

**AN INTERVIEW WITH  
TOM WALBRIDGE**

**by**

**Peter McDonald & Michael Clow**

**June 8, 2004**

Forest History Society, Inc.

Durham, North Carolina

© 2005

© 2005 by the Forest History Society, Inc.  
701 William Vickers Ave.  
Durham, NC 27713  
[www.foresthistory.org](http://www.foresthistory.org)

All rights reserved.

**Explanatory Notes to Accompany the  
Interview of Tom Walbridge**  
by  
Peter MacDonald

Tom Walbridge is considered by most to be the “grand old man” of forest engineering in the American Southeast.<sup>1</sup> For one thing, he was one of the very first, being hired by Bowaters in 1953 as a logging engineer at Calhoun, Tennessee. For another, the activities he engaged in throughout his career came to define the profession of forest engineering. At the time he started there was no such thing as a “forest engineer” in the Southeast; Walbridge himself refers to the “various forest dirt jobs”, by which he meant site preparation, construction of logging roads, and the development of a network of wood yards. But with his attempts to improve the productivity of Bowaters’ harvesting operations, by his establishment and participation in the forest engineering group of the Southeastern Section of the American Pulpwood Association meetings, by his assumption of the leadership of the Harvesting Research Project, and by his creation of the Industrial Forest Operations Programme at Virginia Tech – all of these established in the Southeast forest engineering as a profession with much to offer to forestry.

On his arrival at Calhoun he was confronted with the “bobtail truck” harvesting system. Two to three man crews used chainsaws to produce pulpwood that was loaded manually on small single axle trucks; these were actually driven from the road to the stump. When loaded, the entire crew travelled in the truck to a wood yard, where all manually unloaded the pulpwood onto rail box cars for delivery to the mill. Because many of these small producers were rooted in agriculture, they were part-time producers: “... I don’t think very many of them worked over a hundred and fifty days a year ...”. Poor weather simply exacerbated this work rhythm.

As low productivity was a quality intrinsic to this harvesting system, Walbridge attacked this problem on its periphery by constructing a network of thirty-one wood yards in order to reduce the hauling distance to around twenty miles. Because these wood yards were owned by the company, it was here that he could successfully initiate mechanization. By introducing Hyster Loaders and the Pulpwood Dream, the physically demanding task of unloading trucks was mechanized. A later development was the Currie Cost Cutter, a giant chainsaw which cut twenty-one foot logs into five foot lengths of pulpwood while still loaded on the truck.

For the harvesting system itself, Walbridge developed the big stick loader. Mounted on the bobtail truck, it was used to load pulpwood produced at the stump onto the truck. Given that it eliminated what was likely the most physically demanding of all harvesting activities, it found immediate acceptance by producers; Walbridge describes its operation in the interview. But, as

---

<sup>1</sup>A retrospective on “Doc’s” career can be found in an article by Jim Mooney, “Doc’s Perspective”, *Timber Harvesting*, January/February, 2004, 26-28.

Walbridge somewhat wryly notes, rather than increasing production it tended to reduce the quantity of working time – producers still generated the same quantity of product, spending more time in agriculture and related activities as a result. Such were the vicissitudes of this bobtail truck harvesting system.

The most important endeavours undertaken by the American Pulpwood Association to facilitate mechanization of pulpwood harvesting in the Southeast were the retaining of the Battelle Memorial Institute and the creation of the Harvesting Research Project. The appointment in 1960 of the Battelle Institute, consultants in industrial engineering, was met with a degree of skepticism by those in the field who, struggling to improve the efficiency of harvesting, saw them as uninformed outsiders; as Walbridge comments: "... unfortunately they never had a clue as to what was wrong...", that "[t]hey didn't know what they were doing".

One recommendation made by Battelle that Walbridge took issue with was the development of a hydraulic loader intended to be mounted on trucks larger than the bobtail ones currently in use. Now to be fair to Battelle, manual loading was highly problematic because it was both physically difficult and the most time consuming of all the logging activities. The introduction of a specialized self-loading truck would detach loading from the actual harvesting process itself. Therefore, by separating loading and unloading from the logging crew, they could continue to produce while the truck was loading, travelling to the wood yard, and unloading. But as Walbridge points out, such factors as balancing of crew and truck idle times, inability of large trucks to enter the woods, and greater fixed costs could undermine such projected efficiencies.<sup>2</sup> Not to be forgotten is the fact that Walbridge invented the big stick loader; he argues that as well as providing a status symbol for its owner, the bobtail truck provided the means of transport for the crew both to work and to home. Moreover, this harvesting system was always balanced whereas separating the production of pulpwood from its transport could introduce an imbalance between cutting and hauling.<sup>3</sup>

Another issue with which Walbridge took some issue was the finding by Battelle that one of the most important determinants in the variation of productivity among logging crews was what they termed "crew aggressiveness". One can sympathize with his reaction when attempting to imagine the sort of "leadership" or close supervision and management required by the "boss" of these three man rural crews to bring this desired objective about. Ironically, he would be

---

<sup>2</sup>See Thomas A. Walbridge Jr., "Bob-tail Trucking versus Contract Trucking", paper presented at the 1964 Annual Meeting of the American Pulpwood Association, pp. 84-86. This is a reprint contained in an untitled folder in the J. Blonsky Papers, located at the Forest History Society.

<sup>3</sup>*Ibid.*

doing so in the absence of his status symbol – his bobtail truck (with its big stick loader) if the recommendation made by Battelle to separate trucking from the harvesting process were to be implemented.

The American Pulpwood Association oversaw the implementation of the Harvesting Research Project in 1967. Comprised of a consortium of six Southern pulp and paper companies who provided the financial support, Walbridge informs us that it was to some extent modelled on the Canadian example of Logging Research Associates (LRA). LRA was a private consortium of three Canadian paper companies, established in 1962 with the goal of developing a full tree to roadside harvesting system.<sup>4</sup> By 1965, LRA had designed and constructed six prototype roadside processors called the Arbomatik, proving so successful that the disposition of the pulpwood produced came to be the new problem.<sup>5</sup> By the standards of the time, this was a remarkable technological achievement for it was the very first full tree type of harvesting system.

Under Walbridge's tutelage, the HRP represented the most significant industry endeavour to promote the mechanize tree harvesting in the Southeast.<sup>6</sup> As well as conducting industrial engineering studies of individual machines and harvesting systems, HRP also developed standardized definitions and measures of productivity as well as simulation models (Harvesting Analysis Technique) which permitted the computerized assessment of different harvesting systems. Though not specifically mentioned by Walbridge, many see HRP's development of a mechanized felling machine that was also capable of bunching as an achievement the significance of which becomes clear when one observes the ubiquity of the drive-to-tree feller-bunchers that so define contemporary Southeastern harvesting systems.<sup>7</sup>

Unfortunately, HRP adhered to the LRA model perhaps more than its founders intended. Like LRA, HRP disappeared due to an economic recession with its member companies deciding to discontinue funding in 1973.

At the time, Canada provided more than just a model for HRP. As Walbridge contends, several machines were being developed there in the 1960s – a formative period in the history of mechanization – some under the auspices of the Woodlands Section of the Canadian Pulp and Paper Association. In particular he mentions the Vit feller-buncher. First developed in 1957, it

---

<sup>4</sup>A full tree harvesting system is one in which the felled tree is skidded from the stump to roadside where it would then be delimbed and slashed into pulpwood bolts. Because full trees had to be handled, this type of system made the greatest demands on mechanization.

<sup>5</sup>See C. Ross Silversides, *Broadaxe to Flying Shear: the Mechanization of Forest Harvesting East of the Rockies*. Ottawa: National Museum of Science and Technology, 1997, pp. 83-86.

<sup>6</sup>For a description of the objectives of the project, see "APA–Harvesting Research Project", *Pulpwood Production and Saw Mill Logging*, April, 1968, pp. 20-24.

<sup>7</sup>One may wish to consult the interview with Bob Lanford in this respect.

was not only the first feller-buncher but the first mechanical tree harvester to operate in Canada.<sup>8</sup>

Tom Walbridge was a joy to meet and to interview. He spent an entire day with us, not only providing the interview but also educating two relatively ignorant “foreigners” in the mysteries of Southeastern harvesting systems. Fortunately, he did so relatively early in our interview schedule when such an education was most needed. I can think of no better person to have done so.

---

<sup>8</sup>Silversides, *Broadaxe to Flying Shear*, pp. 37-38. Provide a photo.

Peter MacDonald (PM): Okay, today is Tuesday the 8<sup>th</sup> of June and we're interviewing Dr. Tom Walbridge, retired professor of forestry from Virginia Tech.

Michael Clow (MC): Professor emeritus.

PM: Right, mistake number one. And the interviewers are Peter McDonald and Michael Clow. Perhaps then, Tom, we could start by having you give us a brief personal biography about where you were born, how you got into forestry, you know, those kinds of general things that people would probably be interested in.

Tom Walbridge (TW): Well, I was born in California and went through high school in California and went from Long Beach, California to Seattle, Washington to enter the forestry school. About that time the war broke out, World War II, the big one.

PM: The big one, yes.

TW: And so rather than be drafted I went down and enlisted in the Navy into a D5 program, which was for deck officers. So after completing the ninety-day wonder course back in New York, I came back to California, married and went to duty in Miami to the small craft training center and quickly became involved in anti-submarine warfare training. [Tape turned off]

PM: So you were talking about being assigned to small craft and anti-submarine warfare in Miami I think.

TW: Right. And I then went from the East coast to the West coast to almost every school that the Navy had, firefighting, and you know, a whole list of their schools, gunnery and underwater sound, and all that. And they were beginning to send a lot of people to Italy on LSTs, which I wasn't particularly enamored with. So I called the captain of my Mine Sweeper whom I had met at a training session and said I wanted to be his anti-submarine warfare officer and he said fine. So he requested from the bureau of personnel me to be on his ship. And so I was assigned to his ship, the Mine Sweeper, aptly named U.S.S. Caution. And we drove back from Miami, my wife and I, and I went to Portland and took the shipping commission. And that was, I had been in the Navy fourteen months and across country three times before I ever got my feet wet. So that's pretty much the thing. We were in the Pacific in the Marianas, around Saipan, Guam, that area in the Mariana Islands and we served our time there for about seventeen months. We were called back to the states to be recommissioned and refitted with a couple more guns and we were sent to sea. Twelve hours later they opened the orders, after we were at sea for twelve hours, and they sent us to Cold Bay, Alaska. If you know where Cold Bay, Alaska is all you have to do is look at the Aleutian Chain and as far as you can go the very last island is Cold Bay. This is one of the highlights of my career in the Navy because two months after we were assigned there we got a full complement of Russians, officers and men. They had already removed our men and everybody except petty officers and officers and we had a hundred and eight Russian men, officers and enlisted men and no interpreter. And this was a circus. You can imagine all the shouting and pointing. And then you know, I think it was right after VJ Day that we turned the ship over to them and sent us back to the states. So that was my career in the Navy, some seventeen months overseas. I would say that if I had not been married I probably would have stayed in the Navy because I thoroughly enjoyed that work. I knew it was no place for a married man so I came home.

Now I guess you know that before I could go into the Navy I had to complete my college degree to get into that program. So I had my degree and I hadn't worked a day in the woods except for summer work. So when I came back I said well, ain't no way I can find a job by myself so I immediately returned to school, like most GIs did and during that process I got a letter saying that they would like me to come to Montana and see if I would be interested in a job there. So I went to Missoula, Montana in 1946 and started teaching, stayed there until 1953. I went there to teach harvesting, road location and construction, and surveying. My first class of GIs was a hundred and thirty-five students.

MC: Sizable class.

TW: Well, it worked out quite well because I had a Monday-Wednesday section and a Tuesday-Thursday section, and a Friday and Saturday section.

PM: That sounds like a six-day week to me. [laughter]

TW: I enjoyed that. That's when I realized that I liked to teach. I really liked to teach and I loved teaching right up to the day I retired. But you know a hundred and thirty-five students in a class to an uninitiated professor was quite a shock.

PM: Even to an initiated professor I think.

TW: It worked out well. In 1953 I was offered a job with Bowaters Paper Company in east Tennessee as logging engineer. And there were no logging engineers in the South at the time. There were people that had been assigned certain duties such as site preparation and that sort of thing, road building and that sort of thing, but no formal title like forest engineer, logging engineer, like they had in Washington and Oregon at the schools there.

MC: Why is that do you think?

TW: So I started calling myself a forest engineer because I wanted it to be different from a logging engineer because we weren't doing that much logging. So I just started calling myself forest engineer and then all the companies that were members of APA that I got to know, the personnel that I got to know, that had these various forest dirt jobs, they started calling themselves forest engineers. So we finally got permission from the American Pulpwood Association, APA, to form a section of the clientele, forest engineering section, yeah, I think it was. And we used that as a way to keep involved with what's going on all over the South by all these engineers would get together. And it was very interesting because if we got into some very boring session of APA, we would sneak off and find a room and pick each other's brains all day long, very, very interesting. That was the beginning of forest engineering in the South.

PM: Okay, that's really interesting.

MC: Do you remember some of the people who were in that group?

TW: Oh, yes. Art Bunker from Union Camp is one. Joe Blonsky from West Virginia was another. Jim... [interruption]

MC: You had mentioned Art Bunker, Joe Blonsky, and you were saying Jim somebody or other.

TW: Yes, what the hell is that boy's name. I can see him just as, anyway, we managed to get about eight people involved from the other companies. Another giant in that area was Bert Carlson from Champion Paper Company.

MC: Was this the group with Tom Kelly and L. O. Wright or was that a later group?

TW: No, that was a later group. L. O. Wright was always active in APA. His thing came from the fact that he was the director of company operations for Union Camp. He probably ran company operations longer than anybody else in the South. As you know, he just retired five or six years ago.

PM: Yes.

TW: Wonderful guy.

PM: Yes, we met him and agree with you. What sorts of things did you talk about in your meetings or what sorts of problems?

TW: Well, of course, we were very careful to stay away from prices but we were allowed to talk about the cost of operations. Somebody did a study, time study, and they wanted to report it to the group they could say, you know, it costs us this kind of money. We didn't stay that's what the price should be. We were very much aware of the limits there. But it was a good close group that stayed together for a long time.

PM: Did it have a particular name?

TW: We were just the forest engineering section of...

PM: Of the APA?

TW: Of the APA, yeah.

PM: Did you talk about different harvesting techniques?

TW: Oh, yeah. What we would do is ask one guy to explain the system they used and why they thought it suited them and so forth.

PM: And then people would take turns making these presentations and then everybody would discuss it?

TW: Right, every year we had one topic. And it was really a good experience.

PM: What years are we talking about roughly speaking.

TW: From about 19--, well, in the first place I didn't do anything at all in forest engineering with Bowaters Paper Company other than build wood yards and roads. Didn't get into harvesting at all until Mr. Edgar, who was my boss, said I want you to see what we can do about improving operations and what sort of systems and what sort of equipment, you know, should we be thinking about. Sent me to Canada in 1952 to look at skidders.

MC: Nineteen fifty-two or 1962? '52? [This would have to be 1962]

TW: Yeah, with Ross Silversides and that bunch. Can't think of anybody else's name with [Captain's Casey?]. So my report was, you know, we could use them and, of course, in his inimitable style he said great, I want thirty of them in the woods in the next two years. [laughter] I looked at him and said wow, boy.

MC: Now did he intend these for use on company operations or by your contractors?

TW: No, the procedure there was the producers had no money, no capital. So if we wanted to change operations from bobtail operations to mechanized operations we would have to come up with the money to do it. How much do you know about big stick loaders?

PM: A little bit but we're willing to hear you tell us about them.

TW: Well, the big stick loader was the breakthrough [or I'd say?]. I put a hundred and eight big stick loaders in the woods in two years.

PM: Maybe you should talk about how things were before they were introduced so we have a better sense of...

TW: How things were was it was like five-foot wood and all hand, hand loading of the trucks. In some cases unfortunately unloading the trucks onto railcars.

PM: By hand.

TW: Or into boxcars, just incredibly labor intensive. The only thing they really had was a chainsaw and what we called the bobtail truck. You know what a bobtail truck is.

PM: So one of the only ways of increasing production would be by having more crews or more producers working.

TW: Right, of course.

PM: And I suppose that had something to do with wood yards as well.

TW: Well, yeah. Okay, the theory was that the bobtail trucks were not capable of hauling wood more than about fifteen miles. So what I did was took a map of the railroad and it went down about every twenty miles, yeah, about every twenty miles we would look for a small town where we could put a wood yard. So in my career with Bowaters I built thirty-one wood yards. All they had to do was go down the Southern or the L&N and you'd see one of our wood yards about every twenty miles. And that way they could deliver the wood with a bobtail truck. And we weren't into long distance trucks then. Nobody ever heard of hauling wood a hundred and fifty miles. So it just kind of came from there. We didn't get any real increase in productivity until we went to long wood.

MC: So that was the situation when you introduced the big stick loader?

TW: Yeah. And they were wonderful because they were a winch that was developed from the backing play of the truck and had boom, cable, and simplicity in itself. Ran right off the power takeoff of the truck. And at one time we were installing them and supplying them with the big stick loaders for eleven hundred and fifty dollars. And the beauty of that particular winch was that you could pull the wood straight up. So what you did is you build a bundle of wood in the woods, about like that, maybe a quarter of a cord, wrap the cable around it and just jerk it right up onto the truck.

PM: Right, so the truck would go from bundle to bundle?

TW: Well, the truck wouldn't but the men that were hauling the cable out would go.

PM: So it kind of winched it from wherever it was to the truck?

TW: Yep.

PM: Okay.

TW: And you know, we were charging a dollar a cord for it so you couldn't miss. They were very eager to use them because it took a lot of the back problems out of it.

PM: Right.

MC: Well, that must have increased their ability to produce wood quite a bit.

TW: Yeah but they didn't change their habits that much. They got about forty-five cords a week, period.

MC: They just worked less time?

TW: Sure. They had to take care of their whiskey trees.

MC: Whiskey trees?

TW: Corn. And they had other things to do. Most of them farmed a little bit. It wasn't what you'd call a fulltime job and it was very susceptible, of course, to the weather and the roads. So I don't think very many of them worked over a hundred and fifty days a year because the minute it got wet they just quit or icy or whatever.

MC: So what was the attraction of the company of going to the expense and bother of the big stick loaders if it didn't bring them more wood or more cheaply?

TW: It probably kept them in the woods longer. It was such an improvement on the physical labor that everybody wanted one. I mean I remember going down to the wood yard and seeing eight or ten trucks lined up and somewhere in that lineup would be a guy with a big stick loader and it just drew a crowd, you know. So they all wanted one. The sure was, better get one of those things. They're handier than a pocket in a shirt.

PM: And they could use it to unload at the wood yard too I suppose.

TW: No.

MC: No?

TW: No, had to be unloaded by hand or by Hyster loaders pretty much. You know what Hysters are. And of course the one that was very common and good because it was so rugged and inexpensive comparably was Taylor Machine Works' Pulpwood Dream I think they called it. And so we had mechanized wood yards long before any other improvements really. That's the first thing we did. Every time we'd build a wood yard we'd [inaudible].

MC: So while you were building all these wood yards you were also mechanizing them as well?

TW: Right, yeah. And you know the last development on the wood yards were these Currie cost cutters. You've heard of them?

PM: I've heard of both, yes. But maybe you could describe them just for people listening anyway.

TW: It's the world's biggest chainsaw, electrically powered and the machine was on tracks. So the truck would park parallel to the mount of the machine and could be driven forward and backward on the track to be lined up perfectly. And then the saw would come down and cut through a complete load and move back and do it again. And so we came up with the idea of going to give the producer the advantage of long wood. We started buying wood that could be cut into four pieces onboard the trucks. And then the machine would pick it up just like it was delivered in short wood. And that was a change there.

MC: What year would that be roughly, late '50s, early '60s?

TW: Well, let's see. I went to APA Harvesting Research Project '68. It would be probably '64 to '65. And we bought one for almost every wood yard we had. And some of the guys actually, some of the truckers or producers actually came onto the landing, got out of the truck, cranked up the saw, cut their own wood, you know, got unloaded and left. It was a great system and it worked because you can imagine

how much time it saved. Instead of cutting everything into five-foot wood, we called it MSL, multiple stick lengths, twenty-one feet we got four pieces you know. It was a good system.

PM: Did this change the harvesting system?

TW: It didn't change the harvesting system much, no, except that they didn't have to cut the wood up on the ground into five-foot lengths.

PM: They cut it into twenty-one foot lengths instead.

TW: Right, so that kept the saw off the land longer. It was just a great idea.

PM: Would they use the big stick loader to load these twenty-one foot lengths?

TW: Yes, it could but usually it was probably some other method like I know that they did use Taylor's Loggers Dream to load some of it.

PM: So that was a kind of in between stage between the pulpwood system and then the tree length I guess.

TW: Right and that's kind of when we started talking in terms of pulpwood producers and contractors. No one ever talked about being a pulpwood producer. Everybody's a contractor. Everybody's a logging contractor. That's how they kind of got to the situation.

MC: Because the one system could produce, therefore, either case?

TW: Right. Well, they could go with the long wood for their sawmills if they wanted it. But that's probably the breakthrough in mechanizing pulpwood producers, which were kind of looked down upon, were really contractors. It just simplified everything.

PM: A few moments ago, Tom, we were talking about the forest engineers group within the APA and I'm wondering if you could talk a little bit more than you did before about the kinds of topics that came up for discussion and the things that people were talking about and the things they were trying in tree harvesting and so on.

TW: Okay. Basically what that was, was a group of foresters who had been given engineering responsibilities by companies, site preparation, roads location construction, bridges, culverts, all that sort of thing, the dirty end of the job, so to speak. And I know that our reputation was not professional foresters. But of course we didn't care because we wanted to see this stuff developed. So what we tried to do it use that group as a sounding board for different systems. Somebody would give a paper, at least two papers at every meeting, short paper with slides, on the newest thing in their area and then we'd discuss it. Of course, we had to be very careful of anti-trust. So the word was no discussion of costs. You could have discussions of what appeared to be because you were using some method of study that was okay. We had those reports that came out every time we had a meeting, an annual meeting. And I wish I could remember more people. But we had quite a crowd at one time. And then it got to be where forest engineers once a year would get a Greyhound bus and we would travel somewhere to see something. Those were wonderful adventures.

PM: Do you remember any of the things that you went to see, any of the systems?

TW: Oh, yes. What was that machine, dumped the tree on top of its head?

MC: RW30?

TW: Oh, no. The RW30 came ten years after that.

MC: Bush Combine?

TW: No, it's even after that. Can't think of it right now but anyway it was developed in Canada. You ever heard the name Rudy Vit?

MC: Yes.

PM: Was it his machine that you're trying to think of?

TW: I think it was a Vit.

PM: It was on a Bombardier track and it had that shear on the front?

TW: Right, on the front, right.

PM: And when the tree was felled it kind of flipped that over.

TW: Right, and would carry it on top in kind of a saw tooth thing.

MC: And it would after it was fallen would...

TW: Dump, just slide right off the back. I went to Canada and saw that in 1968. And there were several machines like that out in Canada. Came off pretty much the woodland section of CPPA *Canadian Pulp and Paper Association*. But we would try to schedule a trip somewhere every year that we could go take a look at.

PM: So the people in the forest engineers group would have a pretty good knowledge of everybody else's operations and they'd be kind of borrowing ideas and trying things out and that sort of thing?

TW: Oh, sure, you bet. We were feeding off of each other and the main idea was to try to increase productivity, lower cost. We weren't very successful at it but we tried.

MC: What were the obstacles?

TW: We didn't really have very good data to tell what the production should have been or what it really was. We had people, you know, you might have heard of Charlie Williams who came out doing the Battelle [Battelle Memorial Institute] study and started talking very gloomily about twenty cords per man day when the annual production was like two cords per man day was a good operation. There were some crazy things. The one I like if you want to hear it...

PM: Yes.

TW: You may want to take it out of there but this was the one that was developed by, what's that company's name. I might think of it but anyway he had the idea of circling the tree, grabbing the tree, and then taking a chisel and chop it off. So anyway, Charlie had this tree and his back you know and then this chisel is supposed to dramatically chop right through the tree and fall the tree. Well, apparently all it did was just shake the heck out of the machines and the operator. [laughter] And so they gave up and cut the tree down with a power saw. Then the idea was, this was all Charlie Williams' idea, twenty cords per man day, was to back up to the tree and pick up and skid with it. I think one of the ideas was to back over the tree and take the limbs off and then come forward and drag it or skid it. Well, they backed up the machine and immediately high centered the machine and, of course, it wouldn't work, didn't work. So one of the comments that came from Bert Carlson was Charlie, even a beaver knows enough to stay off

the damn log. [laughter] But we would have things like that happen and, of course, we were so used to things not working we just thought it was pretty funny. Our bosses didn't think it was too funny.

MC: This brings up something, which we've begun to think into our heads and that is that before high-pressure hydraulics people just didn't know how to get the power in order to cut through a tree.

TW: That's right, exactly right. The biggest thing that ever happened to the pulpwood industry or the logging industry was pneumatics, you know.

MC: Pneumatics or hydraulics?

TW: Hydraulics, I'm sorry, yeah. That's the biggest thing that ever happened. Probably the biggest step was when they started using hydraulics for loaders and twisting back and forth, using a blade on a skidder. All that stuff was made possible with hydraulics. Of course, you know it's so incredibly sophisticated that very few people can even work them. When we first started using hydraulics if we didn't get enough pressure we just opened up and put a penny in there and reduced the size of the cylinder and ran that way.

MC: Keeps up the pressure.

PM: Yes, lots others I expect as well.

TW: Fewer hoses. Okay, what else?

PM: Well, maybe we can talk a little bit about the Battelle Institute, a research institute, how it was. I think it was hired by the APA. Is that right or something?

TW: Yes.

PM: Anyway, you tell us.

TW: Well, the story was, my boss came to me and said he wanted to talk to me about something and I guess he figured that I was very sensitive about forest engineering because he said now, I don't want you to get upset and quit. But he said our bosses have decided that they want to take on this Memorial Institute study and each company is going to put in like fifteen hundred dollars and hire these guys from Battelle to come down and analyze what's wrong with the pulpwood industry.

MC: Now these guys were not forest people at all, were they?

TW: No, they were engineers. Well, most of them. I thought you know, it's okay by me. It's so bad we might as well get somebody else in here to stir this stuff up, you know. So would let them come down and they would do what they wanted to do. I had some young man came down and looked over what I was doing, made mention of the fact that I had a staff big enough to run General Motors. And unfortunately they never had a clue as to what wrong.

PM: Because they weren't foresters you think?

TW: No. They didn't know what they were doing. They didn't know how to cope with situations, the way I looked at it. Really nice people, I can't remember the guy's names now but they were very polite and very nice and they were very careful not to step on toes and things like that. But all it did was bring, its' greatest function was to make the people in the mills aware of the problems, which we had never been able to get anybody to listen to. So in that regard it was really good. We got the attention of the mill people because it was their money. That's the first thing. It always works out like that.

PM: [laughter] So the studies that they did weren't nearly as important as the role that they played you just mentioned?

TW: Well, they came to a rather poor conclusion and that was a major problem of pulpwood production was the loading, the cost of loading. And, you know, and so they came up with the idea of a hydraulic loader, which was probably the very first hydraulic loader, Prentice, and they modified it to go on the back of the truck right behind the cab. And the truck was to drive through the woods and pick the wood up off the ground and load it on the back of the truck.

PM: So it was just like the old bobtail truck system except that it had a loader on it?

TW: That's right, exactly. And I remember Charlie Williams saying we need a loader, a hydraulic loader on the back of the truck that was wandering around in the woods like we need a hole in our head. [laughter] And the other thing they did, they came up with a formula for production costs for wood. You have seen it?

PM: No.

TW: Well, it was a very sophisticated formula statistically and so on and so forth. And the only think wrong is they had a boober [I believe this is correct; he means a fudge factor] factor in there somewhere to make it come out right. So it came down to the fact that the whole problem with the pulp industry was they just needed a little more get up and go. And so what they did they put a number in there that made the statistics come out very well called crew aggressiveness. My boss was so mad when he saw that he didn't know what to do. He said anybody in this business knows the harder you work the more money you're going to make.

PM: And that was the factor that made things come out right?

TW: That's exactly right. It was like, well, maybe if we add the kitchen sink here, we can get our score up. So that was Battelle and in way, it's main advantage and function was that people in the mills were listening to what was being said by their own [willing?] organizations because they were paying for it. And I think it went on for five years, four years, something like that.

MC: Why were the mill people, who were totally dependent upon this supply of wood, and couldn't do anything that they wanted to do, why for so long did they ignore what was going on in the woods? Was it such a low part of their overall cost that they could just ignore it and cut the [practices?]

TW: I don't think so. I think what it was, was that wood costs were acceptable. And they didn't want to muddy the waters. I don't know this to be true and you might want to check it out. But I think that at one time all the mills waited to see what International Paper Company was going to do about prices. And they would increase the cost of wood like fifty cents a cord and within twenty-four hours every mill in the South knew what the cost increase was and that apparently enough to make it work. That's probably what kept us from having a shortage of wood. The main problem with that is that most of that increase went to the wood dealer and not to the poor contractor.

PM: Now you say that one of the positive effects of the Battelle reports is that it made management in the pulp and paper mills aware of the problems. Now did that have anything to do with the APA setting up the HRP project, do you think? I mean did one follow the other like that?

TW: I think that we could say that the American Pulpwood Association's formation of the Harvesting Research Project was based mainly on the enthusiasm of Ken Ralston, who more or less sold Eddie Hinton of IP that since Canada had the project for research, which was Logging Research Associates, and so Mr. Hinton who had the power just said you know, that's a good idea. And, of course, Ken said he put on an all day presentation of wood costs and equipment and systems. And as you probably know, IP

funded the development of Bush Combine. So he sold Eddie on the idea and Eddie got on the phone and called up six guys and all of a sudden they had four thousand dollars a year and nobody to run it. And Ken apparently talked him into hiring me. And the only reason that I got hired was because of my activities in the forest engineering committee where I knew everybody in the country that had anything to do with production. I consider that one of the most fortunate things that ever happened in my career because it was just really a wonderful opportunity to really dig into this stuff. So one of our major ideas at the very outset was let's standardize this stuff. You know, let's standardize how we measure, how long it takes to fell a tree. Let's standardize how much time it takes the cord per load of different woods prices and so on. And we just tried to put some benchmarks on this stuff instead of. If you go to a meeting and somebody says get four cords to a man day and he says well, what do you base that on. Well, we just. It forced people I think to make honest comparisons over potential equipment made to the systems. It doesn't sound like much but it was quite an accomplishment. It's kind of like all engineers trying to get together and deciding the best thing for farm tractor was the three-point hitch, you know, same idea.

PM: What were some of the other things that the Harvesting Research Project undertook, some of the other things that the Harvesting Research Project did?

TW: Well, we had documentation of forest stands like the Swedes had where they used one meter by, not one meter, one [help there?] was the Model 4 and they measured every tree in that stand, bark thickness and all that sort of thing. So we decided we needed that kind of information to see how our harvesting analysis technique would work and that was Bill Stuart's main job at HRP, was to develop the harvesting analysis technique, better known as HAT. And we had one-acre models, one square acre of probably thirty different stands, tremendous amount of data where you could know exactly how many trees you had of certain size and so forth. Our first models I think gave us a tremendous database for forest conditions and the Harvesting Research Project, I mean harvesting analysis technique rather, was trying to do two things. We wanted to be able to measure the productivity of the system on a variety of stands or a variety of systems on a certain set of conditions. And so with that and we had a tremendous amount of data on that and still worked. It was probably one of the first, it probably was one of the first attempts to be able to analyze different systems on one stand or different systems on a variety of stands.

MC: These would be computer based I supposed.

TW: Absolutely.

MC: Now this would be in what, the middle to the late 1960s?

TW: Yeah, Bill had that pretty much in hand by the time we got here and we came here in 1973.

PM: So you'd be running these on the old mainframe computers way back?

TW: Right.

PM: An old graduate school thing.

MC: IBM 360s with punch cards.

PM: Yeah, and [for training?].

TW: Thank God I escaped that.

PM: [laughter] So you could also do the tests on the computer as well, right, without actually doing it?

TW: We had to describe to the computer how the machine operated how the machine operated. We're going to go down and we're going to take this many trees on this side of the machine and that many

trees on that side of the machine. And, you know, we'd start out on one edge and we would log forty acres and then we'd see what we got with that. It was really quite a system. We put all the graduate students through it, [hist?] them on to it.

PM: [laughter] I mean you could do all kinds of things then, couldn't you? I mean any machine or any system I suppose, even an imaginary machine as long as you could. [interruption] So I was saying you could even put I suppose an imaginary machine as long as you could describe what it was supposed to do.

TW: Sure.

PM: That's really remarkable when you think about it, really remarkable.

TW: That was one side of it. The other side of it was to make actual studies of systems using the same methods of measurement. And so what we did with the guys that were in HRP we said, all right, show us the system that you really think would be the best system for your area and let us analyze it. So we studied the Bush Combine. We studied, you know, that kind of stuff and by the end of the year, of course, every one of the six sponsors had a documentation of their system and examples of what other systems could do as a way of trying to be sure that people get the chance to see everything. I don't know where you're going to find one. I'll tell you, knock on that door there and see...

PM: ...simulation models. I mean I guess I didn't really realize how complex they were and what they were capable of until you just talked about them now.

TW: I think you could get a copy of that report from Bill Stewart. I think he has copies of all the HRP studies. Unfortunately, I don't. Why I didn't keep a library of my own, I don't know. Yeah, we tried to make like, like Mike said, we tried to bring some sense to the chaos.

PM: So the member companies then, they have productivity figures for the systems that you studied, like the Bush combine I suppose would be one of the ones you studied.

TW: Right.

PM: And you had the productivity studies of what their own systems were capable of. And they also knew what the productivity might be in the simulation cases as well.

TW: Right.

PM: Well, they really knew what was going on then, didn't they, as a result of the HRP?

TW: I think so.

PM: Do you think it provoked or motivated them to make any kinds of changes into their own harvesting systems as a result of this?

TW: Well, it allowed the forest engineers of various companies to probably work out ways of financing stuff. See one of the basic problems of the whole idea was that these people didn't have any money. So it came down to well, it came down to, what are we going to do and bankers wouldn't touch those guys. One banker told me said I don't loan any money to the three Ps, pulpwood contractors, preachers, and painters. [laughter]

PM: So did the companies have to finance any change that was going to come about at the time?

TW: Oh, yeah. They didn't want to admit it but well, we financed all the big stick loaders and the skidders and the loaders and anything else we thought would work, the Currie cost cutters, you know, that sort of thing. And at one time I think our company almost a million dollars of money out and as Mr. Edgar said, we never lost a penny.

PM: That's remarkable.

TW: I think it's impossible. [laughter]

PM: Did many of the companies start to finance mechanization as a result of the HRP?

TW: I think a lot of them did because they didn't, you know, they really didn't want to talk about it. I would go to a meeting with the engineers and said well, we financed some of these people with loaders. And I mean just between us, I think they're still financing people for these big machines. My question is and always has been how can you pay two hundred and seventy-five thousand dollars for a cut to length system.

PM: Could you say a few words about what happened to HRP?

TW: Well, that's a well-known fact. The fall of 1973 was an incredible downturn and companies decided that they didn't want to fund us anymore.

MC: An economic downturn?

TW: Yeah.

MC: By the way, the same thing happened I think to LRA *Logging Research Associates* is that it was closed down because of an economic downturn because it was a very promising system I think.

TW: Yeah, right. The way you were set up was fine, you know, for the Arbomatik. There's only one thing there. I said to Doug I said, I can't remember his last name. He was the head of LRA.

PM: We've got his name somewhere so we'll be able, okay.

TW: Yeah, okay. Anyway, I asked him. I went to see the operation. I was very much taken with it. And incidentally they had one of the first feller bunchers and mounted the wood all on this backend and pulled the whole tree into the system. I said to Doug, what do you think. Well, he said, we'd have been all right if the foresters had given us proper data on the trees. And I said what do you mean. Said this system won't survive on small trees like this. [laughter] But it was amazing, something to behold.

PM: So the flying shear was the delimiting mechanism as I recall.

TW: No, it was the bucking mechanism.

PM: Oh, you should describe it then.

TW: Well, okay, if you look at the front of the machine there are three heads that look like orange juice squeezers. And they would force the tree into that and it would delimit and then this shear would follow that stick until it was up to the stick length, proper stick length, and then it would cut it off. So it was a flying shear. The shear followed it right out and cut it off, went right back. And it was very impressive I thought.

PM: So it was basically economic conditions that cut into the HRP?

TW: Well, you know, we were getting enough money every year in the budget for those six companies for us to be noticed. It was a good chunk of their budget.

PM: That's right.

TW: And when we saw that we were threatened, they just said well, the fun is over, too late now friends. It was quite a shock to me to be told over one night by Ken Ralston that we were done and I had about twelve people to take care of.

PM: And after that you came here to Virginia Tech?

TW: Yes.

MC: Tell us the story of that. The dean who hired you was just here. What was the story of how you came here?

TW: He was never, was he a dean.

MC: So he was just head of the school?

TW: Huh?

MC: Was he head of the school, forestry school?

TW: Yeah, he was head of the school. At that time we had no dean because we weren't a college. We were part of the agriculture. Yeah, John approached me probably very shortly. In fact, I never did know where he got his information. But he knew that HRP was going down the tubes before I did and he called me one night and said you're not going to have any money next year you know. And he said I think it's about time you get this industrial forestry operation off the ground. And I said well, I appreciate that but I wasn't convinced that we were out. And then it was Ralston who called one night and said you're done, Bud. You'd better start planning places for Bill Stuart. The arrangement was with the companies, which was so neat, was all those guys that were working for me during that period were retained by their companies, so there was no fear of what would happen if we went broke. So that was, you know, a pretty nice situation and the arrangement was that HRP would pay for their movement to Atlanta and that HRP would pay for people to get back home. So all of the four major people, their jobs were secure. And I had the opportunity to recommend, you know, raises for what I considered their importance and their performance and everybody was very happy. And they just hated that it went down but there was nothing we could do about it, or nothing I could do about it. [tape turned off]

MC: So you came to Virginia Tech and?

TW: Bill and I sat down and Bill did a lot of it, we sat down and we designed a program of education that would give the guy an orientation towards the industry, an understanding of the systems, understanding of their limitations, and also understanding of the people that they were going to have to work with. So they had to take a course in rural psychology, is it sociology?

MC: Sociology.

TW: And they had to take a business course and they had to take an engineering course down the road on small machines. And analysis, of course, they had to take the harvesting analysis technique as one of their courses. And so what were we producing was just exactly what industry was looking for and this is why John took the trouble to come after me because this one guy was very supportive of Virginia Tech told him said you know, John, [brief interruption] But anyway, he said John, your foresters ain't worth a damn to industry at this point. They don't know anything about logging. They don't know anything about

loggers. They don't know anything about costs. And he said bring me a program that will allow certain schools that are interested in that area, those areas, to be graduated from here and be acceptable to industry. We were lucky. We were really lucky. I did go on that kind of a [head for him?] about four hundred of them in the industry and procurement. Even today you can go to the FRA meeting and say how many guys are here from Virginia Tech. [laughter] So we just, we worked at it.

MC: And this was the Industrial Forestry Operation, the IFO program

TW: Right.

MC: And it was unique? It was different from the other programs in the South?

TW: Yes, in fact, it was different than almost all the other schools, except the west coast. And you know, Oregon you know now is the forest engineering school and come out of there with degrees in forest engineering. They're more rigorous courses actually than what we had but ours just fit like a glove fortunately at the right time.

PM: That's what I was about to ask you because this would be what middle '70s, early '70s? I'm just trying to think of when the HRP.

TW: '73.

PM: '73 okay. And this would be the time when mechanization was really beginning to get going so there was a real kind of fit there so you were just right at the right time.

MC: And in some senses one of the major outcomes of the HRP was the IFO, ironically enough. Because you had been working on precisely the problems that needed to be addressed and therefore, when your plug was pulled you were available to fit that academic program.

TW: Six years, yeah. We started HRP in 1968 and they stopped it in '73.

MC: So what has happened to the IFO program since you retired?

TW: It's been slowly going down because the things that they wanted the IFO program for, are pretty much understood by all of our students now. We finally got them to forest harvesting as a required course in all of the disciplines [Voice too low to hear].

PM: Because you've kind of made an imprint on the other programs then?

TW: Right, yeah. Well, I think one thing that we've seen and I didn't think about it until talked about it one day. The background of the students that we have now, are not from farms. When we first started in '73 they were. So it was just natural for them to be interested in farm equipment, tractors and this sort of thing. It wasn't considered to be to be dirty or unprofessional. Now they are, interest in that sort of thing is not being professional a forester you know just I don't agree with but.

MC: Has there been a plateau in the development of new systems, in improving productivity?

TW: Yes, I don't know about the productivity improvement but you know, kind of like now, so what else is new. You know we've got power to move things. We got power to shear them and delimb them and fell them, to do almost anything they want to do with trees you know. But wood procurement whether we like it or not is still concerned with the people that produce the wood you know. And if you want to deal with people and buy wood from contractors, you better understand their business. And it's not necessarily unprofessional to be interested in that sort of thing. That's my philosophy anyway.

PM: In a way you almost have to have the same kind of knowledge as the old wood dealers to have support of people and how to deal with them and make arrangements and all that sort of thing.

TW: Some of the most successful people in the South were wood dealers that started out in the old days. Number one fellow that was our assistant woods manager, said I'll tell you how I got into forestry or into wood procurement. Said I was a C- student and I said to my friend where in the world am I going to find a job. The guy said you don't have to find a job, just become a wood dealer. He turned out to be one of the most successful people in the South, millionaire. He shipped a hundred and ten thousand cords a year all during World War II. Had to cut it a dollar a cord.

MC: How did the wood dealer system emerge?

TW: How did it emerge? It emerged because purchasing agents didn't work. You know everything that the mill had was always taken care of by a purchasing agent. Well, a purchasing agent had no way of contacting these hundreds of guys out here and so they came up with the idea of well, you know, get a dealer and let him have this area. Some of those dealers practically had their own wood baskets and they just produced whatever the mill wanted every year. Some of the better ones went out of their way to help the contractors and some of them did nothing. But it's been a really interesting business.

PM: Yes, yes. What have you found most interesting looking back on it now?

TW: The people.

MC: I'm trying to think of how the wood procurement system worked? You've got the mills that have a final demand. You have wood dealers. You have the loggers, the contractors. You have the workers and then you have the landowners. What was the original kind of distribution of power, balance of power amongst them? For instance, some people have suggested that the wood dealer system grew out of the way the South itself was organized. Other people say that the mills created the dealer system and imposed it on them.

TW: I think it was what you just said first. A wood dealer was usually well known in a community and probably a good 'ole boy. And because he was that kind of person, he had an opportunity to become quite wealthy because all he had to do was get a big enough order from IP. But he didn't have time trying to handle all the details so it was just a natural fit in a rural environment for these dealers to be accepted as somebody really important and you know, and it worked out real well. Because these guys, you know originally if you remember the way it used to work was nobody went in the woods when the crops were going in. And nobody went in the woods when the crops were coming out. But between those periods the only way you could get a guy in the woods was to have him become a contractor and start working for the dealer. And it just kind of grew. And there's some of them that, you know, they're called [pen hookers?] and they're people that are not necessarily up and up. But a good dealer was worth his weight in gold to a company.

MC: Now as time has gone on and the contractors or loggers have stopped running bobtail trucks and are now running very expensive equipment, maybe half a million dollars or more worth of equipment?

TW: Closer to a million.

MC: Closer to a million, does the system of this contracting formal business, does it still need a wood dealer operation to handle it?

TW: I think the companies feel that way. I think they're willing to let those kinds of details be handled by the wood dealer and pay them for it as a service rather than any other. There are so many details to take care of. And like Bob said today, the way it is now the contractors don't know from one day to the next where their wood's going to be delivered some places. And it just brings a little bit of control out of the

whole situation. But I think one of the problems was that some of the companies decided that they could control cost by bringing pressure on contractors and even, which surprised me, even trying to get dealers to do certain things that never would have been done ten years ago, never. You can't expect, well, you'll see that system of the most productive dealers is not going to work. They can't ask those people to go into a contract, an independent contractor, and say let me look at your books. I think you're making too much money. You know, they can't do that. I told Buck Ford when he was in here a year ago I said you're going to get your butts in jail if you're not careful. And now look at the damn problem IP is having. They just want to control. Buck is not doing that anymore but he was. Scared the hell out of him.  
[laughter]

MC: Well, Tom, I want to thank you on behalf of Peter MacDonald and I and the Forest History Society, where the record of this interview will remain.

TW: You're most welcome.