Association of Earth Science Editors Annual Meeting
Friday, November 10, 2006
3:30-5:00 p.m.
Technical Session 6

On the Public Understanding of Science

(Note: I had written a part of this talk before the AESE meeting, the balance of it was "recreated" from my notes when I got back to the office. I reserved the right to embellish and/or clarify in a number of places and hope that meets with favor from readers. It is, therefore, not an actual transcript of the talk and in some places may be what I wished to have said and so the words may differ but the spirit is the same. GW)

The General Public: The Most Difficult Audience of All

I developed the idea and abstract for this talk when the session was entitled, "How to Reach Diverse and Difficult Audiences." Having a compelling fondness for alliteration and 30 years of public service experience with both diverse and difficult audiences, this seemed like the perfect spot to talk about something I've long harbored very strong feelings about: the love, hate relationship that the public sector has with that ill-defined, sometimes ill-mannered, and often illogical audience, the general public.

Then, Fred went and changed the session title on me… to "On the Public Understanding of Science"… and I was presented less with what I saw as a forum to talk about the public as a receiving audience than as a special interest group to be wooed and won, because our very future as inhabitants on this fragile planet depends on it.

(Note that I did submit an abstract for this talk, which didn't get included in the program, and is appended at the end of this talk, just for the record.)

I agree that it is desirous to engage the public in understanding science, but it is no easy task for a number of reasons and, so, I stand by my original title for this talk: "The General Public: The Most Difficult Audience of All."

What you get today is just me talking and reflecting on those many years and this one incontrovertible conclusion: the general public is the most difficult audience of all to reach. Why do I make this rash statement? First, there is no such thing as "general" in the public; they are, in truth, very discrete customer segments that cannot be lumped together.

There's the education customer. This can be anyone from a 3rd grader to a high school teacher to a post-doc intern to a distraught parent looking for last-minute homework help. That's already a range of audiences that's hard to satisfy. And yet, no one in that range can be ignored either.

One of my favorite stories about how important it is to reach out to school-age audiences is that you never know who might be in that school group and what impact you might

have. The USGS at its National Center in Reston, VA, has a Visitors Center that brings many hundreds of students through it in the course of a year. Being in the Washington, DC, metropolitan area, we often find the children of elected officials, ambassadors, and even political appointees in the eager groups who learn about what we do.

In this favorite story, a new assistant secretary at the Department of the Interior was explaining to his children at the dinner table one night what it was that he was doing in his new job and what important things it was that the bureaus in Interior did that he was responsible for… He wasn't making much headway with his discourse and his natives were getting restless and obviously rather bored with Dad's humdrum job, when this appointee happened to mention that he was also responsible for the U.S. Geological Survey… His young son (so the story is told) sat up straighter in his chair and said, "Dad, that's so cool, they study earthquakes and volcanoes and all about the water… and grizzly bears… and I learned about maps and saw a dinosaur's footprints. Gosh, Dad, you've got a great job!" You see, his son just happened to be in the group that had come from one of the private schools in downtown DC. The assistant secretary told this story on himself when he first came out to visit the USGS and on several other key occasions, including a briefing on Capitol Hill. That one connection to his son did more good than a dozen briefings by USGS officials.

Our former director Dallas Peck would always tell the story of his life in geology as having begun because of a high-school class and the interest of one special earth science teacher. I would never deny the impact that reaching out to young people can have but it comes at a cost. With a slender budget, which comes first, dollars for science or dollars for outreach? I think we all know the answer.

Let's go back to that parent in the pantheon of the general public. They, too, can be the most appreciative and supportive of audiences and also the biggest pain in the neck. The USGS has long prided itself on its service to the public. For many decades, we have had offices that the public could come to and buy maps and publications; we have staffed phone numbers that people could call with myriad questions and place map orders. We have always treated correspondence from the public with respect and prompt responses – even when they took the dreaded route of writing to their Congressman first – and we had those nasty ticketed pieces of correspondence that had to be answered no matter how crazy or inopportune the question or query. And so, we open our doors, answer our phones, and write responses to letters, all with a true commitment to "earth science in the public service" – the original motto of the USGS, which was coined for our centennial celebrations in 1979.

…until you get that call from the parent whose child has a science project due the next day and it's 5:00 in the afternoon and they aren't asking nicely about help for their child, they are demanding that you give them everything to write a paper that should have been started 6 weeks ago. Back in the day when you had to actually make copies and mail stuff to them, this was particularly irksome. Now, with the Internet and so much information available online, you'd think this might have diminished, but there are still some of those taxpaying parents who feel that what they pay in taxes reserves them the

right to have you be their personal researcher. It might not be so bad if it was the students themselves who called but when it's the parents it can really get to you.

No, that's not all parents or all of the public. I've also gotten letters and phone calls of appreciation for having taken that extra step. I've gone out of my way to find a resource for someone and given them my name and number and asked them to call me back if they didn't get what they needed. I've listened to a woman who called at dawn from California and whispered to me that there would be an earthquake that day and wanting to warn me so I could warn everyone else; I've gently explained to an elderly gentleman how he could still order a map from a real person and he didn't have to try and listen with his hard-of-hearing ears to that "damn recorded message" with its irritating demands to push buttons he had a hard time seeing; I've contained my laughter as I assured a woman that we were not the Genealogical Society and that no, we couldn't help verify her family tree, even if there was an inheritance involved (she kept yelling into the phone "You don't understand, honey, this means money!) And for years we kept in our files in the Public Affairs Office a multi-year correspondence between a former public affairs officer and a lonely woman on Long Island who was certain that the headaches she suffered were being caused by offshore drilling and couldn't we do something to help? He wrote her back each time, imparting a bit of science knowledge but mostly just being a fellow human being.

The general public is also an insatiable audience. Another customer segment is the community in which a science organization resides. The USGS has hosted many an open house in which we literally throw open our doors and welcome in hundreds to thousands of visitors over a day or a weekend. At the USGS National Center, we started these very modestly with a half-day event in honor of our 20th year in Reston. It was an unqualified success and so the leaders – and the public – wanted more. And so, each time, the events became more elaborate and longer, and we tried to do even more. We even ended up with a rivalry between the three major USGS centers as to who could give the public a better event. These became massive undertakings that took months of planning, countless staff hours in preparation, thousands of dollars in expenditure, and hundreds of volunteers. Were they worth it? Yes… and no. Yes, it was gratifying to have thousands of people come and see what it was we did. The scientists, many of whom were skeptical at first, found themselves gratified by the interest shown in their work and in feeling that they were doing something significant in reaching out to the public. We made great political points with local elected officials who had a venue at which to speak and for political appointees as well. But no one really understood or appreciated what it took to put on such an event – especially when they began to stretch to three and four days, involve hundreds of exhibits, and required coordinating with several dozen schools and bus schedules.

But I have to admit it was gratifying to read the questionnaires that we had the public fill out and get a sense of how much it meant to them to feel a part of what we did, that they appreciated being able to talk to a "real scientist," and that they felt that what the USGS does is important to their lives. Of course, my favorite was the little boy who exclaimed proudly when asked what was the best part of the open house, said: The revolving door!

But back to that insatiable part… No sooner had we gotten all of the exhibits put away, let the staff recover, and take a deep breath, when the calls would start – When are you having your next open house? And you have to resist that still, small voice that wants to say, as soon as you're willing to pay more taxes so we have a larger appropriation and can *afford* to do it more often…

Why should a government science agency care about the public? Is it only about ensuring that there are the resources to do the science? I've always felt that one of the most critical reasons was to have informed citizens in the voting booths of America. Not to ensure that they voted for one party or another but so that they could understand the scientific issues that were being advocated by one side or the other. I want them to understand why it is that a developer shouldn't be able to build a shopping mall in a floodplain. I want them to understand why they may have to pay more for utilities to ensure that the environment is clean and healthy for their grandchildren. I want them to understand that if we didn't have stringent building codes in this country, the kind of devastation that happens when an earthquake strikes in Turkey or Iran could happen here.

And yet so much of what we do in public outreach is incidental or accidental. There are not enough dollars to do the science, much less to invest in extensive campaigns to reach the general public – that amorphous, insatiable mass. Do you only invest in that 20 percent of the public that the polls have shown to be interested and engaged? What about the other 80 percent? Perhaps that's why you invest in reaching out through education channels, in hopes that you'll indirectly reach through the parents and the teachers those young minds. It's not that I don't think Joe Six Pack or the woman I worked with before I came to the Federal Government who lived in a trailer with her three kids and an out-of-work and abusive husband aren't worth trying to reach – but at some point you have to decide who you can most and best reach. And how you best "frame" the issues with the public, as Lee Allison spoke of yesterday.

Having served for about three decades in a variety of jobs and offices within the USGS that have had either a direct or somewhat indirect connection to serving the public, I have too often found myself being asked to get the support of the public and to make them understand the importance of our science but asked to do it without many resources and sometimes without much compensation. I've lugged many an exhibit or table-top display and materials to a weekend event in the local community and been a one-woman show for USGS science. I've stood at many a trade show, professional society meeting, or conference at a USGS booth and hawked our scientific wares. I've worked press rooms at White House Conferences to GSA sectional meetings to county fairs. I've wrangled with reporters on magnitude versus moment scale; I've given interviews at 3 am to a brand-new Reuters reporter who wanted to know "just what is an earthquake anyway;" I've touted the merits of the USGS and its streamgaging program in a talk show with the new mayor of a city recently devastated by the great floods along the Mississippi River. It's been both immensely gratifying and depressingly futile. It's such a huge job and it's never done and it's never enough; nor is there ever enough money, time, or people to do it right.

So, after 30 years of public service, I'm ready to stop. I leave it to others to carry on. It's a good fight and one worth doing but I contend that we'll never have the commitment to science that is being called for in the American Competitive Initiative, or that is needed to face the future of this country in which the public health, public safety, and public posterity of all Americans is secured, unless we, as a Nation, are willing to put our money where our platitudes are.

And if we can't get the resources, then we need to be very careful and very strategic in how we communicate with the public and we must leverage every single dollar, stretching it to its maximum to provide the best return on that investment from the public that we can.

I'd like to talk about some efforts that I think have been worthwhile and that I count as proud accomplishments in my 30 years of government service.

First, use others to communicate your message. If you can't do it yourself, work with others who have bigger budgets or more public-oriented missions to do it for you, or with you. Here is where relationships with trade associations, professional societies, academic and community groups, and the private sector come into play big time.

Fostering relationships with these groups always pays off. Inviting these groups to meet with you is a great way to open and maintain an effective dialog. The USGS does this through listening sessions with its customers and partners, at which they are invited to speak their mind, to provide input, to react to issues or questions that we pose to them. In turn, these organizations report to their memberships about these opportunities and have ensured that the USGS message reaches hundreds more customers – their memberships and the public, as well.

Those relationships are also nurtured at the conferences and trade shows held by those organizations and by being there with an exhibit, workshops, demonstrations, targeted handouts, a compelling message, and trained and enthused staff who can engaged the participants. Yes, it sometimes means committing substantial resources in exhibit fees or conference sponsorships, but it is the kind of investment that is repaid in support that the USGS can count on; voices willing to speak up on behalf of the USGS at times when we can't be the spokesperson ourselves; and a leveraging of materials and messages way beyond the conference venue into their publications, their outreach, their members, and often their communities.

And it's not just allied scientific societies and trade associations that should be courted. Many other organizations need science information and can have a tremendous multiplying effect for your organization and its science. Groups such as the National Association of Counties, the National Conference of State Legislatures, and the National Governors Association all have agendas, committee structures, and conferences for which the message "on the public understanding of science" is pertinent and can have great impact.

Other groups, such as the Association of State Floodplain Managers, the Association of State Drinking Water Administrations, and the American Society of Civil Engineers, as well as many others, have State representatives and State-based organizations that host conferences, workshops, and other events, all of which provide great opportunities to reach out to the public through others.

Second, never underestimate the power of the press. Besides being alliterative, it's true. You can reach potential millions with a well-crafted news release. I think Jack Hess will appreciate this story: I still have in my files a copy of the news story that appeared in the Nevada papers, quoting Senator Harry Reid and extolling the new water-quality project that the USGS was getting underway. That new project was one of the first 20 starts in the now two-decade long USGS National Water-Quality Assessment program. I was one of the chief architects of a well-crafted public awareness campaign that targeted the local press in each of the areas where the new projects were beginning, coupled with fact sheets on what the program would do and what the water-quality issues were in the area that the USGS – and its cooperators – were seeking to address. One of the reasons I've kept that news story so long and with such pride is because of Senator Reid's quote – because it was lifted word for word from the quote in the USGS news release; he simply changed the attribution to himself (and I don't think Phil Cohen, our former Chief Hydrologist, who was the original voice in the quote cared one bit).

We also worked hard to cultivate members of the press. I say "cultivate" very carefully because one should never think that they can work the press to their advantage. But that doesn't mean that you don't tell them when you like a story they've written; or that you don't think of them first when you have a new report that you think they'd be interested in; or that you take their call, even if it isn't a day when you really want to deal with them or anyone else. Contacting them to set the record straight, if a misstatement is particularly egregious is another opportunity – you can set the record straight by gently correcting an error and also pitching another story to them – a "second day" story, which gives you a chance to present a topic or issue with a fresh or different pitch. (While I didn't say this at the meeting, be careful how you deal with corrections to news stories or quotes; be respectful and non-confrontational; don't nitpick about tiny points of inaccuracy that aren't truly wrong; look at it as an opportunity to turn the story to your advantage with correct information, an opportunity to cement a relationship with a reporter, and providing a new resource to the reporter by letting them know the science issues or information to which you can be of help to them in the future. Also, have a policy with your members and/or employees for "Letters to the Editor," on how and when they should be done, how affiliation should appear, and what your review and approval procedure is for such official communications.)

One of our favorite reporters for many years was (and is) Randy Schmid of the Associated Press. Randy loved the subject of water and had even taken a number of classes in hydrology to know more. When our public affairs officer found this out, we put together a special kit, complete with a USGS hat, pertinent publications, resources he could call upon, and lots more. We had a friend for life. And we never abused that privilege, either. There was one time, though, when we wished Randy weren't such a

great fan of the USGS or such a well-respected and well-read reporter. Our public inquiries group had put together a guide to all of the USGS maps and publications about the National Parks, which we thought – with our most civic minded goals foremost – would be a great thing to tell the public about. And we had the perfect "hook" since it was getting along towards summer and people planning their vacations to see some of the Nation's crown treasures of the natural world. And that's kind of how we billed it. And, of course, we mailed a copy of the news release (you'll have some idea now how many years ago this was) with a special note to Randy along with a copy of the guide… Randy loved the idea, ran the story with a pitch that everyone in the country just had to have a copy of this guide or their summer just wouldn't be complete. And since this was the Associated Press, the story ran in dozens of newspapers from Poughkeepsie to Pensacola to Provo. And the requests started pouring in, not in dribs and drabs, but literally pouring in by the hundreds within days. We ran out of copies of the guide long before the orders stopped coming in. We had to run several thousand more copies and people had to work countless extra hours to fulfill all of the requests. Remember that bit about the public being insatiable?

You would think we learned our lesson with that one but we often reached out to the public very directly through the press, as well as giving voice to our science through the media. We used the occasion of National Science and Technology Week, sponsored for many years by the National Science Foundation the third week in May, to help produce a colorful poster that had an extensive list of government resources on the back side. In addition to helping out with the artwork on the front, we offered a special kit of earth science resources for teachers and students if they would just write to us. We were clever enough to code the mailing address so that we'd always know which effort it was that the public was responding to. We made up several dozen kits in advance and felt we'd done a good public service. To make a long story short, we fulfilled several thousand requests for those packets over the ensuing years. Yes, years. What we thought would have been a one-time, one-week response didn't count on the fact that teachers and others would hang up the poster and leave it there… or that teachers like to have class assignments where the whole class writes to a government agency and asks for something. And so, ten years later, we would still from time to time get a request for the packet addressed to 119-ST. As I say, they are insatiable.

Special weeks and days that relate to the sciences, declared by various organizations, are great ways to reach out to the public – and much of the publicity and focus is already done for you, as they usually have a specific message to which you can tailor your own. Earth Science Week, sponsored by the American Geological Institute, is a great one, as are: National Drinking Water Week (Association of State Drinking Water Administrators), National Ground Water Week (National Ground Water Association), Geography Awareness Week and GIS Day (National Geographic Society and others, including ESRI, Inc.), and the various activities of the Groundwater Foundation, which sponsors children's ground-water festivals and has a community based program called Ground Water Guardians (this is a favorite of USGS Chief Hydrologist, Bob Hirsch, who has a strong affection for these "little old ladies in tennis shoes"), which has citizens literally adopt and be the guardian of their local ground-water resources, and has an

annual conference (at which Hirsch would be confronted by the Keds-clad blue hairs) at which awards are presented.

The news media will usually cover such events and observe these special weeks and days. Anniversaries of natural events are another great way to engage the public in understanding science – such as significant floods, earthquakes, or even the founding of your organization at some significant milestone.

I'd like to add a few more words about the news media and the public. You need to carefully think about what the public truly needs to know and how to "frame" the science as Lee Allison said. As one example, when USGS earthquake scientists first came up with long-term earthquake probabilities for northern California, this seemed to be an appropriate and necessary time to engage and inform the public. The whole notion of probability and forecasting of natural hazards over a time horizon (30 years in this case) is not an easy one to "frame" in a way that makes sense to the public who is used to knowing if it's going to rain tomorrow, not that there is a 60 percent probability (with a +/- 5 percent confidence level) of a magnitude 6.5 or greater earthquake occurring sometime in the next 30 years. But we carefully crafted a news release, developed some helpful graphics, and held a news conference to explain to the general public, through the news media, what the USGS knew about the likelihood of earthquakes shaking their world anytime "soon." Overall, the roll-out of this information went well and the scientists were actually rather enthused about the media response at the news conference. One scientist was so enthused that he went back to his computer, crunched the numbers some more and excitedly came back to the public affairs specialist in Menlo Park, CA, the next day with a "new" probability that showed that the likelihood had increased from 4 percent to 5 percent. It was hard for him to understand why it wouldn't be a good idea to call another press conference and tell the media to "stop the presses" because he had come up with another single percentage point of certainty over the next 30 years. Scientifically significant, maybe; publicly significant, no!

Timing of announcements with the public through the news media is also another issue. When the Long Valley caldera near Mammoth, CA, became restive, our scientists wanted to go public in a big way to ensure that the public was informed and understood the volcanic potential of this long-dormant feature. Unfortunately, the timing was such that there was a major public event happening then over a holiday weekend and the vacation-spot nature of Mammoth came into play with a lot of real-estate developers and town council folks adamant about not making a big public splash with the news. The USGS worked with the various local interests and instead of a press conference and news releases, there was a more measured public exposure through orchestrated town meetings with USGS scientists explaining what was happening in a more controlled environment. There were still some bumps and bruises over this but at least the framing didn't have to be done the day after massive headlines of "Mammoth to Explode!" (And luckily the deformation slowed and the microseismicity declined.)

It's also a good idea to work with news-related organizations in the same way that you work with allied organizations. Groups like the Society for Environmental Journalists

and the Outdoor Writers Association have annual meetings, Web sites, and other opportunities where you can offer yourself and your organization as resources and as spokespersons when the need arises. Another group is the National Institute for Computer Assisted Reporting, which runs a very robust listserv that often has opportunities for the earth sciences to engage with resources, information, and other input in telling a story using graphics, statistics, etc.

Working with the news media can have a wonderful multiplying impact that reaches many more eyes and ears than trying to do the public outreach yourselves. Always remember to craft your message in metaphors or analogies that the public can understand and relate to. Make your comparisons and explanations vivid and visual – that's one of the beauties of the earth sciences, they make telling stories in pictures and in engaging ways very easy. One of my personal favorites was explaining record breaking flooding in the wake of a tremendous blizzard in the Northeast and Mid-Atlantic, something that we came to call "The Superbowl of Floods," since the timing of the flooding coincided with that annual grappling on the gridiron (see, I do like alliteration). The size of the flooding was so great that it was hard to figure out how to equate it for the public and the usual conversion of cubic feet per second of streamflow discharge into million or billion gallons per day just wasn't cutting it. I came up with the idea of translating the volume of floodflow into how long it would take for a football stadium (in this case Sun Devil Stadium in Arizona where Superbowl XXX was being played) to fill (and how often) to match the peak flow of several rivers. It took a bit of calculating on the part of our hydrologists, along with some calls I made to staff at the stadium who thought I was crazy asking for the dimensions of the inside of the stadium to come up with width, height, depth to calculate volume, but we finally came up with a way to make the conversions. We issued a news release that we sent to the metro desk (and also the sports desk) of a number of newspapers that had experienced flooding – and also, of course, to the cities where the teams competing came from (Dallas Cowboys and Pittsburgh Steelers, if you've forgotten). We constructed a table that gave the river and USGS streamflow gaging station location, the peak floodflow in gallons per minute, the number of gallons of water that Sun Devil Stadium would hold (221 million gallons, if you're curious), how fast the stadium would have filled at the flood's peak, and last, "In the 60 minutes of regulation play, how many times would Sun Devil Stadium have filled." This was a very vivid way to explain to the public numbers that would otherwise have been difficult for them to grasp and telling them in terms – football stadiums – that would resonate with them. (I also added a "Note to Editors" at the top of the news release that said: "While the Dallas Cowboys may lead in the polls, Pittsburgh Steelers fans can take heart that this year the Ohio River near Pittsburgh, PA, 'wins' the Superbowl of Floods, filling Sun Devil Stadium, site of Superbowl XXX, faster than the other rivers.") The result was a box story on page A-3 of *The Washington Post*, a real news coup and one of my prouder accomplishments as a public affairs specialist. Let's face it; anytime you can combine science with sports, it's a home run.

Going back to the Web, it's a great way to reach the public but you have to remember that it is a passive delivery vehicle and that you still need to couple your Web activities

with other actions that push the information out. (As we heard earlier about RSS Feeds and Podcasts…)

Our FAQ (Frequently Asked – or Anticipated – Questions) database has proven to be a great way to educate and inform the public. We gathered up several hundred disparate sites where FAQs had previously been posted and put a front end application on them that presents the FAQs by browseable category or through searching and then provides a link back to the program pages that are the actual host of the content, which is a way to reinforce the FAQ by providing a plug for the host pages and the other content that is available there. With one of the last redesigns of the USGS Home Page, we have programmed it so that there are three FAQs that show up on a dedicated piece of that prime real estate and also provide a link to the FAQ Home Page and the browse categories. This way, we're "pushing" the FAQs up and out through the USGS Home Page. We are doing this with our Publications Warehouse, which is the official repository and citation source for USGS information products, as well, and there are always three new publications shown on the USGS Home Page with a link as well to the Pubs Warehouse to explore further.

To demonstrate the popularity of our FAQ database, we serve about 3,000 FAQs each month and have served more than 2 million in the three years that the database has been live. We have also recently instituted an RSS feed for new or updated FAQs that has proven very popular as well (we were even written up as an outstanding government resource in an online newsletter for librarians). The guy who keeps up the FAQ database is also reaching out to the various USGS science programs to refine the questions that are there, think about new FAQs, and, in general, to show that this is a value-added service that our information services folks can provide to USGS scientists and program managers.

We are also looking at some other enhancements to the FAQs that would perhaps tie them better to our Science Topics site, which is the front-end of a controlled vocabulary or thesaurus of science subjects that is becoming a much-used way to explore USGS science. Other enhancements might be to better link FAQs and publications to current event type information so that we were better responding with available information during floods, earthquakes, fire season, etc.

The USGS Newsroom also has an RSS feed for news releases and is organized in such a way that it provides great resources for the news media and the public as well. A site like a newsroom is also a good place for "evergreen content," the kind of material that people need all the time, for example, definitions, basic facts, anniversaries of significant earth science events, etc. As a specific example, when Hurricane Fran caused massive flooding in Virginia a number of years ago, USGS hydrologic technicians who were out in the field taking high-flow measurements were confronted by television news crews who wanted to know what they were doing and what the technicians could tell them about the flooding. The hydro techs came back to the office and said that it would have made their job so much easier if they had a laminated 3x5 card that they could carry in their back pocket that had some basic information on it – the first question they had been

asked was "How does this flood compare to that of Hurricane Agnes in 1972?" Agnes had been the last great flood in Virginia and if the hydro techs had a card that listed the five (or 10) greatest floods in Virginia they would have handy that kind of vivid comparison that can make the point and paint the picture with the public.

As another example, our Vermont-New Hampshire water office put together packets of public outreach materials that they had the technicians carry in the van as they worked out in the field. These materials, general interest brochures, colorful education posters on a variety of water subjects, some basic facts about the USGS and its water program, etc., served not only to inform the public and be a good public relations tool but also to diffuse some of the distrust of what the government was doing out in the hinterlands. And speaking of working out in the field, here again, the earth sciences have a "natural" advantage in providing great fodder for photo captions and/or media events to invite the news media to cover field activities.

By way of concluding – because I could go on with another 20 or so years of examples – I think we need a new paradigm for dealing with that difficult audience of the general public. The government can't be all things to all people. Getting something "free" from the government, for example, has had to take on a new meaning. One the USGS used to give away thousands of general interest publications and educational materials without any charge to the public. As budgets tightened and demand continued to increase, this effort became a rather large and largely unsupported line item in the USGS budget that managers tried to toss back and forth into one another's lap with no one wanting to take on the responsibility for funding these efforts. This is another one of the difficult messages of dealing with the general public – managers and leaders love the public acclaim that comes from public outreach activities and events but when it comes to signing on the bottom line to support these activities, they often sing a very different tune. Now, we still offer many of these products and materials free but there is a shipping and handling charge of $5.00 for every order if we have to mail the materials to a customer. If they actually come into a USGS office or stop by an exhibit at a conference or trade show, there is no charge, but if we have to incur expenses beyond the printing and distribution charges that we are allowed to recover by law, then the public has to bear that expense. Making information available on the Web has also changed public expectation. More and more, we are asking the public to "self deliver" the information and products they desire. We make it available but they need to come to us to get the information. And we're pushing more and more in that direction. The "Contact Us" link on the USGS Home Page currently goes to a large form that the public can fill out and submit their questions to us. There is some type above the form that suggests that they can call us or to check out our FAQs and other Web resources and if they can't find the information, they can fill out the form below but we suspect that few people are reading the other suggestions and are simply filling out the form as they have been conditioned on other Web sites to do that. As soon as we have a few things adjusted with the application that operates this feature, we are going to move the form "further back" in the process so that the public is forced to use other resources like the FAQs, the Science Topics, or that "Science in Your Backyard" sites before, as a last resort, they are allowed to fill out the form and submit their question. It may seem very unfriendly for a

publicly supported organization to do this but the reality is that we have neither the funds nor the staff to effectively support such a "free" service.

As a side note, when the Internet was first gaining popularity, much was made of the fact that the World Wide Web was free but it's not; it's actually very expensive if you take into account the investments in hardware, software, applications, and staff that are required to provide all of this information without charge to the public.

So, back to my new paradigm: If the public is not willing to pay more in taxes or to otherwise support public science, then they will need to "pay" in some other way, or they will need to take greater responsibility in getting the information themselves. Our responsibility is then simply to make it available; they either need to pay a fee to have the information delivered to them or they can get it themselves.

My closing points are that we do have a responsibility to the public and as I said at the beginning, I think our very future depends on ensuring that the public understands science. Also, you need to be very strategic with your science communication – leverage resources wherever you can and with whomever you can. Prepare your scientists to be effective communicators (don't let them do it just because they want to – that "geo ego" thing we've heard about – they need to be good at it). Let's face it, science and scientists can be intimidating to the public. Remember that great scene in the movie Ghostbusters when Peter Venkman (played by Bill Murray) says, "Back off, I'm a scientist…" Be sure that the scientists who are your spokespeople know how to interact with the media and the public.

Reward the scientists who do outreach and do it well. Make it something that counts for them professionally, maybe not equal to journal publishing but not something that they feel detracts from their credentials or scientific record either. Reach out and train teachers as was suggested in an earlier talk; that's a great leveraging tool and multiplying factor. The teachers in turn will train countless students to be astute citizens about science. Engage the news media as another powerful means to put your information before the public and to bring it into a public policy perspective and context.

For AESE, I would suggest that we work with other communication groups or perhaps have a school of journalism be a joint sponsor of a meeting when we are in a university town. State surveys might consider sponsoring an internship for a journalism student who is interested in science writing and reporting.

Be strategic in your communication planning and actions. Remember the simple formula:

Right Audience + Right Message + Right Timing = Effective Communication

Communication is how we connect with the body politic. It's the way that we can bring science into public discourse. Without that effective engagement with the public we will continue to exist on separate planes of distrust and disinformation (as we talked about

earlier in the intelligence design discussions). The public can be very uncomfortable with science, it is unfamiliar territory for many and they often don't like what it tells them. But we must keep the dialog going. Communication is a multi-faceted effort and it doesn't happen at one time or in only one way.

Going back to my original thesis about the insatiability of the public, remember that you'll never be done and there is always more to do. The science goes on each day, too, so look for the opportunities to connect with what's going on and to connect with the public.

The public may be the most difficult audience or all but they are also the most necessary – they are essential to the discourse and we have a responsibility to engage and educate… and perhaps even to entertain.

I'd like to end with a quote from a former USGS Director. These words were spoken more than 30 years ago but they are still relevant and maybe even more compelling today:

> There is one final problem that is in itself not primarily of a scientific character, but is as difficult and important as the others – namely, the problem of communicating the results of our work to the public in a way that they can be understood and used. Taking a hard look at the work of the U.S. Geological Survey several months ago, I suddenly realized that the maps and reports of which we have been so proud – and justly I think – have been released in a form in which they are understandable only by other earth scientists. Little wonder that insufficient use has been made of our results by land-users and land-use planners, and little wonder that the general public lacks understanding of fundamental resource and environmental problems."
>
> V.E. McKelvey, USGS Director
> AAPG Annual Meeting, Denver, CO (April 17, 1972)

The challenge is there. I invite you to meet that difficult audience and help them to understand the science in their backyard.

Thank you.

Original Abstract Submitted:

The General Public: The Most Difficult Audience of All

After 30 years of public service in communicating science to diverse audiences, I have one incontrovertible conclusion to share: the general public is the most difficult audience of all to reach. Why you might ask? First, there is no such thing as "general" in the public; they are, in truth, very discrete customer segments that cannot be lumped together. Yet, too often, government agencies treat them as a single group—with one approach, one product, one message, and, far too often, a very small budget. Second, there is the diabolical dilemma that government leaders and managers at every level consider the public's needs mostly when it is in *their* own best interest to do so. Communication strategies that support meaningful outreach and targeted information products to meet diverse needs of discrete and varied customer segments within the public community are difficult to implement in times of flat budgets, fluctuating management support, and the vagaries of commitment to the general public. Careful and strategic planning is needed. Using examples from a 30-year career in public affairs, communications, and outreach, I will discuss effective strategies for reaching the public and dealing with and avoiding pitfalls along the way.

Examples used in the presentation will include the USGS National Water-Quality Assessment program and its two decades of effective public communication about the status and trends in the quality of the Nation's water resources; targeted launch strategies for a number of key USGS publications; customer engagement and relationship building with external organizations; and experience with numerous USGS open house, visitors center, conference, and media relations efforts on a variety of science subjects. Collectively, these examples will be a retrospective analysis of public communication from a Federal agency to diverse audiences.

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