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Pilot Study of Methods to Support Stakeholder Prioritization of Transboundary Aquifers for Investigation along the US-Mexico Border

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Four US and six Mexican border states share significant interconnections in terms of trade, jobs, energy production, manufacturing, and natural resources such as water. The border states have a mutual interest in characterizing groundwater resources shared between the US and Mexico, a task made difficult by scarcity of information. To address this challenge, a number of US and Mexican federal agencies and universities via the Transboundary Aquifer Assessment Program (TAAP) have come together to jointly study the shared groundwater resources of the border region, and to develop the information needed by cities, states, industries and local communities to support decision making and land management.

Investigations of four binational aquifers selected in the first phase of TAAP are in progress. Carrying out these investigations has created a cohesive binational multi-institutional team of social and physical scientists and established relationships with a broad network of stakeholders. Completed products relevant to the present work include: (1) analysis of the availability and integration potential of binational data sets, (2) aquifer assessments including a review of US-Mexico aquifer classifications (3) development of water-balance models, (4) analysis of aquifer vulnerability to contamination, and (5) a set of protocols and agreements that address the specific physical, legal, cultural, and institutional setting of the US-Mexico border.

Additional aquifers along the border (estimates of the total range from of 8 to 38) could be investigated, but there are questions as to how to define them, which to choose, and what types of studies are needed. To help answer these questions, we developed a pilot project to investigate and develop methods and tools to assist decision makers and land managers in prioritizing additional aquifers for investigation along the US-Mexico border. First is an approach for rapid

assessment of additional aquifers using existing data, published literature, and simple analytical tools including conceptual hydrogeologic model development and precipitation-groundwater lag-correlation analysis. Second, a groundwater modeling platform was developed for use by stakeholders for both learning and planning. Third, in preparation for stakeholder ranking of aquifers for investigation, we conducted a review of multicriteria decision analysis (MCDA) as applied to coupled human-natural resource systems and a review of real-world examples of aquifer prioritization schemes used by governmental entities. Finally, an assessment of uncertainty with respect to knowledge about and trajectory of the coupled human-biophysical system was carried out to aid in stakeholder discussions of prioritization criteria and weighting schemes. These results and tools can be used to support prioritization of any set of aquifers. However, some are specifically designed to address transboundary aquifers and will be used to inform binational discussions regarding prioritization of future aquifer investigations along the US-Mexico border.