Watermaster Stonewalls UCI GDE Study

In Borrego Valley, where the desert floor meets the aquifer beneath it, a scientific debate has quietly taken on enormous significance. At issue is whether the mesquite bosque near the Borrego Sink—a sprawling desert woodland that supports birds, mammals, and rare plants—depends on groundwater for survival.

The answer matters because California's Sustainable Groundwater Management Act (SGMA) requires groundwater plans to protect ecosystems that rely on aquifers. If the bosque is a groundwater-dependent ecosystem, groundwater pumping must be managed to avoid damaging it.

After three years of fieldwork funded by a Proposition 68 grant from the California Department of Water Resources, researchers at the University of California, Irvine reached a clear conclusion: the mesquite bosque near the Borrego Sink **does rely on groundwater and functions as a groundwater-dependent ecosystem.**

Yet critics—including consultants advising the Borrego Watermaster—have attempted to cast doubt on the findings, arguing that the study does not represent the "best available science." However, a close reading of the reports and responses tells a different story. The critiques do not dismantle the science. Instead, they rely on shifting standards of proof, speculative alternatives, and a misunderstanding of how ecological science actually works.

A Comprehensive Scientific Investigation

The UCI study was not a quick survey. It was a multi-year scientific investigation designed specifically to resolve long-standing uncertainties about the mesquite bosque. Researchers combined several independent methods to test whether the trees rely on groundwater:

- **Stable isotope analysis** comparing water in mesquite tissues with groundwater and soil moisture
- **Evapotranspiration measurements** documenting how much water the trees use
- **Plant physiology measurements** assessing water stress
- **Satellite remote sensing** tracking vegetation productivity across the landscape

These lines of evidence converged on the same conclusion: mesquite trees near the Borrego Sink are accessing groundwater. The isotope analysis alone showed that **54 to 82 percent of the water inside mesquite trees matches groundwater**, not shallow soil moisture.

Meanwhile, evapotranspiration sensors revealed that the bosque consumes more water than rainfall alone could supply, meaning another water source—groundwater—must be sustaining it.

In ecological science, this kind of convergence is powerful. When independent methods point to the same explanation, confidence in the conclusion increases dramatically.

The Critics' Impossible Standard

So why the pushback? At the core of many criticisms is a subtle but crucial misunderstanding of SGMA and ecology. Some critics argue that the study fails to prove that mesquite trees rely **exclusively** on groundwater. They suggest that runoff infiltration or soil moisture might also supply water.

But under SGMA, an ecosystem does not need to use groundwater exclusively to qualify as a groundwater-dependent ecosystem. It only needs to **rely on groundwater at some point in its life cycle.** Mesquite trees are well-known "facultative phreatophytes," meaning they can switch between water sources depending on conditions.

As UCI scientists explained in their response to critics, demanding proof that plants rely on groundwater **100 percent of the time imposes a higher standard than ecological science or SGMA requires.** By that impossible standard, few ecosystems on Earth would qualify as groundwater-dependent.

Speculation vs. Evidence

Many critiques also hinge on hypothetical alternatives rather than evidence. One frequently cited possibility is that the trees might survive on moisture stored deep in desert soils rather than groundwater.

But decades of hydrological research show that long-term storage of deep soil moisture in arid landscapes is extremely limited. Most infiltrated rainwater is rapidly returned to the atmosphere through evaporation or plant uptake.

Field data from the Borrego study confirm this pattern. Soil moisture sensors detected only shallow, short-lived moisture pulses following rainstorms. To sustain nearly two thousand acres of mesquite woodland through years of drought using deep soil moisture alone would require a phenomenon rarely observed in desert ecosystems.

The far simpler explanation—and the one supported by isotope chemistry and water-use measurements—is groundwater access.

The Mapping Error That Changed Everything

Another revelation from the UCI project was that earlier groundwater plans dramatically underestimated the size of the bosque. Previous planning documents identified only **13 acres of mesquite woodland** near the Borrego Sink. Modern mapping conducted by the UCI team found roughly **1,850 acres** of mesquite habitat. This correction alone fundamentally alters the debate. A small grove of trees might plausibly survive on localized runoff. A woodland covering nearly two thousand acres cannot.

The "Data Gap" Argument

The remaining critiques largely point to “data gaps”—for example, the need for more monitoring wells or deeper soil measurements. But identifying areas for further study does not invalidate existing evidence. Scientific understanding always evolves. What matters is whether the available evidence is sufficient to inform policy decisions.

Even the consultant report critical of the study acknowledges that the UCI research represents a major advance in understanding the ecosystem. That is precisely what “best available science” means under SGMA: credible information produced using established scientific methods, even if uncertainties remain.

Science vs. Politics

Ultimately, the debate over the mesquite bosque is not just about science. It is about groundwater policy. Recognizing the bosque as a groundwater-dependent ecosystem means groundwater managers must consider its survival when setting pumping limits. Ignoring that science allows pumping decisions to proceed without accounting for ecological impacts.

The UCI study did what good science should do: it collected data, tested competing hypotheses, and produced a coherent explanation supported by multiple lines of evidence. The critiques, by contrast, largely substitute speculation for evidence and demand a level of certainty that environmental science can rarely provide.

In the end, the question facing Borrego Valley is not whether the science is perfect. The question is whether decision-makers are willing to follow it.