Questions from Rep. Wittman for
Dr. Kevin McGuire, Director of the Virginia Water Resources Research Center

1. Dr. McGuire, you noted the program's 1:1 matching requirement and that, in many cases, institutes are exceeding that match. Can you walk us through how programs such as Virginia Tech's effectively leverage federal dollars with outside funding to improve research capacities, and how it makes these programs one of the most efficient federal research investments?

   The federal investment through the Water Resources Research Act (WRRA) program functions as a powerful catalyst — not simply a funding source. At Virginia Tech's Water Resources Research Center, every federal dollar from this program has been multiplied approximately 3.7 times on average through state, local, and external partnerships. And Virginia is a mid-sized institute within the National Institutes for Water Resources (NIWR) network, so this level of leverage is representative, not exceptional.

   This efficiency stems from what the program actually builds: sustained institutional capacity. The WRRA investment establishes subject-matter expertise, research infrastructure, and a national network that positions each institute to attract opportunities well beyond what appropriated funds and match alone could generate. State agencies, local governments, and other partners turn to NIWR institutes precisely because they offer scientific credibility, established relationships, and the agility to mobilize quickly around regional challenges.

   A clear illustration of this is Virginia's response to a harmful algal bloom reported at Smith Mountain Lake in 2023. The Virginia General Assembly directed the Department of Environmental Quality (DEQ) to coordinate with the Virginia Water Resources Research Center to lead a study in partnership with the DEQ, the Department of Health, and a local lake association — and provided direct state funding to support it. Because of the Center's statewide reach with academic experts and existing partnerships, we assembled a multidisciplinary team from across the Commonwealth, conducted a root-cause assessment, and delivered actionable recommendations for long-term monitoring and management.

   That project would not have been possible without the foundational investment of the WRRA program. The Center's existence, its staff, its networks, and its scientific credibility created a clear pathway for state and local partners to engage academic researchers on a problem with direct consequences for public health and local economies. That is the efficiency story: federal dollars do not simply fund discrete research projects; over more than 60 years they have built an enduring national infrastructure of expertise, relationships, and institutional capacity that makes every subsequent dollar go further. Continued investment ensures that infrastructure remains intact and ready to respond to the next water crisis and challenge.

2. You also mentioned that each institute tailors research to its state's specific water challenges. Could you give an example of how Virginia's water issues differ from other states, and how this program allows you to address those unique needs?

   There is a long-standing saying in water management that "all water issues are local." Even within a single state, water challenges vary widely depending on geography, climate, land use, infrastructure, and community needs. So, the topics are as varied as our state's landscapes and communities!

   In Virginia, the Center has addressed the full geographic range of the state's water challenges. In the east, funded research has focused on groundwater management and managed aquifer recharge, critical issues for communities that depend heavily on groundwater in the Coastal Plain. In the west, projects have examined the use of environmental forecasting in drinking water reservoir management and microplastics in surface waters, reflecting the concerns of communities reliant on mountain and Piedmont watersheds for their water supply. This east-to-west range illustrates how a single state institute can serve the diverse and sometimes competing water needs within its own borders.

   Our institutes are closely attuned to local and regional conditions, allowing them to focus on the research and policy questions that matter most in their states. At the same time, the national network ensures that no institute works in isolation. Lessons learned in one state inform approaches in others, regional collaborations multiply impact, and effective solutions can be adapted and transferred across borders. The result is a program that is simultaneously local in its focus and national in its reach, combining the responsiveness of place-based expertise with the collective strength of a coordinated, 54-institute network.

   The diversity of NIWR research reflects a fundamental truth: water challenges are regional. Example project themes illustrate this well. Virginia tackles PFAS (per- and polyfluoroalkyl substances) in rural water systems; Wyoming focuses on snowmelt and critical mineral extraction; Oregon navigates transboundary groundwater conflicts; Mississippi manages Delta agricultural runoff; North Carolina addresses hurricane vulnerability and harmful algal

blooms; California confronts multi-sector water scarcity; and Great Lakes and Plains states are battling PFAS bioaccumulation and Ogallala Aquifer depletion. No centralized program could anticipate this breadth, which is precisely why housing these institutes within universities is so valuable. These researchers are not just solving today's problems; they are at the frontier of hydrology, water chemistry, and policy, developing the next generation of tools in eDNA detection, AI-integrated forecasting, and water treatment.

By anchoring the WRRA program in academic institutions, Congress has ensured that the most rigorous and innovative science is consistently brought to bear on the water challenges facing every region of the country, while simultaneously training the next generation of scientists, engineers, and water managers who will carry that work forward. The result is a program that delivers on two fronts at once: advancing the science needed to protect public health, sustain agricultural productivity, and manage natural resources today, while building the workforce capacity to address the water problems of tomorrow.

3. Thank you for highlighting perfluoroalkyl and polyfluoroalkyl substances, forever chemicals, as a major national challenge. How does this program's framework uniquely position states to respond to contaminants, such as forever chemicals, compared to federal-only efforts?

   We target the relevant issues that occur in our states and that might present unique concerns or challenges. For example, in Virginia where we have about 20% of the population on private well water systems, there were questions about potential PFAS contamination in these systems. Our researchers found that most samples had detectable PFAS in them, but samples exceeding EPA MCLs for PFAS were rare and occurred in homes with additional water quality contamination challenges (e.g., lead, *E. coli*). What separates this project from federal-only funding, is that Cooperative Extension was involved assisting in the community engagement element.

   Also, in Virginia there has been major debate over PFAS in biosolids (treated sewage sludge) applied to farm fields. There is current legislation in the General Assembly now which is leaning toward a focus on monitoring, testing, and potential restricting of land application rather than a ban. We have funded at least one project on this topic, and in our most recent call for proposals we received additional submissions focused on PFAS and biosolids. We are also funding a study examining PFAS from septic systems in Northern Virginia drinking watersheds and the role of extreme precipitation in the fate and transport of PFAS.

4. You mentioned that hundreds of students are supported annually through this program. What kinds of careers are these students entering, and how critical are they to our national water infrastructure?

   The students supported through this program represent the next generation of professionals responsible for keeping America's water systems functioning and improving them. They go on to serve as engineers designing and modernizing drinking water and wastewater treatment systems, hydrologists managing river basins and aquifer systems that communities and agriculture depend on, water quality scientists protecting public health from emerging contaminants like PFAS and harmful algal toxins, and policy and legal professionals navigating the complex water rights and regulatory frameworks that govern how water is allocated and protected across the country.

   What makes this workforce pipeline particularly valuable is where these students come from and how they are trained. Because the institutes are embedded in universities across all 50 states and territories, they draw students from the regions they will ultimately serve. A student trained at Wyoming's institute understands the legal complexity of prior appropriation water rights and the hydrology of snowmelt-driven systems. A student trained in North Carolina understands coastal flooding dynamics, agricultural runoff, and the water quality challenges unique to that state. That place-based, research training is the hallmark of the WRRA program and is difficult to replicate.

   The urgency of this pipeline cannot be overstated. The American water sector is facing a significant workforce shortage as a large cohort of experienced engineers and scientists approach retirement. At the same time, the challenges facing water systems are growing more complex. Aging infrastructure, emerging contaminants, increasing variability in water supply, and new demands such as the enormous water requirements of data centers all require a technically sophisticated, well-prepared workforce capable of solving problems that did not exist a generation ago. The students supported by this program are not an ancillary benefit, they are a core return on the federal investment, entering careers where their expertise directly protects public health, supports agricultural economies, and ensures the reliability of the water systems that every American depends on every day. WRRA program alumni are employed across federal, state, industrial, and nonprofit sectors, and in the USGS Water Mission Area alone, about 10% employees were supported or trained at some point in their careers by a NIWR institute.