



Learning from Recent Modeling Projects

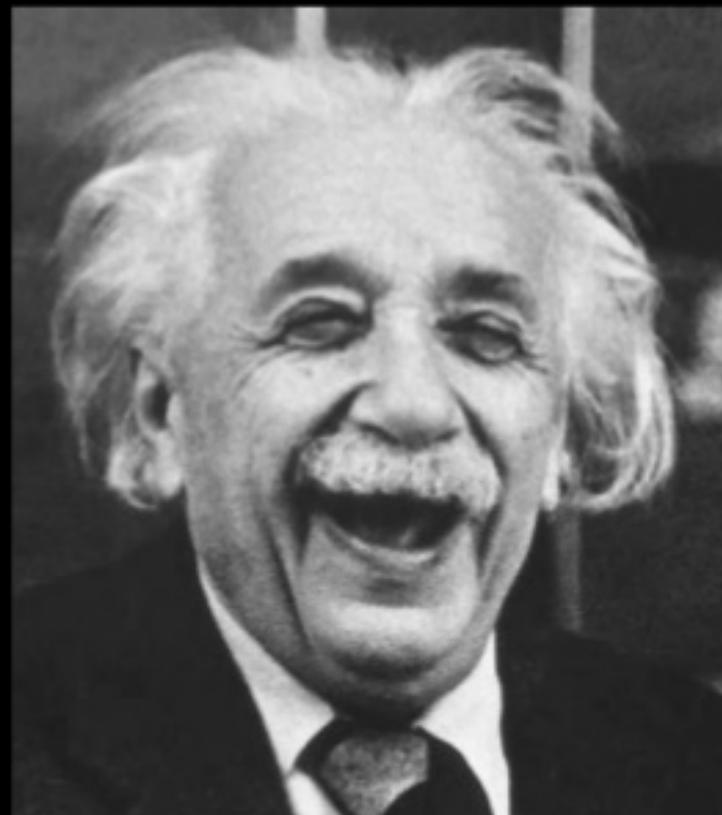
Shanon Phillips- OCC

Steve Patterson- BioXDesign

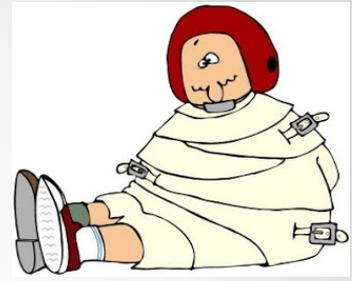
OCLWA April 5-6, 2017

“The definition of insanity is doing the same thing over and over again but expecting different results.”

Albert Einstein
(maybe)



Are we Insane?



- How many major watersheds/waterbodies in OK have been modeled just ONE time?
- When an issue is identified with a water model, how many times is it the same issue identified with a previously completed model?

Purpose of Presentation

- To summarize comments/ideas from regional water management experts in order to explore possible action to improve the effectiveness and utility of water models
- This presentation is NOT intended to:
 - Complain about any person/agency/other entity's performance/experience in modeling
 - Throw out the baby with the bathwater
 - Imply that good work and/or useful results have not been accomplished through the use of water quality or water quantity models
 - Solve the world's problems or necessarily identify new ideas that haven't been heard from before
- Just a summary so we can further discuss; just to be we're not trying to be



Method:

- Conducted phone or in-person interviews of the following people and asked them the same set of basic questions.
 - Monty Porter and Chris Adams – Oklahoma Water Resources Board
 - Joe Long, David Akakpo, and Soojung Lim- OK Dept. of Environmental Quality
 - Darrell Townsend- Grand River Dam Authority
 - Brian Haggard- Arkansas Water Resources Center and University of Arkansas
 - Thad Scott- Baylor University
 - Greg Kloxin- Oklahoma Conservation Commission
 - Randy Worden- Central Oklahoma Master Conservancy District
- Summarized the common themes as well as the many different insights and suggestions about how we could work together to improve model input, output and usage



Benefits of Models

- Estimating system responses
- Evaluating management scenarios
 - Standards changes
 - Conservation practices
 - Manipulation of hydrology
 - Other things humans can control
- Filling in for missing data
- Total Maximum Daily Loads



Benefits of Models

- They're so SEXY!!!

Common Issues: Is There Ever Enough Data?

- How much is not enough?
 - Too short a time period (i.e. only one year)
 - Limited hydrologic conditions/hydrologic data
 - Limited spatial coverage of data
 - Limited chemical and hydrologic data for watersheds of Oklahoma lakes
 - Assessment programs don't typically collect all types of data required for water models
 - Frequently lack sufficient data to do independent calibration and validation of models
 - May lack data to fully evaluate water quality standards impairment
 - Who knew that temperature of inflow was one of the most critical factors to predict strength of stratification in a SE OK lake?
- Sometimes available data is not used in a model
- Aren't we using a model to substitute for data we don't have???

Common Issues: Knowledge

- Most people are not trained to or do not actively model
- Many modelers are experts in IT but not in ecology
-
- Models are often run by experts unfamiliar with the waterbody
- Use of a water quality standards in model is not necessarily the equivalent of use of a standard for assessment purposes



Common Issues: Communication

- Many diverse groups with different backgrounds, skills, and goals generally involved in modeling
 - Sometimes we don't speak the same "language" or allow sufficient opportunities for everyone to give input
- Considerable work often happens in the lag time between communication among modeler and people who will use the model
- Sensitive issues related to possible regulation can serve to limit communication
- Frequently, we only have the output of a model to evaluate; the most complicated models are too expensive for average entities to maintain and therefore we can't replicate model output ourselves

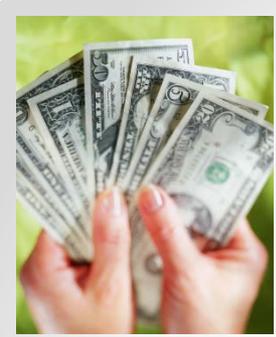


Common Issues: Choose the Right Model/Parameters/Data

- Not always certain that we use the best model
 - Often must rely on experts to make that choice. Experts may have bias and may also not really understand the conditions in the waterbody
 - Tend to favor most complex models that we may lack sufficient data for
- Not always certain that we focus on the most appropriate endpoint(s) for the model
 - Nitrate in lake models can be an effective guide for how well the model is working



Common Issues: Resources



- Trying to do too much with not enough
 - **Money:** many models were limited in scope because of available resources, leading to a poor product
 - **Time-** we typically don't allow enough time:
 - For communication
 - For the changes in management resulting from the model to work
 - **People:** we don't have the right stakeholders and experts at the table throughout enough of the process
 - **Follow-up:** in many cases, once the model is done, there isn't much done to verify that it was right or to collect missing pieces necessary to improve it.



How Can We Improve??

...

Is it even possible?

Possible Solutions

- More communication from the beginning, maybe going as far back as the workplan
 - Prioritize watersheds or parts of watersheds for intensive focus
 - Force the modelers to talk to you frequently along the way
- Involve EVERYONE- even the **SCARY** people
 - The more partners, the more potential resources you have
 - People involved from the beginning are generally less inclined to pick apart the end product if they feel they had a role in designing it
 - Need modelers, ecologists, hydrologists, water users, water managers...
- Collect/Use more (appropriate) data
- Simpler models
-

Possible Solutions, cont.

- **What about something other than a model???**
 - In the Wister Watershed, we're investing about \$40,000 to monitor all HUC 12s in the watershed for one year and determine where it makes the most sense to focus future efforts
 - Lets spend more money on fixing the problem and less money on coming up with a number that defines the problem- maybe delay the regulatory approach...
 - Watershed Plan in Lieu of TMDL- lets make this a reasonable alternative in places where it makes sense.

Possible Solutions, cont.

- **Do some follow-up**

- Keep working in the same place to evaluate whether what you're doing is working.
- Expect that solutions take a while to happen
- Collect more data-
- spend money on those things and you might be further along than if you had a million dollar model.

Final Thoughts

- Interviewee thought: “Science needs to drive these things but science in a vacuum doesn’t fulfill all the goals. We need to have politics and input from other sources to have a workable solution.”
- Interviewer thought: Everyone we interviewed wanted the same thing- better models (or use of) to protect water resources- none of the solutions recommended are impossible if we support each other and work together

Questions???

- Shanon.phillips@conservation.ok.gov
- S.Patterson@bioxdesign.com

