

Peer Review Summary Document

(1/13/2011)

Peer Review Plan

[Regional Groundwater-Flow Model of the Redwall-Muav, Coconino, and Alluvial Basin Aquifer Systems of Northern and Central Arizona](#) [56 KB PDF].

Title and Authorship of Information Product Disseminated

Regional Groundwater-Flow Model of the Redwall-Muav, Coconino, and Alluvial Basin Aquifer Systems of Northern and Central Arizona by D.R. Pool, Kyle W. Blasch, James B. Callegary, and Leslie F. Graser.

Peer Reviewers Expertise and Credentials

Peer Reviewer #1 – Ph.D. in hydrogeology. Reviewer #1 is a Geology professor with substantial experience in the hydrogeology of Northern Arizona, groundwater modeling, and construction of Northern Arizona groundwater models. Reviewer #1 also possesses expertise in riparian hydrogeology.

Peer Reviewer #2 – M.S. in engineering geology. Reviewer #2 is a hydrogeologist who studied groundwater systems in Alaska, Arizona, and Utah over the course of his career. Reviewer #2 has an extensive understanding of the groundwater flow systems in Arizona basins and in the Colorado Plateau and is sought out for hydrologic advice in the region. Reviewer #2 also has experience in the construction of many numerical models of the groundwater flow systems in Arizona alluvial basins and in the Colorado Plateau region.

Charge Submitted to Peer Reviewers

The reviewers were asked to make an objective evaluation of the groundwater flow model described in the report including background information and model construction and calibration.

Summary of Peer Reviewers Comments

Reviewer #1 - Summary of comments

Note that because of the extensive scope and large area of the model, and the request for a reasonably quick review, limitations were that Reviewer #1 did not have time to review all of the references cited in the report for accuracy. In general, Reviewer #1 did not perform a detailed model parameter verification, that is, it was beyond the scope of the review. Data verification is performed separately from peer review.

Major comments provided by Reviewer #1:

1. The report refers to boundary conditions by the name of the MODFLOW package used, not geographic name of the feature. This is too cryptic for most readers. For example, calling the Colorado River a drain is very confusing to a non modeler. It

would be better for the readers of this report if the names of boundaries did not match the name of the MODFLOW package which simulates them, but a simplified description of the type of boundary. Once that springs are simulated with the Drain Package of MODFLOW, then always refer to spring discharge not the name of the MODFLOW package in the report text and the figures.

2. Authors might consider including a brief section up front comparing this regional model to the scope and scale of other regional USGS models.
3. The lack of data tables severely limits the usefulness of the report. Additional tables are recommended for clarity.
4. The report does not include a section on goodness of calibration. A brief section on this topic should be included with a discussion on what criteria were used to determine when the model fit was determined to be good and a description of calibration relative to this goodness criteria. This section needs to be more explicit than the current discussion of error relative to measurement error and it might also be helpful to show the goodness of fit to springs discharge and basin baseflow. For example, you might have a basin with a measured baseflow of 100,000 af/yr and a simulated baseflow of 90,000 af/yr, so you could say it is within 10 %, or potentially "good" for your calibration. A casual reader will have no idea what is considered a good fit between measured and simulated water budgets, so it would be helpful to define these so the reader will understand why the measured and simulated aren't always the same, and why this is acceptable. One or two tables could eliminate many pages of text and allow the reader to more easily compare observed (estimated) and simulated water budgets by region or boundary and then a summary of the overall model water budget would be useful at the end of this table. Including a table summarizing the observed and simulated discharges for all springs in the model is recommended. Such a summary table replacing the long text describing the water budgets by basin would be helpful for the reader.

Reviewer #2 - Summary of comments

Major comments provided by Reviewer #2:

1. The title seems to convey what the report is about and made a suggestion that the author consider adding "Regional" as the first word to give the sense that this is not a simulation for predicting site-specific water levels. According to the reviewer, the Abstract does what it is supposed to do--give the reader the essence of what the report contains. Reviewer #2 found the introduction to be good; giving a complete background and literature review.
2. The reviewer observed that the word altitude, is used along with elevation, throughout the report and suggested that only one be used consistently, stating that although either would suffice he believed elevation is more appropriate as altitude is usually used in reference to flying above the surface of the earth.
3. Regarding the main body of the report, Reviewer #2 noted that in a few places metric units and then English units were used and suggested staying with English units in this type of report.
4. Further the reviewer suggested trying to use appropriate modifiers, for example - high and low should be used in relation to elevation or accepted geologic language such as "high-angle fault", not the value of an aquifer property or a recharge value. Other comments were that large or small, less or more, or great work better; use very only if it is part of a technical term such as very fine-grained but it's generally

better to not use it otherwise; highly is another modifier that could be omitted in most cases; and significant is mostly a statistical term, therefore substantial or large are clearer. Use of the word "hydraulic" as a modifier for data or properties, stating that hydraulic is more a physics or engineering term and that the word hydrologic or aquifer would be more appropriate to use.

5. References should be thoroughly checked. Citations for at least 20 references in the "References Cited" could not be found.
6. Overall, the report will be a good addition to the hydrologic literature and it should be well used by future investigators.

Summary of USGS Response to Peer Reviewer Comments

Response to Reviewer #1 comments

The authors provided the following responses:

1. An effort was made to make the text less cryptic by discussing flow components in terms of their respective names and not the name of the MODFLOW package used to simulate the feature.
2. Authors agree that the added comparison of this model relative to other USGS regional models would be interesting but is beyond the scope of this report.
3. Tables and figures describing water budgets have been added as suggested.
4. The authors agree that a calibration discussion was needed. The version of the report Reviewer #1 commented on included only a model evaluation section and did not clearly explain the calibration procedure. This was partly the result of an early decision in the project that the term "calibrate" would not be used. The modified report now uses the term and the calibration procedure is explained.

Response to Reviewer #2 comments

The authors provided the following responses:

1. The comment by Reviewer #2 suggesting a title change was accepted. The title of the report now refers to the "Regional" groundwater system.
2. The term "altitude" is now used throughout the report after Reviewer #2 suggested using it instead of "elevation".
3. The issue mentioned by Reviewer #2 with regard to inconsistent units has been rectified.
4. Use of many modifiers, including "highly, significant" and many others, have been greatly modified as a result of comments by Reviewer #2 and editorial reviews.
5. Numerous errors and incompleteness have been addressed in the reference list as noted by Reviewer #2.

In general, comments and suggestions by Reviewer #1 and Reviewer #2 were very helpful and will result in an improved publication. The text and model have since undergone modification as a result of these reviews.

The Dissemination

The published information product will be released in a USGS Scientific Investigations Report publication series and will be available at <http://pubs.er.usgs.gov/>.