

November 9, 2023

Mr. Thomas Shipman, Jr.  
thomas.shipman@mail.house.gov  
U.S. House of Representatives  
Committee on Natural Resources  
Subcommittee on Water, Wildlife and Fisheries  
Washington, DC 20513

Sent via email:

Dear Mr. Shipman,

Attached to this letter please find responses to the questions transmitted via letter dated October 30, 2023, from Representative Cliff Bentz, Chairman, Subcommittee on Water, Wildlife and Fisheries.

I thank Representative Ciscomani for these questions and Chairman Bentz for the opportunity to provide these written responses. Please let me know if you have any questions about these responses.

Sincerely,



Sharon B. Megdal, Ph.D.  
Director, University of Arizona Water Resources Research Center  
Professor, Department of Environmental Science  
C.W. and Modene Neely Endowed Professor  
Distinguished Outreach Professor

**Question 1. You have worked on groundwater issues at the local, regional, national and international levels, could you please speak to the nature of the work you have done in this space and the key findings you have made in your career as it pertains to groundwater management?**

Groundwater has been central to my work since the early 1990s, when I served as Executive Director of the regional Santa Cruz Valley Water District, which was based in Tucson, Arizona. It was during that period that I became involved in groundwater recharge, sometimes referred to as managed aquifer recharge. The district developed a recharge project in partnership with a local irrigation district and developed an augmentation plan. Later in the 1990s, I served as a water resources consultant to Pima County (AZ) and others. My work included multiple collaborative efforts to recharge surface water delivered through the Central Arizona Project and effluent. As a consultant, I worked on studies, financing plans, and permit applications. Since 2002, when I joined the staff of the University of Arizona Water Resources Research Center, I have worked on many groundwater management issues, including examination of differences across states in how they manage and regulate groundwater quantity and quality. My groundwater-focused, university-based research, education, and Extension work was supplement over a 12-year period during which I served on the popularly elected, volunteer board of directors for the Central Arizona Project (2009-2020). Throughout my two six-year terms, I was a member of the Central Arizona Groundwater Replenishment District and Underground Storage Committee. I served as committee chair for five years. Groundwater is the source of over 40% of water used in Arizona, with many Arizonans 100 percent dependent on groundwater.

My local, regional, and state-wide efforts expanded nationally with some state surveys we conducted on water quantity and water quality governance and management. Due to our nation's decentralized approach to groundwater governance and management, there is significant variation in state frameworks. We sought to characterize similarities and differences in approaches and challenges across the United States. My work took on more international dimensions after the authorization of the Transboundary Aquifer Assessment Program (TAAP) and the binational aquifer assessment efforts with Mexico began. I have been part of global dialogues to raise the visibility of groundwater as a key water source, regularly pointing to our regional and border groundwater-focused efforts. Along with TAAP work, which focuses on characterizing transboundary aquifer systems and groundwater conditions, I have continued to work on managed aquifer recharge, which is playing a more important role than community-driven and user-driven water management. My comparative analyses include water management in water-scarce, growing regions. Unlike many who work on groundwater, I am not a hydrologist. Rather, I focus on groundwater policy and management. Through my writings, lectures, and teaching, I endeavor to make things understandable so that individuals of varying backgrounds can draw from the practices I have analyzed. My work is catalogued in my CV, which can be accessed from this page: <https://wrrc.arizona.edu/person/sharon-b-megdal>. A perusal of my publications and presentations will demonstrate the depth, breadth, and real-world relevance of my groundwater work.

Key findings and contributions of my work include:

- Managed aquifer recharge is an important tool for furthering achievement of water management goals, especially in arid to semi-arid regions.
- Arizona's regulatory framework for aquifer recharge is exemplary and can serve as a model for other jurisdictions.

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- Efforts to characterize aquifers and groundwater conditions can assist communities and water users to better manage their groundwater resources.
- Functioning cooperative processes for working across borders and communities are crucial to identifying pathways to solutions to water challenges.
- Water users, including individual consumers, value learning more about where their water comes from, especially when they cannot see the source, as is the case with groundwater.

### **Question 2. The existing TAAP program has several different participants, both in the Southwest and Mexico, can you elaborate on how all the different participants play a role in the collection, analysis and presentation of the information they find on the water in transboundary aquifers? Why would it be beneficial for H.R. 5874 to reauthorize this program?**

I am pleased to report that TAAP's collaborative efforts are strong. On the U.S. side, the Transboundary Aquifer Assessment Act (P.L. 109-448) authorized the Secretary of the Interior to establish a transboundary aquifer assessment program, with the U.S. Geological Survey (USGS) being the lead implementing agency. Section 4.a of P.L. 109-448 included this language regarding the establishment of the program:

*(a) IN GENERAL.—The Secretary, in consultation and cooperation with the Participating States, the water resources research institutes...and the IBWC, as appropriate, shall carry out the United States-Mexico transboundary aquifer assessment program to characterize, map, and model priority transboundary aquifers along the United States-Mexico border at a level of detail determined to be appropriate for the particular aquifer.*

Because IBWC historical involvement in groundwater assessment had been limited to that associated with implementing Minute 242 to the 1944 Water Treaty, the role of IBWC (International Boundary and Water Commission) was not clear back in 2006. However, discussions subsequent to the late-2006 passage of P.L. 109-448 quickly clarified that establishing a binational assessment program required IBWC involvement due to the Mexican section's role in all binational waters, including groundwater. The facilitating role that began with the development and adoption of the 2009 Principal Engineers' Report continues to this day. While each country can assess aquifers on their respective sides of the border, binational collaborative efforts necessitate IBWC involvement.

USGS serves as the federal implementing agency for the United States. Along with engaging in assessment efforts, USGS manages the flow of funding to the participating federally authorized water resources research institutes. The process occurs through an annual proposal and budgeting process, with budgeted amounts dependent on federal appropriations. For Mexico, Mexico's national water commission, CONAGUA, is involved. For the Arizona-Sonora assessment efforts, University of Sonora experts have participated. Other federal and state agencies, along with Mexican university experts, have engaged. NGO representatives and state and local entities have engaged as well. Over TAAP's history to date, funding has been at times intermittent and not necessarily synchronized across the two federal governments. Nevertheless, coordination on binational efforts along the Arizona-Sonora border has continued with little interruption. In addition to completion of the *Binational Study of the Transboundary San Pedro Aquifer*, team member representing the five entities whose logos are on the cover of the San Pedro study (IBWC, USGS, University of Arizona, CONAGUA, and University of Sonora) have continued

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working on a similar study for the transboundary Santa Cruz Aquifer. More will be said about these collaborative efforts in my response to Question 3.

Binationally completed efforts to date have included compiling and harmonizing existing data, but the data are sometimes associated with out-of-date modeling or measurements. New investigations have been undertaken, including water balance modeling conducted by members of the University of Arizona team. The binational cooperative efforts to date have been limited to the four priority aquifers specified in P.L. 109-448. There are many more aquifers along the border, and additional assessment efforts are needed for the four priority aquifers.

Reauthorization will signal federal recognition that the transboundary aquifer assessment program is needed to assist border communities in developing a common understanding of their aquifer and groundwater quantity and quality, which will feed into more informed groundwater management decision making. In addition to the technical studies, reauthorization will enable the partners to work together to share the information broadly on both sides of the border, always in recognition of the roles of national, state, and local jurisdictions and water users. Reauthorization will signal recognition that groundwater, which is invisible, is a critical water resource. The reauthorization language includes a provision enabling specification of additional priority aquifers along the Arizona-Sonora border, except for the Arizona Department of Water Resources designated Yuma Basin. This modification to the original authorizing language is critical to enabling assessment of additional transboundary aquifers by program partners to serve more communities along the Arizona-Sonora border.

### **Question 3. What would you say has been the greatest accomplishment made by the TAAP program to date, and what projects do you think will be most impactful for border communities moving forward should the program be reauthorized.**

Of course, I am proud of all of TAAP's contributions to understanding the aquifer and groundwater conditions. I am proud of the multi-faceted efforts, including the binational mapping that is very important to visualizing the data. I am proud that our efforts led to binational approval of the first binational and fully bilingual aquifer study, the *Binational Study of the Transboundary San Pedro Aquifer*. If I must single out the greatest accomplishment to date, I will point to the establishment of the binational partnerships and processes to carry out the program effectively. These partnerships, which enabled completion of the San Pedro study, provide the strong foundation exists for future efforts. Excellent working relationships exist across agencies, across experts, and across borders. The outputs are evidence of this. Additionally, I point to an article by Callegary et al., which explains the value of the collaborative processes (<https://doi.org/10.1016/j.ejrh.2018.08.002>). My international observations and interactions indicate that cooperative relationships cannot be taken for granted; they can be difficult to accomplish. Binational partnerships are critical to binational work plan development and implementation and lead to acceptance of assessment results by the affected individual and entities. It is sometimes said that imitation is the greatest form of flattery. The partners working on transboundary aquifers elsewhere along the border have recognized the benefits of developing the strong working partnerships and processes. H.R. 5874 will enable more support for border communities and their efforts to understand and manage their groundwater resources. I will conclude as I concluded my written testimony by stating that reauthorization will reinvigorate and reinforce the robust effort to bolster water security for our border communities and economies.

Thank you for the opportunity to respond to these questions.