was a

Classification System, and I don't like to admit it but part of the success of the National Wetland Inventory is we never had enough money to do the job, so nobody ever expected to get paid to do most of the things they did. But they were – people were willing to be part of the effort because it was so open and such an interagency effort. One meeting that comes to mind is July 1975 at the University of Maryland where we invited in all the Feds and paid for State people to come in and all of a sudden, we were telling them that we were going to develop a National Classification System, so you have any comments about that very interesting meeting?"

Virginia Carter: "Very contentious it was very contentious, we had the scientists from Georgia who disagreed totally with what we were doing, and we had other scientists – it was hard to focus people's understanding on the fact that we were trying to accomplish a National Inventory, as opposed to get down to detail of individual type of wetlands, we were trying to get some kind of consensus for the country and sometimes I felt that that message kind of went right over individual scientists' heads; they were so busy focusing on their individual wetlands, as opposed to what the country needed."

Frank Golet: "I don't know where we were at the time, I think it might have been a second draft or something, or third draft. We had already put in a huge amount of time, you know a couple years, and all I remember about that meeting, outside of the bitterness and so on, [was that] we came home with a stack of documents that was probably more than two feet high of comments, criticisms from people in all agencies all across the country. Fortunately, Lew was the senior author, so he took that stuff home, and he sorted through it and I think we ended up probably an inch maybe of what we thought was going to be really significant and help us out, and help the country out, and the Classification system. And the rest of it was a lot of personal opinions, and gripes and so on, and that's how we handled it. We held another meeting, we sat down, we looked at what we thought was really significant and we forged ahead and tried to solve those issues."

Bill Wilen: "This is Bill Wilen, I think that's a very important – collaboration is really important, letting everybody come in and tell you what their opinions are, but then at the end of the day somebody has to decide, and decisions have to be made and – but the good thing about that meeting is everybody either was there, or it was sort of like Woodstock, claimed they were there, but everybody knew about it. But then when some changes were made in the Classification System, they say, "Well, I'm really glad you made that change to the Classification System." And I'd always say, "Thank you very much. I know that was a critical contribution." I didn't say there was 105 other people with the same comment, or if I did, if I was approached by 105, I told them the exact same thing, a lot of people had a lot of buy in because they felt that they were there, or they thought they were there or they knew people that were there, and they knew people's comments were brought in, but it was very interesting with Lew Cowardin, where – he would be up there on a stage and they be firing questions at him, and he didn't answer all the questions. I didn't know Lew, I said, "How come you didn't answer some of the questions?" and he says, "They weren't worth answering, I'm waiting for a better question from somebody else." He just sat up there on the stage and there's questions coming from everybody."

Frank Golet: “You know Bill, another thing that came up – and you [know] this much better than we do, I’m sure - was the question of ‘what’s the significance of these maps going to be? Are these going to be official maps?’ For the state of Massachusetts, for example, where the state has certain laws that say what you can do, and what you can’t do on that property. And so, I know you wrote a disclaimer that went in the bottom corner of the map that says, ‘*These maps were not created for regulatory purposes*’. But, at the beginning, I think there was a lot of fear about that, that they might be used for that purpose, and who is Fish and Wildlife Service to go out there and make these maps and tell us what should be protected and what shouldn’t.”

Bill Wilen: “That’s a good point, that disclaimer helped us a lot, and it directed people to the regulatory agencies for the decisions on jurisdictional wetlands but it’s true, a lot of people -- decades into the National Wetland Inventory -- were concerned that they were going to be used for regulation versus used for planning and used for reconnaissance and I’m going out in the field to do a regulatory determination, what am I going to run into? And some states did use it, not officially but they couldn’t go out in the field and in Alaska, you know you just can’t go, you look at your National Wetland Inventory map, and National Wetland Inventory maps are used more and more now, it’s on the internet, and how when they’re construction grants, if you have a construction grant, you have to go through the National Wetland Inventory mapper and even the 2010 Census used NWI data because if populations are separated by mountains and rivers they are counted differently and wetlands. So, they’re kind of used by everybody now, and now everybody wants more, more and more details and finer resolution.”

Frank Golet: “They’re probably, you know, one of the first places people go when they have any interest about a particular piece of property anywhere. I mean, I know, for whatever reason, I was looking to find the extent or the limits of my grandfather’s property and the first thing I did, of course [because] I was involved in NWI, that’s the first place I went, and I said, ‘Okay, let me take a look at the maps for Connecticut and this particular area and I could go in there. It was pretty exciting, something that we had worked on and developed. There’s a map and it’s putting this boundary around my grandfather’s property and it’s saying ‘this is the Classification and this is what is next door over here and so on’, so by my own experience there for many years as a kid I could say, ‘Hmm, not bad. You know?’”

Bill Wilen: “Yeah, they were – the maps aren’t perfect obviously, but they’re really very, very good and we’ve had a lot of defenders now, you know years later because they use them, they have to defend the map because they’re using the maps, so they went from opponents to defenders.”

Virginia Carter: “I think they may become even more useful as we experience more and more sea level rise, in terms of these trends in status data that you’ve been able to publish. That’s very valuable information; we really do need to know what’s happening to the wetlands.”

Frank Golet: “I think EPA must be using them to some extent, aren’t they Bill? Coastal Areas?”

Bill Wilen: “EPA is using them [in] S.L.A.M.M, Sea Level Affecting Marshes Model. Dick Park called me up in 1985 and said “I’m thinking about sea level rise and if you would digitize your maps, I’d use them in my model.” And I remember that conversation like it happened yesterday and I’m sitting there – this guy’s a space cadet – what? sea level rise? – we barely can produce the maps never mind digitizing them. So NWI has been the unit that all the marsh simulations from across the country have been used and they use them everywhere including raising the docks in Newport News, Virginia, and all kinds of studies and Ducks Unlimited using them saying, “Well if we take those dikes away, and those former dike lands up in the Pacific Northwest, how much habitat can we create?” So, my contribution to S.L.A.M.M. has been to convert NWI codes into the S.L.A.M.M –.”

Virginia Carter: “What’s S.L.A.M.M.?”

Bill Wilen: “Sea Level Affecting Marshes Model.”

Virginia Carter: “Okay, sorry.”

Bill Wilen: “...into the [S.L.A.M.M] categories and US NOAA has it, their coastal mapper, out of Charleston, they have access to the S.L.A.M.M Simulation. S.L.A.M.M Simulations have been done for the entire Gulf coast from Texas all the way around and other places. So NWI data, without NWI data you wouldn’t have S.L.A.M.M models for sea level rise. One thing that we did with the National Wetlands Inventory, we didn’t try to determine the jurisdictional limits of anybody’s regulation, we didn’t try to build in our value bias into the Classification System, and any Classification System that did build in values into the basic structure of the Classification System, that Classification System doesn’t exist. So, I don’t think we did that, well - I don’t know if, we did that intelligently or if we did it as a driver, but however it came out, not doing those things was very important to the longevity of the Classification. Now people have come in, like Ralph Tiner with his NWI Plus, adding additional modifiers to the Classification System, like is it inflow outflow, outflow only, is it tidal, is it juxtaposition to rivers and lakes? By adding other modifiers to the existing Classification System, people have been able to develop potential wetland values and functional assessments. The Fish and Wildlife’s Classification System has become the National Standard and that’s through the Federal Geographic Data Committee, and the Federal Geographic Data Committee is under OMB. If you have a data standard, specifically OMB circular 16, the circular was developed for standards and mapping so that people who spent Federal monies doing mapping they did it the same way and they liked to say, “Produced once, used by many.” So circular 16, which are very old circular in the ‘50s, circulars get revised every 10 years or so, so many circulars die, I think we’re up into 160 or 70 circulars now, so very old circular, very important, and the purpose of that is so that when Federal Agencies either pay for mapping or use Federal funds for mapping, they use standard. So, all the circulars relate to Standards. That’s why that’s so important. And now that the data is digital, the

National Wetland Inventory Data has been determined to be a National Geospatial Asset to be used by all the Federal Agencies. And it is very widely used. Before I retired, I decided that we needed to do an update to the Classification, some science had changed and we had changed along with the science in our mapping, but we hadn't changed the Standard because it's very hard to change standards, and so I decided that we were going to go and do the second edition of the standard, go through all the 12 steps or 13 steps you have to do, that's why it took – why it takes 2 or 3 years - and there's a lot of collaboration, a lot of conferences and a lot of stuff, but the other thing was what Frank mentioned, that he had collected up comments, concerns, confusion that his students had over his decades of teaching it – and so I decided if I could get Frank to help me, I was willing to do that, and I don't remember exactly what I said when I went to Frank's retirement party but basically the message was, "Frank, please help me so I do no harm.""

Frank Golet: "Exactly, I remember those words very clearly, I can see you at the podium, and you riveted on me."

Bill Wilen: "So with Frank's help and my stubbornness, we have a revised National Standard that should last for another 3 or 4 decades I would hope."

Frank Golet: "We'll never know, will we?"

Bill Wilen: "We'll never know. This is the end of Virginia Carter's Oral History contributed to by Frank Golet and Bill Wilen."

KEY WORDS:

Collaboration, environments (natural), estuarine environments, mapping, maps, meetings, public attitudes, sampling, satellite photography, science, scientific personnel (USFWS), surveying, vegetation, wetlands