Beverly H. van Buuren

BEVERLY:

(Slide 1) Today I am going to talk to you about the California perspective on managing uncertainty through linking data collection with decision making.

(Slide 2) I wonder if anyone recognizes this guy? He is usually looming around in our offices while everyone tries to ignore him. In California we have tried to manage his impact by creating links between data collection and decision making. That sounds great, if I stand up here and say "Linking data collection to decision making," but how do we actually accomplish it?

(Slide 3) Here is a schematic of the systematic approach we are attempting to take in California. It starts with identifying and prioritizing types of data uses (i.e., decisions).We next move on to identifying pathways that link data collection to data uses. Once we have some of these aspects on paper, we begin work on identifying uncertainty through identifying holes in our data collection processes. The next step in the process is actually the most difficult and time-consuming. In this step we need to determine if the holes (i.e., uncertainty) in data collection *actually* hinder our data use. Once we have a structure around that aspect, we prioritize the holes through linking them back to our data use priorities. And finally—and this is where we get into *managing uncertainty*—we create systems to patch those holes. This process may look familiar to some of you as it is grounded in the philosophies of quality assurance.

(Slide 4) Now that you have an introduction to our approach, I wanted to pop up on the screen California's policies. Underneath each policy, I have listed an example of a data use (i.e., decision). The reason we are attempting to manage uncertainty is to help us make more informed and technically sound decisions in order to support our state's policies and legal mandates.

(Slide5) Remember, in California we are trying to manage uncertainty through linking data collection to decision making. I want to show you our conundrum in both of these areas. We

have a wide variety of agencies and organizations collecting data. Layer on top of that significantly diverse water body types and study designs. We also have a plethora of reasons that these agencies and organizations are collecting flow data. And finally, in terms of decision making, we have multiple end-user groups and purposes for flow data. In some cases the same flow data may be used for multiple purposes.

(Slide 6) Further challenges include one size does not fit all. Flexibility is critical in a state like California. We also have a limited institutional capacity. Our Fish and Wildlife statewide flow program has one staff member. What does that mean? We must leverage reports generated by others to be effective. The ability to use these reports requires that documentation of data quality is essential. From the last two slides, are you starting to see where we might have uncertainty?

(Slide 7) Let us look at some areas of uncertainty, we identified as priorities, through linking back our ability to use data. Fish and Wildlife receives outside study reports often with little to no supporting documentation and/or missing critical information. We had no systematic quality review of studies. We did not have a tool or efficient process, partially due to the issues identified in the first bullet point, to assess reports when they were submitted.

(Slide 8) Remember this slide? This illuminates layers of uncertainty. Lots of players, different water body types, etc. You may ask, "So what?" What are we going to do about it? What is the *best* tool that we can use to work through this scenario? In California we have looked to managing uncertainty though building comparability. We have identified comparability as the most effective tool.

(Slide 9) How are we building comparability in order to link data collection with decision making? We are establishing common indicators, applying the use of application-appropriate methods, developing a quality assurance program, creating a toolbox and training program, and designing an information exchange network. However, why are we doing this? Remember, we need to be able to use our data in decision making and, at the same time, have confidence that it is technically sound, transparent, and defensible.

(Slide 10) Let us look at an example of comparability. Fish and Wildlife is collaborating with the California State Water Resources Control Board by sampling 20 priority steelhead streams. The goal of this collaborative study is to develop a flow sub-index of aquatic life which can be aggregated and integrated into the larger aquatic life index the State Water Resources Control Board already uses to assess conditions, trends, and to identify restoration priorities.

(Slide 11) One of the products that will come out of this work is a report card. These are interactive web pages where the public can drill down on a stream's health and find out exactly which parameters are contributing to its health and outcome. While we have seen products like this in the past for chemistry, flow is a new factor in the game. This was possible due to the previous work we did in building comparability.

(Slide 12) Now I would like to go through a few of our tools. I want to remind you about why we have developed them. We are not writing a standard operating procedure (SOP) (i.e., method) just because we want to write an SOP. We are *always* linking the tools back to a need grounded in data use. We have identified areas of uncertainty and use quality assurance systems to help manage those areas.

(Slide13) We have created standard operating procedures (i.e., methods) to ensure the capture of data of known and documented quality. We have published guidance documents that promote comparability and technically sound data collection.

(Slide 14) We have templates for use. Up on the screen we see a template for flow reports submitted to Fish and Wildlife. Remember, we need to leverage data in California and therefore we must use data that is submitted to our agency from other organizations. This template not only makes life easier for the organization submitting its report, but also promotes comparability, transparencies, and illuminates data quality issues.

(Slide 15) We have tools for staff and others. This is a guidance document on report review and its corresponding review checklist. This tool gives staff a consistent, comprehensive and more efficient approach to determining the usability of reports.

(Slide 16) Another fantastic tool on the Fish and Wildlife web page is this interactive public tool. This is a map of California with some of its streams highlighted in blue.

(Slide 17) If we click on one of those streams, an information box will open. In this case, we have clicked on Rush Creek.

(Slide 18) If we expand the box we find information, and the Fish and Wildlife recommendations, for Rush Creek. In this case we can see that Fish and Wildlife has recommendations for dry, normal, and wet water years. This is a tool that anyone, including the public, can access on our web page.

(Slide 19) I wanted to bring us back to this slide to remind us that the whole reason we developed the tools I just showed was to support the *use* of data. We only create tools based on the relationship to decision making and its inherent requirement that we control uncertainty.

(Slide 20) I also want to come back to this slide to reiterate our approach.. We have taken an approach grounded in the philosophies of quality assurance. We have looked to quality assurance to help us navigate through our levels of uncertainty and help manage them.

(Slide 21) Where does this leave us? What are you going to do differently based on what you have heard? I have put up some homework if you are interested in taking a similar approach. Robert Holmes (California Department of Fish and Wildlife) and I are available to discuss this process with you after this presentation and workshop (feel free to email or call us). The first step in the process is to ask yourself: What are the types, and examples of, decision making in your State or Province? I do not want you just to think about this, I want you to write it down. If I were working with you, I would ask you to produce a one- to three-page document outlining your thoughts. Next, I would ask you to consider how your data collection is linked to supporting information to make those decisions? This step works best as a schematic (a picture diagram).. I usually tell folks to sit down with pen and paper and just sketch it out as best possible – brainstorm, do not try to make it perfect. Many times, the situation is so complex we will see

several different schematics addressing different pathways. For steps 3 and 4, I recommend gathering a bunch of your colleague in a room with a big whiteboard. Using the information you have documented in steps 1 and 2, you and your colleagues will brainstorm any holes in your data collection. Step 3 can start going down rabbit holes. For this process, you just want to be able to identify the rabbit holes. You do not want to need to drill down into them at this point. Step 4 is the most difficult. We tend to want to say, "Well, everything is posing a problem or a risk," or we want to say, "You know what? There is nothing we can do about it, so why bother? We do not have the resources." I usually recommend spanning this step our over several days because you need to get grounding between sessions. This step is very difficult to accomplish. It is difficult to figure out when a pathway is truly going to make a difference in decision making. And finally, step 5 is a call-to-action. I would charge you with taking action, starting to create systems, starting to manage your uncertainty based on what you found through this process. This is essential since the bottom line is that data with unknown undocumented quality equates to unusable information.