

REPLY TO DISCUSSION
by M. Todd Walter and Stephen B. Shaw¹

“Curve Number Hydrology in Water Quality Modeling:
Uses, Abuses, and Future Directions”²

*David C. Garen and Daniel S. Moore*³

We are gratified to receive these confirming remarks about our paper. We are in agreement with the points and clarifications that Walter and Shaw have given and have nothing to rebut. We would, however, like to offer a few responses and clarifications.

In their discussion, Walter and Shaw (2005) note our implication that “significant infrastructure and institutional momentum” (Garen and Moore, 2005, p. 379) is one of the “advantages” of the curve number procedure. This is only an “advantage” in the sense that the infrastructure and institutional momentum facilitates widespread and convenient model implementation. This, however, is a two-edged sword. Like any technology, easy access both promotes usage as well as opens the door to abuse.

Walter and Shaw mention the potential consequences of “government sponsored models that are developed largely outside the sphere of scientific peer-review” (Walter and Shaw, 2005, p. 1491). All of the models specifically mentioned in Garen and Moore (2005) have in fact been published in peer reviewed journals, which we cite. We believe, then, that Walter and Shaw’s comment may best be interpreted in a couple of different ways. First, though a model as an entire unit may be published in a peer reviewed journal, certain components or algorithms may not have been peer reviewed separately on their own. It also may be that individual algorithms, like the curve number, were once accepted but have now fallen out of favor by the scientific community or have become superseded by new physical understandings or computing technology. Second, because of the lag between

the latest scientific understandings and their incorporation into routinely used tools and models, engineering models being developed and used today, although useful, are not necessarily subjected to peer review nor are they necessarily expected to provide a sufficient basis for a peer reviewed journal article. Nevertheless, government sponsorship does afford long term support for model development and maintenance that could not otherwise occur. In addition, there are always opportunities for strong partnerships between universities and government agencies.

Admittedly, however, there are some dangers. Government sponsorship may imply complete scientific acceptance, as Walter and Shaw have noted, when significant reservations in fact exist. Related to this is the danger of taking the mental shortcut of uncritically choosing a model based primarily on its apparent authoritativeness (Levine, 2003) due to government sponsorship. Another risk is scientific ossification when models become institutionalized, not only within the infrastructure of the sponsoring agency (software, training, etc.), but also by becoming codified into laws and regulations that require the use of specific models and methodologies. We understand that sometimes a model is used because of these rigid rules or because choosing another model outside the agency’s infrastructure makes its use too costly; unfortunately, this can sacrifice scientific integrity. Finally, there is the danger of the government agency becoming too “wedded” to a model, where too much of its (or the model author’s) professional reputation is wrapped up in it, or the agency is tempted to promote it too actively without appropriate scientific caution.

¹Discussion No. 03127DR of the *Journal of the American Water Resources Association* 41(6):1491-1492 (Copyright © 2005).

²Paper No. 03127 of the *Journal of the American Water Resources Association* 41(2):377-388.

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Walter and Shaw mention the use of the Universal Soil Loss Equation (USLE) or its variations in water quality models. Its use and perpetuation in these models has progressed in a highly analogous manner as with curve number, for many of the same reasons, and it has its limitations, for many of the same reasons. Recognizing that model development is an evolutionary process, the best service that the scientific community can provide when pointing out such model inadequacies is either to propose improved procedures or suggest specific areas for further research.

We appreciate the opportunity to respond to feedback on our paper and hope that the dialogue on hydrology and water quality models will continue.

LITERATURE CITED

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