Ben Emanuel: Thank you, Gerrit. I'm not going to say a whole lot about myself. Gerrit already introduced our organization and we're colleagues, so I'm fortunate in that. Can save a little bit of time.

I am going to come down to the floor and roam around, as I've seen some other folks do, since we're in the after lunch time period. Hope you're all feeling good in the after lunch time period here in the home stretch of the conference.

Who's ready for a Southeastern case study? All right. Thank you. Where are my ... John, Michelle, Lisa, Jessica, all right. Good. We're diving into the Southeast.

As Gerrit said, I do want to thank Lara Fowler and Bob Caccese and others at the conference who have already noted Eastern states and the fact that we do have drought challenges, we do have water scarcity challenges. We'll talk about that a little bit here. I want to note also, we're going to be talking about a sub-basin of the Apalachicola-Chattahoochee-Flint River Basin, the ACF Basin as we call it.

As some of you may know, we could spend a lot of time at this conference talking about the ACF River Basin. We're not going to do that, but I stand ready to answer any questions and, in fact, questions on the basin-wide scale in the ACF could be useful. I'm perfectly open to those, but we could go all day on that topic.

I will note, if you're interested in the ACF River Basin, or even if you don't know much about it, on the topic of collaborative efforts and stakeholder efforts, do be aware of a group called the ACF Stakeholders, which is a bottom-up group that's come together from all sectors and all portions of this river basin shared by three states to try to find some solutions to the water sharing challenges, to try to find solutions that are equitable and sustainable for our river basin. ACF Stakeholders has not succeeded in having its recommendations adopted by the powers that be, but it's been a very, very important effort within the context of the ACF River Basin as a whole.

The ACF River Basin as a whole, as I was sharing with Brian Richter at the beginning of lunch, remains challenging. Solutions remain elusive. We might get news out of the U.S. Supreme Court very soon, but the issues will go on. We don't know in exactly what form, but they'll go on. The issues are very challenging and also quite fascinating.

I mention all that because as challenging as the ACF River Basin is, just last week one of the folks I work with in the Upper Flint expressed a sentiment that he's very appreciative that in our sub-basin of the ACF, we're doing something very positive. I'm going to talk about that now, and I hope you all will agree.

I also just want to note I'm going to give an overview of the flow challenges we face in the Upper Flint Basin, but I'm going to spend a lot of my time talking about process, talking about people. Gerrit is right: We're the best session! We're talking about people. And, thanks to Aaron Wolf and Rebecca Tharme for framing this up yesterday.

We're going to talk a lot about collaboration, bottom up collaboration, at the watershed scale in the Upper Flint and what we've done to advance that in our work from American Rivers' position in the Upper Flint Basin in Georgia.

That said, with all my joking about moving east, I hope there are some lessons here in terms of collaboration, in terms of stakeholder engagement, that are useful really in any geography. As we've heard, these issues are national and even international in scope.

You're going to see a multiple-stressors kind of situation here. You're going to see an urban interface, a headwaters system of the river system, and various other threads related to power dynamics and stakeholder engagement that I think are more broadly applicable. I'm hopeful that the talk can be useful to you all in that regard as well.

I do want to note since we're in the public involvement session, this has been very targeted involvement of certain sectors who are important: environmentalists on the ground in the basin, but also and most chiefly, water utilities, local water utilities. It is its own flavor of engagement that is context-specific as Steve Smutko said in his workshop the other day, that's sensitive to the context of the basin itself.

Just a map here, and I know it's a little bit hard to see, but at the very top of the map is the City of Atlanta. The Flint River does have its source on the south side of the Atlanta

metro area with our international airport pretty much on top of the uppermost headwaters of the river. So, our challenges begin at the source.

The river flows southward through suburban sprawl areas on the south side of Metro Atlanta. This is a relatively small sub-basin of the ACF Basin, which is a little under 20,000 square miles in total. Steve, I think, mentioned *The Fugitive* being filmed in the Little Tennessee Basin. They shoot a lot of "The Walking Dead" in the Upper Flint now, for those who are fans. If you can think back to *Smokey and the Bandit*, when they jumped the car over the old bridge: uppermost headwaters area of the Flint River! I mention that because when they shot *Smokey and the Bandit*, the headwaters were still sort of rural. That's the landscape in the movie. Now, it's a heavily suburbanized area, really in the headwaters of the Flint River system.

Photo: Alan Dressler

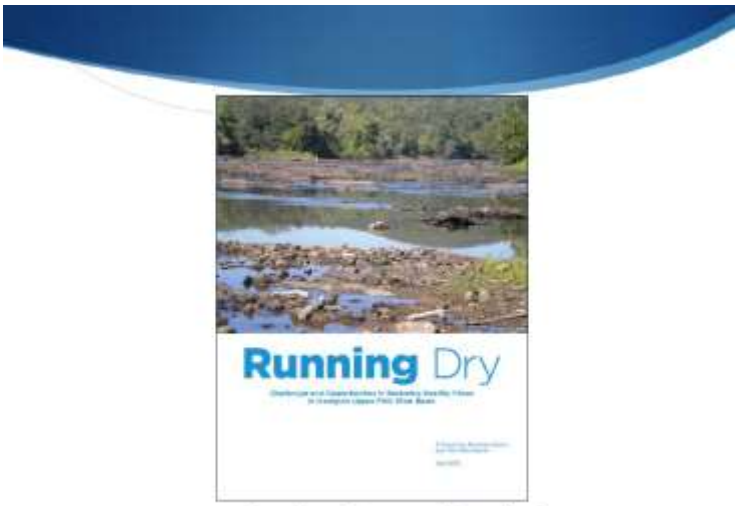
Despite that urbanization in the headwaters, the Flint is still really a tremendous natural resource, really a gem of the Georgia outdoors. High, endemic biodiversity. There's no dam on the main stem Flint River from its source to the Southwest Georgia area where there are two hydropower dams on the main stem. The statistic is it's one of 40 rivers in the country still running for more than 200 miles without a dam on the main stem.

So, still high native biodiversity and endemism and really a fantastic system. This is an area where the river cuts through ridges of Pine Mountain, a disjunct southerly ridge of the Appalachian Mountain chain. An incredible diversity of Coastal Plain, mountain and Piedmont types, both terrestrially and aquatic in that area.

This stretch of river was saved from large mainstem Corps of Engineers dams by our friend Jimmy Carter. *Cadillac Desert* was mentioned earlier today; Georgia shows up in *Cadillac Desert*, so go back and read that passage if you are straining for memory on that one.

Bud and Mary Freeman discovered and described the Halloween Daughter in this area not all that long ago, for those who know the Freemans. We do have federally listed mussel species coming all the way up to the Piedmont into the suburban areas that I mentioned. And, the shoal bass is an endemic black bass, very, very popular with the folks who chase it. They're fanatic about chasing shoal bass, which is endemic to the ACF basin, and most prolific in the Flint River system today.

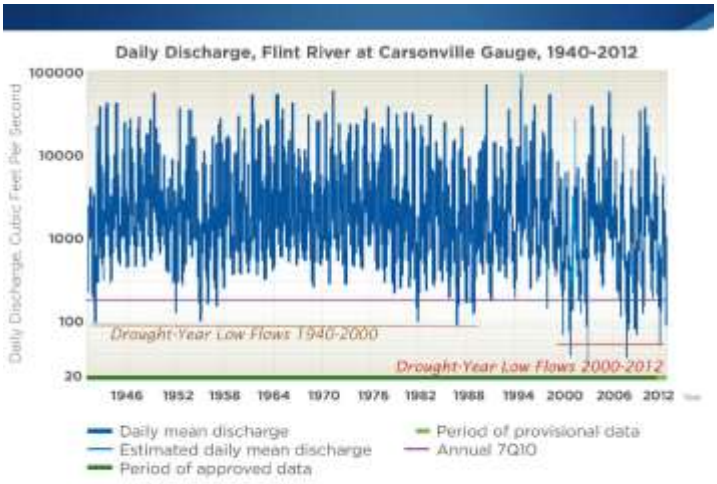
The river suffers not just from landscape urbanization, but from water use and severe drought. I'll show you that in recent droughts, we've seen extremely low flows in the main stem Flint, as well as tributary portion of the headwaters.



www.AmericanRivers.org/RunningDry

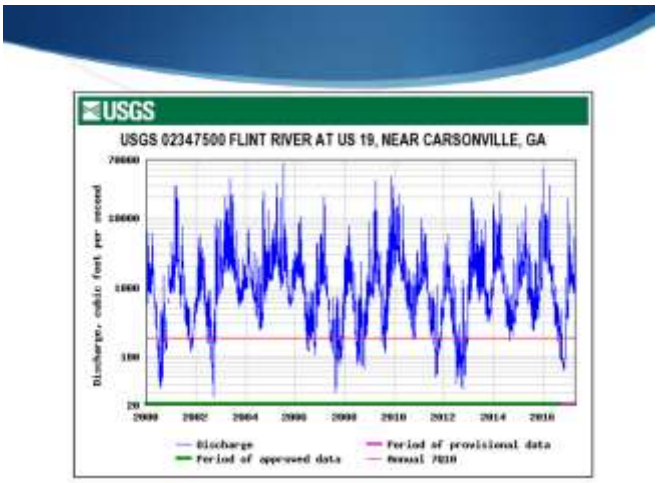
I'll show the graphs in a moment just very quickly, but want to start with the human story. This is a report we did almost five years ago in 2013. The photo on the report, if I were to blow it up, way in the background you might be able to make out a tiny human figure.

That's the late Dr. Mac Dallas fishing from the opposite bank upstream. He was a founding board member of the Flint Riverkeeper organization, lived almost his whole life in the small town of Thomaston nearby. When I first called Dr. Dallas to ask him about his experience of extreme low flows during drought in recent years on the Upper Flint where he had fished for decades, he said to me, "Ben, you could walk across it in your Sunday shoes without them getting wet." That was really true. This was his river, and you could cross it with your feet dry during the drought conditions.

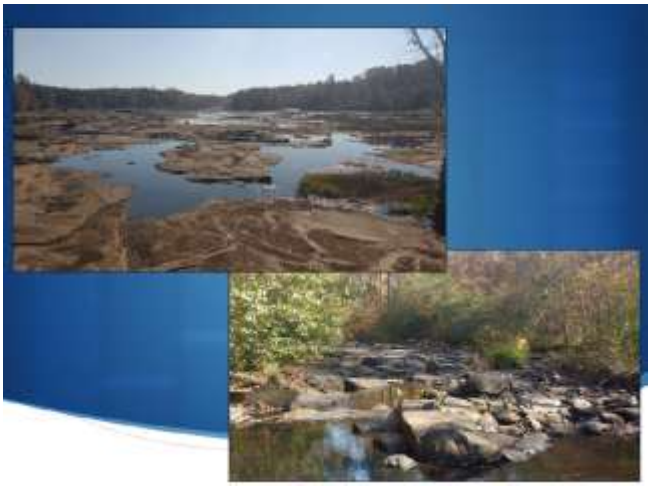


This is the data side of that, and I added some notations just to note the difference between the floor for low flows during drought in the 20th Century versus the floor for low flows during drought thus far in the 21st Century. You see the bottom kind of falling out at that very low end of the hydrograph.

You also see repeated severe drought. There's now been a fourth one. If you parse it, there's three drought events, some are multi-year, on that graph. We've now had a fourth, single-year event in 2016 that could be added on here. You also see some other weird noisiness in the hydrograph in the last couple decades and a general decline, less water availability overall, which is something that we're looking at.

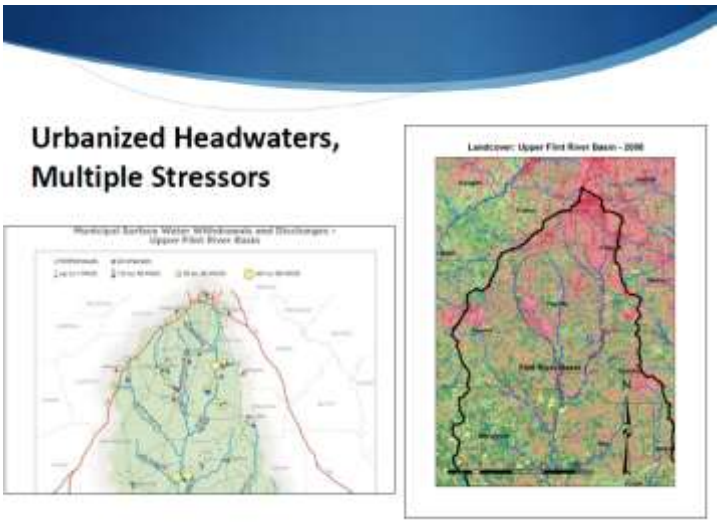


This is just that 21st Century portion, the year 2000 to present, with very low flows in the main stem river during drought. This is the same gauge as the previous graph at the downstream end of the Piedmont physiographic province, and with low flows bottoming out at the very lowest during drought at 20-, 30-some cubic feet per second for the main stem river, which prior to the year 2001 we'd not seen over the historical record for this stream gauge, going back to about 1930.



Just quickly, the ugly pictures of how it looks during drought both in tributaries and in the main stem. These are mostly 2016, that most recent drought event, which was severe but thankfully briefer in duration.

She's very happy to have caught her shoal bass, but it was easy to catch because most of the water flowing in the river is in a relatively narrow channel somewhere across a wide expanse of shoal habitat many hundreds of feet wide. This is in late summer, maybe fall, 2016. Most of the water is in a pretty narrow channel in that case.

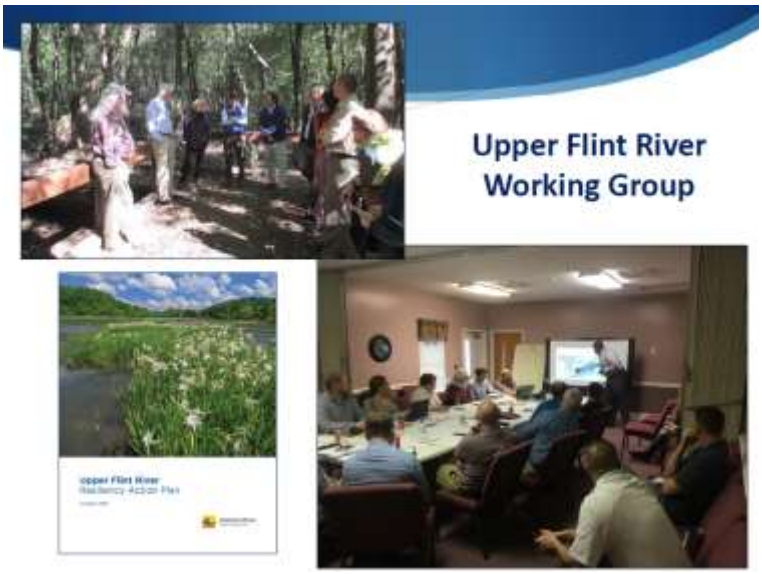


And these are from our *Running Dry* report that we did in 2013. The Flint Riverkeeper and American Rivers collaborated to do this report. We were seeking to call out a flow issue, a conservation issue, that really had not received much attention in policy or in conservation advocacy in the state to date at that time. We documented the hydrology, as I showed you, and we started looking into causes.

Certainly, on the right, urbanized land use has made hydrology flashier, with lower base flows, as we would expect from urbanized land uses. The deepest red shade at the top of the basin outlined in black is the airport itself, 4,700 acres, the world's busiest airport. But, you see there are a lot of pink and red shades elsewhere. This is the story of Atlanta just in my lifetime, with the sprawl that has happened out in the suburban areas of Atlanta and in some cases into the headwaters of river systems that come down off of the ridges on which Atlanta is built in the Piedmont region of Georgia.

On the left, very difficult to see but just to say that nearly a half million people receive public water supply chiefly from pump-storage reservoirs built in the tributary network of the Upper Flint River, largely in the headwaters, depending on how you define them.

As I said: No dams on the main stem Flint River from source to more than 200 miles downstream, but many dams on the tributary network and the headwaters, some of them providing public water supply through pumped storage. A lot of them are amenity ponds – some are farm ponds, but also fishing ponds and amenity ponds that also play a role in impairing hydrology especially during drought conditions, when we get increased evaporation from those slack surface waters that were not impounded historically.



I want to move on from the data to process. What we did after putting this report on the table with the rather drastic title, *Running Dry*, was to be very intentional about continuing relationships that we had begun to form with the water utilities relying on this water system to provide public water supply.

We actually, fortunately, had begun forming those relationships even in the information-gathering stage of doing this report. So, not unlike a USGS staffer, I was talking to the water providers about their infrastructure, about their operations, to make sure I understood it correctly. That direct information-gathering started the process of building relationships.

But, it was then very important in the spring of 2013 when we put the *Running Dry* report on the table that we turned around and said: So, let's get together and talk about it. From the environmental NGO position, we at American Rivers began convening then what we call the Upper Flint River Working Group with our first meeting in June of 2013. We're coming upon on five years now.

This provided a totally new forum for open dialogue, as I said, among conservationists on the ground, but more importantly even among the water utilities themselves, at the scale of the Upper Flint River Basin. The State of Georgia and the Metro Water Planning District for Atlanta do have some mechanisms for providing that, but it was important for us to look hydrologically and physiographically at the whole upper basin from the source to the Fall Line. To some extent, this was a geographic parsing that was a little bit different from what had been done by government entities previously.

We also just were creating a space for new conversations, for open dialogue, for being honest about some problems on the ground and moving towards some solutions going forward.

We met more frequently in the early days. We now meet twice a year in the meeting room pictured at the lower right, which is in a Methodist Church in a little town called

Brooks, Georgia, just on the edge of the countryside as you drive south from Atlanta beyond the suburban fringe. It's part of their Creation Care ministry to donate the room to us for a few hours on a Thursday afternoon twice a year.

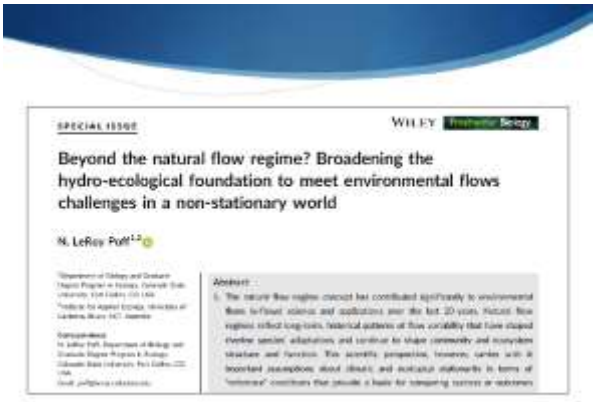
I won't claim any sort of faith-based intent such as Aaron Wolf described yesterday, but I have found it gives kind of a retreat setting. People are out of their offices and maybe in a different mode of thinking and talking when we're in these meetings. It's just been in many ways surprising and very productive to have this new forum.

It's hard for me to describe adequately the change in the landscape that's come about by our creating this forum for dialogue, and I'll say it also has already helped us see some results on the ground in terms of low-hanging fruit.

There were previously some very bad management practices, especially in dry years and in drought -- one smaller reservoir on a tributary stream, for instance, that was not releasing water at times in droughts. This is in North Georgia, typically a pretty wet place, but that stream was de-watered in drought. There are some other examples, but there's some low-hanging fruit on the ground that we've already plucked thanks to convening this effort.

We also ended up convening a conference call that is triggered during drought conditions for all the water providers in the Upper Flint River Basin. It's not coordinating, it's just information-sharing during drought. We established our own triggers that get us on those calls very early in a drought. The State of Georgia does have a drought plan; we've heard about that at the conference. But, folks providing water in the Upper Flint almost always feel themselves at the leading edge of drought conditions in North Georgia. They saw the value of getting on the phone just to share information a little bit earlier, even, than in the process under the state rules.

I want to bring you up to date with our work now, and with updates on a daylong workshop that we convened just in January of this year that had the intent of moving us forward to some new thresholds of how we organize ourselves as a group, and what it is we're trying to accomplish on the ground in the river system for the ecology of the system and for the communities that depend on it.


SPECIAL ISSUE

WILEY Freshwater Biology

Beyond the natural flow regime? Broadening the hydro-ecological foundation to meet environmental flows challenges in a non-stationary world

N. LeRoy Poff[1,2]

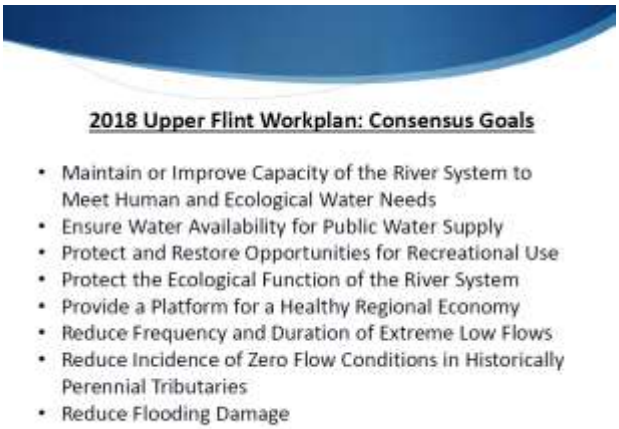
I did not know they were going to give Dr. LeRoy Poff an award also when I decided to cite this paper. But, Mary Freeman with the USGS put this paper that Dr. Poff published last year in *Freshwater Biology* on my radar last fall as we were preparing for the January workshop. I highly recommend it.

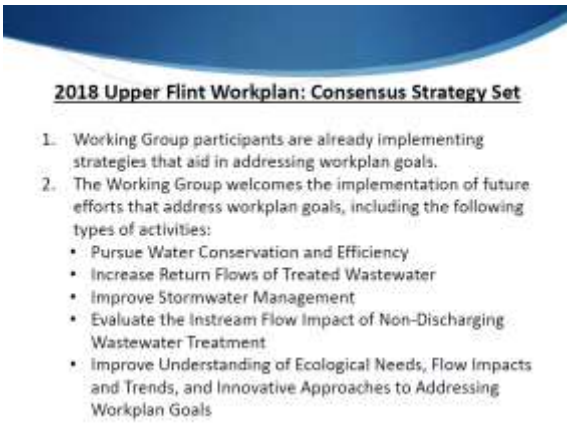
As I was reading it, I was just thinking this describes the Upper Flint perfectly. He's sort of saying that in certain systems, especially highly altered systems, we need to be thinking about how we manage for the reality of the present day and maybe get away from using historical flow regimes as our reference point. I think with the impairments we've got in the Upper Flint, it's very, very applicable.

I'll give you just one line from the paper: “Rapid climate change [We see that] and other sources of hydrologic non-stationarity (population growth, changing land use, etc.) make reliance on historical hydrologic time series questionable for use as a ‘reference’ condition for e-flows practices.”

It just described the Upper Flint almost perfectly for me. It described the pragmatic approach we've been taking with stakeholders as we approach goal-setting and conversations around goal-setting for flows. His take looking ahead on that goal-setting topic is managing for resilience, focusing on “maintaining key processes and relationships that are robust and able to persist with functional integrity [ecological speaking] under anticipated changes in social and environmental conditions.”

I just recommend this as a reference for the group as whole. It’s very relevant to our work, and, I think, a line of thinking that we all need to be thinking about with climate change and other forms of non-stationarity influencing the systems that we're working on.





Two slides here on what we came out of this workshop with one day in January, which was consensus among the Working Group as a whole, water utilities and conservationists, putting out a public document of some kind that states these goals. Look, this is all-in, this is a big tent – a capacious sort of basket that says, we agree on goals that we want to meet for us to restore and protect flows for the future, that maintain a functioning ecology of the river system, as well as just the sustainability of the communities in the basin as well. It is very important process-wise that we're able to say this as a group.

Then we charted some strategies, water conservation and efficiency, for instance. Helping bend the demand curves, as we heard about at lunch, is in the basket as well. That very last bullet at the bottom of the page incorporates a lot of work that we're now charting out with a group of scientists, mostly local to the area, who are very interested in the Upper Flint River Basin, and very interested in making their contribution to this very productively minded, collaborative, bottom-up group that is going on.

I'm very excited about moving forward with some science that's going to help this process going forward, and I think help us set some very good goals to get good results going on the ground.

I'm just about at time, but I can talk more about lessons learned from my work in convening in particular these stakeholders, water utilities, and conservation groups.

Meeting people where they are is very important. Creating a space for new conversations, as I've said, is important. Adapting to uncertainty is something we've got to continue working at, I believe. And, I just can't emphasize enough the importance of good relationships.

It's a very challenged basin. I don't know what the answers exactly are going to look like going forward. I have come to believe pretty deeply that we're only going to find good answers through processes like this that are built on good relationships. It's been a ton of fun – very challenging and very rewarding to be a part of it. We'll continue trying to build the base of resources that are helping us move forward on this work.

I don't see the zero time sign yet, so I'll share just one line that's from a tapestry hanging in the hallway of Brooks United Methodist Church where we have our meetings. Totally coincidentally, but right out in the hallway there are these tapestries with different sayings, some more explicitly Protestant than others. One says, “Inspired People Include People.” I thought that summarizes our work pretty well, and the work that a lot of you all are doing as well. Inspired people include people.

I'll leave you with that and I look forward to questions after. Thanks.