2010 Study of Surface Water - Groundwater Conditions along the Gila River

Deborah L. Hathaway
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S.S. Papadopulos & Associates, Inc.
www.sspa.com
Study Objectives

• Collect hydrologic data
• Develop modeling tools
  • HEC surface water model
  • Riparian groundwater model
  • Regional groundwater model framework
• Conduct test simulation, 2010 river flows and groundwater response
• Prepare report documenting work posted at www.awsaplanning.com
Field Program 2009-2010

- Piezometers along 5 transects;
- Channel cross-section surveys;
- River seepage investigations;
- LiDAR land surface elevation;
- Color ortho-photos;
- Automated collection of groundwater-levels and river stage.
Four Reaches Identified for Study

2010 work focused on two upper reaches, Gila-Cliff Sub-Basin
Location of Well Transects
FM2 Transect
Bird Site Transect
Seasonal Groundwater Levels and River Stage at FM2 Transect
Seasonal Groundwater Levels and River Stage at FM1 Transect
Riparian Groundwater Models

- HEC Model Updated and Run for Six Flow Levels, 75 cfs to 3,000 cfs
- Groundwater Models, 2 layers, model cells 60 x 60 feet
- Simulation of 2010 Hydrograph
Thickness of Top Layer, Riparian Groundwater Models

Reach 1

Reach 2

Model Thickness, Layer 1 (ft)

- 15 - 20
- 20 - 25
- 25 - 35
- 35 - 45
- 45 - 55
- 55 - 65
- > 65

Model Boundary, Reach 1
Model Boundary, Reach 2
Model Boundary, Reach 1
Model Boundary, Reach 2
River Flows Simulated in 6-month Test Run of Riparian Groundwater Model, December 2009 to May 2010
Example of Model Results, 
FM1 Transect

FM1-Str

FM1-1D

Observed
Simulated

Example of Model Results, Reach 1
Groundwater Elevations
Regional Groundwater Model
Scenarios: Can additional supply be provided from the Gila Basin without undesired impacts?

If diversions are increased, or additional groundwater pumped, how will hydrologic conditions in the riparian zone be changed?

- River losses and gains
- Shallow groundwater conditions in channel and floodplain
- Overbank flooding and habitat

Will river management activities have the intended effect?
Alternate Regional Groundwater Conditions, Spring vs. Summer
(Example results from Rio Grande Bernardo Model)

Low Regional Groundwater Condition
- Riparian corridor is “drier” in both the late spring and mid-summer
- River seepage loss rates increase
- Inflow to the drains decreases
- Low regional groundwater conditions result, which could impact:
  - maintenance of desired river flows
  - water delivery via the river channel.

High Regional Groundwater Condition
- Riparian corridor is “wetter”
- River seepage losses decrease
- Inflow to the drains increases
Next Steps for Consideration

1. Refine regional groundwater model to improve representation of basin conditions important to scenario evaluation.

2. Estimate mountain front recharge using water balance approach and public domain spatial climate data for watershed.

3. Build remaining two high-resolution, riparian groundwater models of alluvial aquifer.

4. Continue to monitor existing wells, conduct late season seepage runs, and use data to improve the predictive reliability of all models.

* Use modeling tools to better understand the hydrologic implications of proposed water supply, water use, or land use changes; and, to maximize benefits to all stakeholders.
Questions?