Refining Farmland Appraisals for SGMA and Subsidence Rules in California


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Acknowledgements

The authors thank Stacie Ann Silva, Principal, Altum Aqua Logic, LLC, for her helpful comments and insights.

Abstract

California's new subsidence best management practices (BMPs), drafted under the Sustainable Groundwater Management Act, present a turning point for rural appraisal practice. Traditional reliance on past sales and conventional production assumptions is increasingly inadequate where groundwater cutbacks tied to critical head thresholds may abruptly shorten the economic life of orchards. This paper assesses how BMPs complicate the application of cost, sales comparison, and income approaches and provides guidance on integrating hydrologic indicators, groundwater sustainability criteria, and regulatory risk into appraisal reports.

INTRODUCTION

Farmland, which usually makes up over 80% of a farm's balance sheet assets, has an annual turnover of 2% (USDA Economic Research Service, 2025; Rempel et al., 2024). This makes accurate appraisals essential for effective capital allocation in production agriculture. These valuations enable growers to use land as collateral for financing operations and expansion, help lenders set loan covenants and amounts, and enable investors to measure returns, benchmark performance, and raise additional capital.

In California, the crucial role of orchard appraisals is especially critical for almond and pistachio growers, who are facing unprecedented financial and capital devaluation challenges. During the 2010s, high grower nut prices led to extensive new plantings, often in regions that were unduly dependent on groundwater. The additional acreage led to an increase in supply, which, combined with a stronger U.S. dollar and rising interest rates, has since decreased nut prices and farm incomes. Compounding these pressures, the 2014 Sustainable Groundwater Management Act (SGMA) requires local agencies in critically overdrafted basins to achieve groundwater sustainability by 2040. The combined effects of low nut prices and SGMA's restrictions on orchards overly dependent upon groundwater caused almond and pistachio values to decline by 31.4% and 30.0%, respectively, from the start of 2023 through the second quarter of 2025, according to the National Council of Real Estate Investment Fiduciaries' (NCREIF) Farmland Index (National Council of Real Estate Investment Fiduciaries, 2025).

Rural appraisers can employ three primary methodologies to support an opinion of current farmland values: the cost approach, the sales comparison approach, and the income approach. Under most market conditions, these methods offer reliable and economically justifiable price signals. However, the draft Subsidence Best Management Practices (BMPs) recently published by the Department of Water Resources (DWR) present significant challenges to traditional valuation practices and assumptions. These BMPs suggest that groundwater agencies establish a location-specific critical head[1] threshold, continuously monitor groundwater levels, and curtail pumping when necessary to protect aquifer health. The subsidence BMP suggests that in areas prone to subsidence (i.e., where the groundwater level is below the critical head, and the aquifer has significant clay and/or silt deposits), routine groundwater extraction may need to halt altogether. During drought, when surface water allocations decrease, groundwater access will likely hinge on the proximity of the groundwater level to the critical head, regardless of water banking reserves. Implementation of the subsidence BMP may lead to land repurposing at higher rates than previously expected, increasing the importance of the highest and best use analysis.

Subsidence was a foundational component of SGMA when the legislation was first adopted in 2014. The law explicitly identifies land subsidence as one of six "undesirable results" that must be avoided in groundwater basins. Despite the now decades-old reference point, few, if any, appraisers have addressed this specific risk in post-SGMA valuation reports, understandably so, given the complexity of the situation. However, it is undeniable that these restrictions affect orchard values and create subtle issues with the typical way appraisers employ the three valuation approaches. For example, it is not inconceivable that failure to meet critical head levels could shorten the average estimated economic life of improvements on water-insecure land (cost approach), just as it is likely this situation renders many historical sales non-comparable (sales comparison approach). It widens the spread between the discount rate used for land with more secure or senior surface water rights and the rate used for land dependent on less secure or junior water rights and groundwater pumping. Additionally, appraisers should adjust their nut price forecast higher in future years to reflect anticipated reductions in almond and pistachio acreage and the consequent reduction in supply (income approach).

This paper examines how current appraisal practices may fall short under the new subsidence BMPs and offers practical adjustments to help appraisers produce land price estimates that better reflect today's emerging market realities.

OVERVIEW OF ALMONDS AND PISTACHIOS IN CALIFORNIA

California currently produces over 75% of the world's almonds and more than half of global pistachios. Almond production is highly concentrated in California, with seven counties in the Central and Southern San Joaquin Valley accounting for over 80% of the domestic output. Pistachio production is even more concentrated, with five counties accounting for over 95% of the total.

California almond and pistachio acreage steadily grew by a compound annual growth rate (CAGR) of 2.0% and 5.2%, respectively, from 1980 to 2003 (see Figures 1 and 2). In 2004, the NCREIF Almond and Pistachio Indices achieved record-high capital returns of 8.8% and 9.1%, respectively, along with record-high total returns of 36.4% and 25.9%. This marked the start of 12 years of extraordinary returns, with almonds and pistachios generating annualized income of 16.3% and 22.0%, respectively, and annualized combined income and appreciation returns of 26.8% and 31.8%, respectively. In response to the high returns, growers expanded, and the CAGR of new almond and pistachio plantings accelerated to 5.8% and 9.6%, respectively, between 2004 and 2021.

Almond and pistachio acreage increased by 71.9% and 134.4%, respectively, from 2004 to 2014. Unfortunately, the added tree nut acreage, which both increased the water demand (almonds typically need 4 acre-feet per acre [af/a] annually to maximize yields, while pistachios require 3.5 af/a) and hardened the reliance and demand for groundwater during periods of drought, occurred during an unusually prolonged, dry period. For example, between 2007 and 2013, South-of-Delta agricultural contractors (SODAC) received an average of 39.2% of their surface water rights allocation (U.S. Bureau of Reclamation, 2025). Then, in 2014 and again in 2015, SODAC received a 0% allocation. In response to reduced surface water availability, production agriculture relied on groundwater, which contributed to chronic groundwater overdraft and caused domestic wells to run dry, land to subside, and saltwater to intrude into coastal aquifers; as a result, the State passed SGMA in 2014.

In 2025, almond acreage was estimated to be just under 1.5 million acres, while pistachio acreage was estimated at 620,000 acres. This indicates that almond and pistachio growers have added a net total of 388,833 and 361,220 acres, respectively, since 2014, when the State of California passed SGMA. Technically, almond growers added 562,634 acres between 2014 and 2021 but have since removed 173,801 acres.

The removal of acreage reflects challenging market conditions that began to deteriorate when the relative strength of the U.S. dollar increased in 2016. California exports roughly 75% and 70% of almond and pistachio production, respectively, so the stronger dollar reduced the relative purchasing power of its foreign consumers. Additional challenges arose in 2018, when the Trump Administration enacted steel and aluminum tariffs under Section 301, and major trading partners imposed retaliatory tariffs that stifled exports and placed downward pressure on nut prices (Carter and Steinbach, 2022; Congressional Research Service, 2019). COVID-induced supply chain disruptions also hindered shipments, which resulted in relatively higher ending stocks, placing downward pressure on output prices. The recent bout of inflation increased cultural costs, and the consequent rise in interest rates increased borrowing costs and placed downward pressure on farmland values and profitability.

Overlying these market dynamics was the continual increase in production, brought about by the previous expansion of acreage. While almond production peaked in 2020, pistachio production is expected to set a record in 2025 (see Figures 3 and 4). Additionally, Figures 5 and 6 portray the impact of SGMA on almond and pistachio capital returns in 2023 and 2024. The significant reduction—the value of capital in the NCREIF Almond and Pistachio Indices has fallen 31.4% and 30.0%, respectively, from the first quarter of 2023 through the second quarter of 2025—is a strong indication that appraisers in California began writing down capital values to reflect both curable and incurable economic obsolescence.

Going forward, due to SGMA regulations, California almond and pistachio acreage are expected to contract. In 2024, there were 103,792 acres of pistachios and 143,863 acres of almonds, entirely dependent upon groundwater sitting atop critically overdrafted high-priority groundwater basins. Given the BMP on subsidence, this acreage is likely to be removed from production in the coming years. There is also a considerable amount of acreage in water districts that may need to be removed to halt subsidence and bring basins into sustainability. The reduction of these acres will likely result in a lower supply of almonds and pistachios. This economic actuality stands in stark contrast to many recent industry estimates that seem to ignore the expected reduction in acreage caused by the implementation of SGMA, such as the estimate that pistachio "acreage will top 811,000 acres and production will reach 2.08 billion pounds in 2031" (Tootelian, 2023).

REGULATORY FRAMEWORK: SGMA, SUBSIDENCE BMPS, AND CRITICAL HEAD THRESHOLDS

Historically, landowners in California have controlled groundwater resources, and access to groundwater was largely unregulated. Many basins faced chronic overdraft, causing subsidence, reduced groundwater storage capacity, deteriorating groundwater quality, and wells drying up (Ayres et al., 2021).

On September 16, 2014, California Governor Brown signed a trio of legislative bills into law collectively known as the Sustainable Groundwater Management Act (California Governor's Office 2014). In the bill's signing message, he noted, "A central feature of these bills is the recognition that groundwater management in California is best accomplished locally...The State's primary role is to provide guidance and technical support on how to plan for a more sustainable future and to step in on an interim basis when, but only when, local agencies fail to exercise their responsibilities as set forth in this legislation."

In accordance with the legislation, SGMA requires the establishment of Groundwater Sustainability Agencies (GSAs), which develop and implement Groundwater Sustainability Plans (GSPs). A GSP is a roadmap for a basin to achieve sustainable groundwater management within a 20-year timeframe. The legislation defines "sustainable groundwater management" as "the management and use of groundwater in a manner that can be maintained during the planning and implementation horizon without causing undesirable results" (California Water Code § 10721(v), 2025). The six undesirable results were listed as significant and unreasonable: 1) groundwater level declines, 2) groundwater storage reductions, 3) seawater intrusion, 4) water-quality degradation, 5) land subsidence, and 6) interconnected surface-water depletions.

Subsidence in the SGMA context is the sinking of the Earth's surface. When heavy groundwater pumping lowers water levels in or near sand-and-gravel aquifers, the water pressure in nearby fine-grained clay and silt layers drops. With less internal support, those layers bear more of the overlying weight, and their grains are squeezed together. This aquifer-system compaction can cause the Earth's surface to sink.

SGMA asks GSAs “to avoid or minimize subsidence” because it can decline the capacity and reliability of water, transportation, and community infrastructure, all while permanently degrading the aquifer itself (California Department of Water Resources, 2025a). Even modest levels of subsidence can cause aqueducts and canals to lose freeboard and gradient, resulting in costly retrofitting or even rerouting. Roads, pipelines, and rail can experience cracking and misalignment. Subsidence can also increase lift requirements for wells, leading to higher energy costs, pump failures, and contributing to the failure of domestic wells (California Water Commission, 2025; Bartolino and Cunningham, 2003).

Subsidence and groundwater overdraft continue to affect agricultural regions in California. Following the fifth-driest water year (October 1, 2019, to September 30, 2020) on record in 2020, California experienced its second-driest water year in 2021 (California Department of Water Resources, 2022). During the drought, areas in the southern San Joaquin Valley experienced subsidence at rates up to 1 foot per year (California Department of Water Resources, 2025b). SGMA legislation defined the “minimum threshold” for land subsidence during the planning and implementation period to be “the rate and extent of subsidence that substantially interferes with surface land uses and may lead to undesirable results” (State Water Resources Control Board, 2025). Substantial interference is defined by GSAs through a series of Sustainable Management Criteria.

Subsidence since the enactment of SGMA has led to significant consequences. For example, Nemati et al. (2025) found that from 2015 to 2021, ongoing land subsidence in California’s San Joaquin Valley caused by excessive groundwater pumping for irrigation slowed the growth of nearby home values. Overall, the subsidence eliminated an estimated $1.44 to $1.87 billion in residential property value.

Additionally, the California Aqueduct Subsidence Program has dedicated $2.3 billion to repair active and anticipated subsidence-related damages to the California Aqueduct ($288 million), San Luis Canal ($582 million), Friant-Kern Canal ($924 million), and the Delta-Mendota Canal ($562 million) (California Department of Water Resources 2025,a).

On July 24, 2025, in the wake of continued, active subsidence and the mounting pile of capital required for remediation, the DWR released a draft of the Best Management Practices on Managing Land Subsidence in California and a related video, “The Role of Critical Head in Managing Land Subsidence” (California Department of Water Resources, 2025c; California Department of Water Resources, 2025d). While the subsidence BMP is not a regulation, it does serve as a guide to GSAs as they implement SGMA and is likely to result in changes to the approach to subsidence by GSAs.

The document provides a technical overview of subsidence and provides what GSAs should include in their GSPs to halt or minimize subsidence. Perhaps more importantly to the valuation industry, it is a strong signal to agricultural appraisers in California that the elements of comparison and valuation techniques are at a pivotal juncture. Extraordinary assumptions can no longer be relied on for a workaround, and even sales data selection will become a heavily scrutinized valuation focus. The subsidence BMPs suggest that GSAs establish a location-specific critical head groundwater level, continuously monitor groundwater levels, and curtail pumping when necessary to protect aquifer health. In areas prone to subsidence (i.e., the groundwater level is below the critical head), routine groundwater extraction may need to halt altogether. During drought, when surface water allocations decrease, groundwater access may hinge on the proximity of the groundwater level to the critical head, regardless of the overall water budget or sustainable yield. This means that some properties will exist for which irrigated agriculture will simply no longer be a long-term endeavor, irrespective of whether water can be purchased or pumped. Fundamentally, the dynamics of groundwater allocations may change, and with that, some properties with strong water security will rise in the “balance and supply” tide, while others will sink.

One significant implication of DWR’s subsidence BMP is that some GSAs will need to operate at de facto sustainable-subsidence conditions well before 2040—setting very tight minimum thresholds around critical infrastructure to curb overdraft now—because any ongoing subsidence that substantially interferes with land uses may lead to an undesirable result *today* and will need to be addressed well before 2040. Regardless of how a GSA has defined undesirable results, to avoid or minimize further subsidence, DWR suggests that the best management practice for groundwater level management in areas experiencing subsidence is to raise groundwater levels above the critical head as high and as quickly as possible.

IMPLICATIONS AND ADJUSTMENTS FOR FARMLAND APPRAISALS

For appraisers, the new subsidence BMP emphasizes the increasing need to go beyond traditional static market evidence and include forward-looking risk adjustments into valuation models. Critical head groundwater levels introduce a binary risk factor—where land either maintains viability for permanent plantings or becomes effectively unsuitable for irrigated agriculture—that cannot be fully captured by historic comparable sales or generalized yield assumptions. Consequently, the scope of appraisal work extends beyond documenting orchard condition and yield potential. Appraisers must also consider how regulatory exposure and basin-level groundwater governance impact long-term viability. Doing so calls for the incorporation of hydrologic indicators, anticipated compliance with local Groundwater Sustainability Plans, and the practical limits imposed by nearby infrastructure. Since location-specific critical head levels are not yet widely available, ignoring these factors can result in valuations that overstate the economic life of the orchard, apply unrealistically low capitalization rates, and misrepresent the operational and investment risks assumed by lenders, growers, and institutional investors. The role of critical head groundwater levels and subsidence data, while emergent, needs immediate attention by the valuation community.

Appraisers should consider ways to adapt traditional methods to account for new regulatory, hydrological, and market realities. The new subsidence BMPs will challenge appraisers to tailor best practices within each valuation approach in order to capture the risks posed by SGMA, subsidence, and critical head groundwater levels. Below are some best-practice suggestions and guidance for appraiser consideration.

Cost Approach:

- *Recognize external obsolescence*. Adjust replacement cost models not only for SGMA-related water curtailments and subsidence but also for basin-level critical head levels, which may shorten the economic life of orchards even if they are physically sound. Unlike general external obsolescence that is economically driven and can reverse with improved market conditions, this obsolescence is more likely incurable.
- *Caution in using a cost to cure analysis*. Use current bid prices for well drilling, orchard removal, and replanting but consider whether replacement is feasible at all if critical head levels become binding within the basin.
- *Depreciation analysis*. Factor in functional obsolescence tied to water stress, e.g., orchards on marginal soils or within areas already flagged as subsidence "hot spots."

Sales Comparison Approach:

- *Expand the definition of comparables*. Be on the lookout for sales where critical head values influenced pricing, as buyers may now apply steep discounts to properties with higher vulnerability. The opposite is also true. Strategic buyers may identify areas with higher water security that are more likely to remain above minimum thresholds and value properties commensurately higher. Sale verification should include this level of questioning.
- *Time adjustments*. Apply short-term, data-driven adjustments, recognizing that new subsidence BMP requirements (e.g., zero-subsidence suggestion) can shift market perception much faster than historical sales would suggest.
- *Verify motivation*. Pay close attention to whether sales occurred due to regulatory tightening or threshold-triggered water cutbacks, as these circumstances affect how representative a sale is of broader market value. This is true on both ends of the market spectrum as buyers, and especially investors, purchase properties based on anticipated shifts in water security. The terms "knowledgeable buyer and knowledgeable seller, both acting in their own best interest" are more important now than ever.

Income Approach:

- *Model realistic biological yields*. Reduce production forecasts in areas where groundwater levels are near or beneath critical head levels because growers may face abrupt groundwater use restrictions. Also consider the potential impact of reduced yields on future pricing models.
- *Model realistic nut prices*. SGMA will significantly decrease water availability for irrigation, leading to lower annual production of almonds and pistachios. With reduced supply, prices are expected to rise to ration demand.
- *Sensitivity testing*. Include threshold-based scenarios (e.g., "if the basin drops below X feet, water use is curtailed by Y%") to show the binary nature of risk. For an example, see Figure 7.

- *Capitalization rates*. Add risk premiums for properties in basins where the groundwater level is near or at the localized critical head levels because these orchards carry disproportionate investment risk.

The inherent risk of groundwater curtailment due to subsidence introduces a measurable layer of regulatory and operational uncertainty that directly affects the stability and durability of agricultural income streams. When applying a built-up capitalization rate, the analysis properly starts with a base rate derived from sales of comparable farmland that share similar location, soils, crop type, and physical features but are situated in less water-constrained areas with minimal risk of subsidence. Incremental risk premiums are then added to this base rate to account for potential pumping restrictions, well shutdowns, or mandatory mitigation measures, recognizing these factors as a form of external obsolescence not fully reflected in historical income performance. Support for the individual risk components can be drawn from cost studies on well replacement and mitigation expenses, legislative and regulatory reports detailing subsidence enforcement mechanisms, risk assessments published by agricultural lenders and institutional investors, and, as enough transactions occur, market-derived data from the sale of water-constrained properties.

Understanding the Reliability of Water Analysis

The reliability of an appraisal's water analysis depends heavily on the quality of available data. Establishing a clear hierarchy of preferred data sources ensures that appraisers rely on the most credible evidence possible while providing consistent, defensible conclusions. Therefore, within the appraisal framework, water analysis should be approached with a ranking system based on the quality of the data. The most reliable information—the "best" data—comes from independent, third-party experts, such as water security reports prepared by respected water rights attorneys, hydrologists, or consultants, as well as proprietary for-fee resources like LandIQ. These sources are most likely to explicitly address critical head levels, providing appraisers with defensible evidence about basin sustainability. However, we recognize that this level of water analysis might be too expensive for the average appraisal client, so we also need to consider alternative options.

The second tier of reliability could include owner-prepared or water district analyses, provided these incorporate reliable underlying data and acknowledge groundwater level conditions. Where neither of these levels of data is available, the appraiser must then provide their own water analysis, ensuring it is logical, transparent, and supported to the greatest extent reasonably available.

It is important to note that as GSAs work to implement the subsidence BMP, there may be a lag in establishing a standardized critical head measurement that an appraiser can reference. In those GSAs where this critical head threshold is not available, an alternative risk assessment metric is the relationship between current experienced subsidence levels and the subsidence minimum threshold established in the GSP. By comparing the subsidence rate at or near a property with the established minimum threshold for subsidence, appraisers can begin to understand the relative subsidence risk of the property. In GSAs with approved GSPs, the difference between the minimum threshold for subsidence and the current amount and rate of subsidence is an indicator of when or if subsidence-related management actions may be required. In GSAs without approved GSPs, appraisers can take the same approach but should recognize that the minimum threshold in the GSP may not be representative of the ultimate minimum threshold. At a minimum, appraisers should compare threshold groundwater levels for the subject basin to historical patterns, then form an opinion on whether proximity to the critical head represents a risk or an enhancement to value. Table 1 provides a clearer visual of how an appraiser might identify and analyze the available data used to assess water security.

Once the water security determination has been established by analysis of the available data, the next step is to apply that information directly within the appraisal framework by using critical head level trends to establish a supported element of comparison with which to compare sales data. This is an important step when the market lacks sufficient sales data within a specific basin, and data from outside these basins or even GSAs must be used. Figure 7 offers an illustration of possible market support for a "water security" element of comparison. This chart shows how groundwater levels trend toward the critical head level, with clear "viable" and "high-risk" zones, however, this is only a sample. Actual data would need to be plugged in for each basin or GSA.

Reconciliation of the Three Approaches

In agricultural markets where water security and subsidence risk are the primary drivers of long-term viability, reconciliation of the valuation approaches takes on heightened importance. The renewed focus on critical head thresholds intensifies the need for thoughtful weighting, as they can abruptly shift a property's profile from high-value to nearly non-viable. Additional considerations for a well-supported reconciliation may focus on higher water secured areas (well above minimum thresholds):

- The income approach generally carries the most weight, as future productivity can be modeled with confidence when there is ample buffer above critical head levels.
- The sales comparison approach is also reliable where active transactions exist, since buyers should recognize and pay premiums for properties with a margin against threshold risk.
- The cost approach serves as a supportive role, particularly for newer plantings in stable basins.

These considerations might also involve lower water secured areas (near or below minimum thresholds):

- The sales comparison approach may offer the most reliability if there are knowledgeable participants, and sales reflect threshold-induced discounts. However, care is required to confirm whether such sales are distress-driven.
- The income approach must rely on critical head groundwater level-based scenarios, showing the binary drop in viability when groundwater use restrictions are triggered. The probability of this happening would be another consideration.
- The cost approach often has little weight, since replacement is uneconomic if water allocations are restricted, regardless of investment.

Figure 8 illustrates an example of how the relative weighting of the cost, sales comparison, and income approaches shifts depending on whether a property is located in a high or low water security area.

Appraisers should explicitly state whether critical head levels are a binding or emerging factor in the subject's basin. Appraisal reconciliation must not only balance the reliability of employed methodologies but also frame the value conclusion in terms of groundwater level vulnerability, ensuring that stakeholders understand whether the risk is remote, looming, or immediate.

Changing Regulatory Priorities

SGMA is a regulatory framework designed to bring groundwater basins into sustainability without undesirable results. The framework itself may adapt to changing circumstances. As Paul Gosslin, the DWR Deputy Director of Sustainable Groundwater Management, said, "Looking ahead 15-plus years from now, no plan will look the same as it does today, including approved plans" (Souza, 2025). Therefore, appraisers must remain vigilant to the evolving regulatory landscape, particularly as the DWR adjusts the benchmarks for groundwater sustainability. GSAs initially interpreted SGMA requirements as avoiding or slowing down subsidence by 2040-2042. However, DWR's recent BMPs have refined that mandate—now requiring zero subsidence—or mitigation to pay for subsidence impacts—and suggesting subsidence may need to be managed well before the 2040-2042 SGMA sustainability deadline (California Department of Water Resources, 2025a).

This shift represents more than a technical adjustment, it has the potential to alter the risk profile for properties in affected basins. Critical head levels become even more consequential, as reaching them may trigger immediate regulatory responses rather than gradual cutbacks. For appraisers, this means:

- Revisiting highest and best use conclusions in basins approaching thresholds, since land once viable for permanent crops may transition to dryland, grazing, open space, or other alternative uses such as solar or urban development.
- Treating critical head groundwater level proximity as external obsolescence, to be recognized in both cost and income analyses.
- Communicating with clarity that valuations are subject to rapid revision as subsidence BMP requirements and groundwater level monitoring data evolve.

In short, critical head groundwater levels and the evolution of SGMA underscore that water security must now be considered a dynamic, binary risk factor in agricultural appraisal. Forward-looking valuation models that integrate critical head groundwater levels and subsidence data will provide the most reliable guidance to lenders, investors, and landowners navigating California's shifting agricultural landscape.

DISCUSSION AND CONCLUSION

California's new subsidence guidelines will most likely change the ground rules for farmland appraisal. Reliance on old sales (and potentially sales many would not consider "old") and static yield assumptions may no longer suffice in income analysis. Once a basin approaches its critical head level, the viability of orchards can shift from stable to untenable almost overnight. For that reason, water security should be treated as a primary driver of value.

This shift also forces appraisers to rethink highest and best use because regulatory-enacted restrictions that materially limit water availability can render an existing agricultural use no longer legally permissible or financially feasible, prompting a change in highest and best use away from water-intensive production. In such cases, the reproduction cost of irrigation infrastructure and permanent plantings may no longer be economically justified if those improvements cannot be reliably utilized or supported by a lawful water supply, resulting in functional or external obsolescence. Likewise, the economic life of existing improvements may be shortened to account for such restrictions. Concurrently, the income stream associated with the prior use may become unstable or insufficient to meet market return requirements, failing the test of maximum productivity. The revised highest and best use may therefore shift to a lower-intensity agricultural use, partial fallowing, grazing, or non-irrigated open-land use that better aligns replacement cost support with achievable, regulation-constrained income.

Therefore, in areas where groundwater is near or below critical thresholds, permanent crops may not represent a long-term option. Reports need to state clearly when water insecurity shortens the useful life of orchards or points the land toward transitional or alternative uses. Each valuation method must be adapted: the cost approach should reflect external obsolescence tied to SGMA rules, the sales comparison approach must consider water reliability as an element of comparison, and the income approach should run "what if" scenarios to account for abrupt curtailments in pumping.

Carrying out these adjustments requires a hierarchy of data sources. Independent reports from hydrologists or GSAs are best, but district or owner data may be necessary where more substantial evidence is unavailable. Whatever the source, the assumptions and limits of the data must be spelled out in the report. This clarity enables appraisers to adjust the weight they assign to the three approaches—leaning more heavily on income and sales evidence where water is secure and giving less weight to cost when replacement is unrealistic due to basin constraints.

In closing, current and future appraisal practices are challenged with keeping pace with SGMA and the DWR's push toward zero subsidence. Despite an apparent lack of data, every valuation should at least consider a subject's water outlook, test income against threshold scenarios, and recognize external obsolescence where water limits cut short orchard life. Developing a straightforward way to communicate water risk—such as a rating system—could strengthen the credibility of reports. By keeping pace with regulatory changes and folding those requirements into their valuation methods, appraisers can provide opinions of value that hold up better under scrutiny. Doing so provides lenders, investors, and landowners with a clearer understanding of how new rules impact risk, enabling them to make informed decisions in an environment where policies are continually evolving. In the end, it is the appraiser—armed with insight, discipline, and foresight—who takes the lead in translating uncertainty into clarity, becoming an indispensable guide for stakeholders navigating agriculture's most complex water and land challenges.

FOOTNOTE

1 Critical head is the minimum groundwater level an aquifer system can sustain without triggering permanent compaction of its clay layers and subsidence of the Earth's surface.

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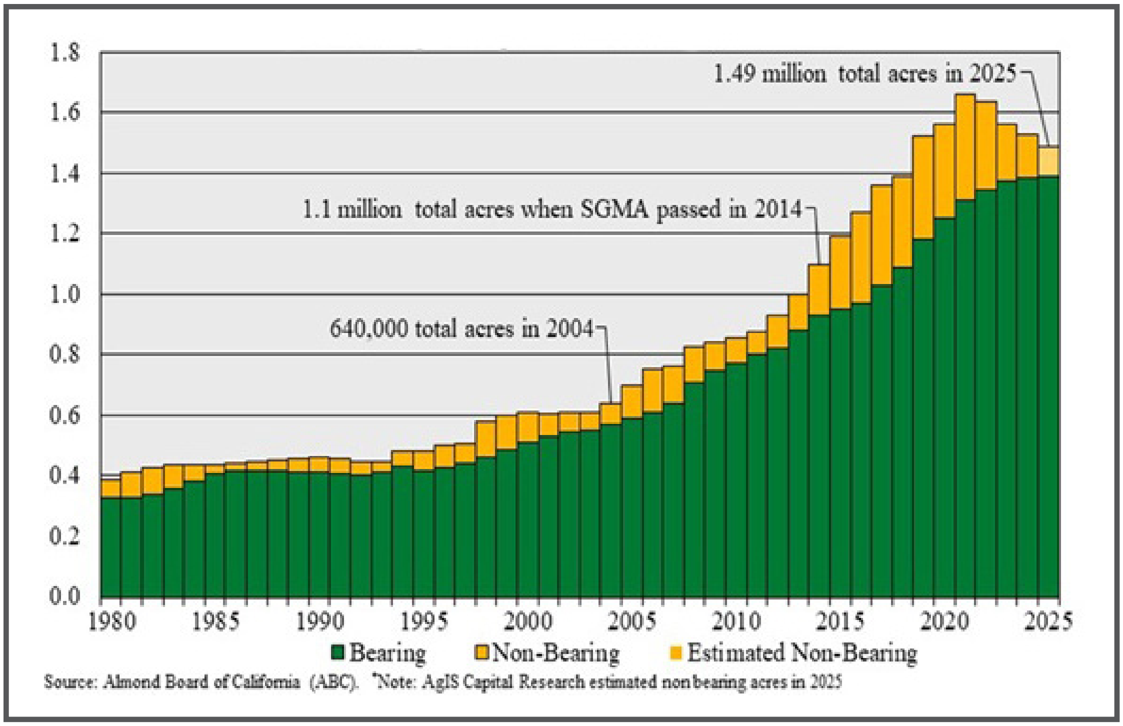

Figure 1. California almond bearing and non-bearing acreage*: 1980 to 2025, million acres

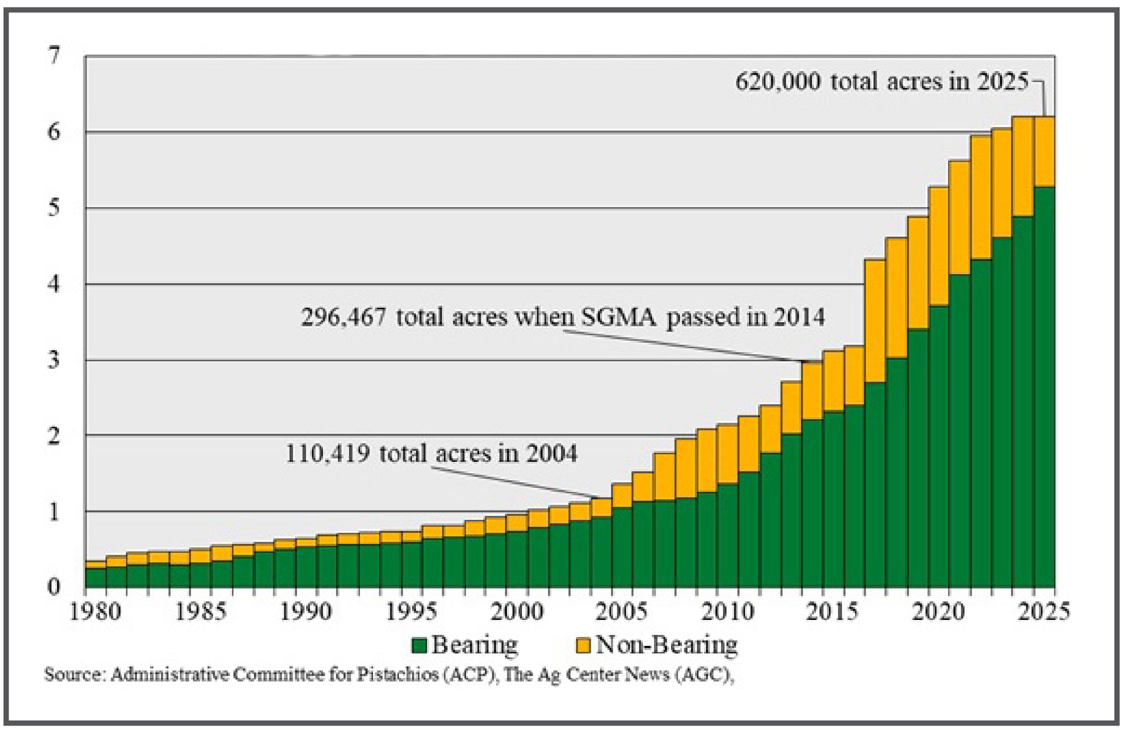

Figure 2. California pistachio bearing and non-bearing acreage: 1980 to 2024, hundred thousand acres

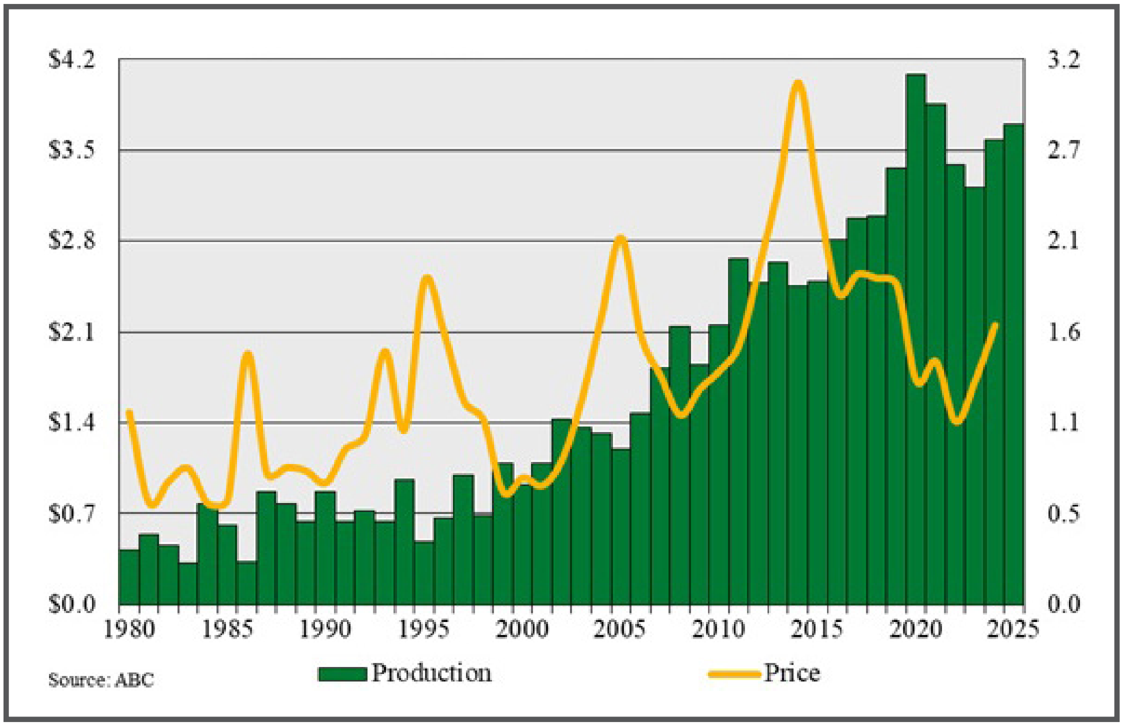

Figure 3. California almond price and production: 1980 to 2025, dollars per pound, billion pounds

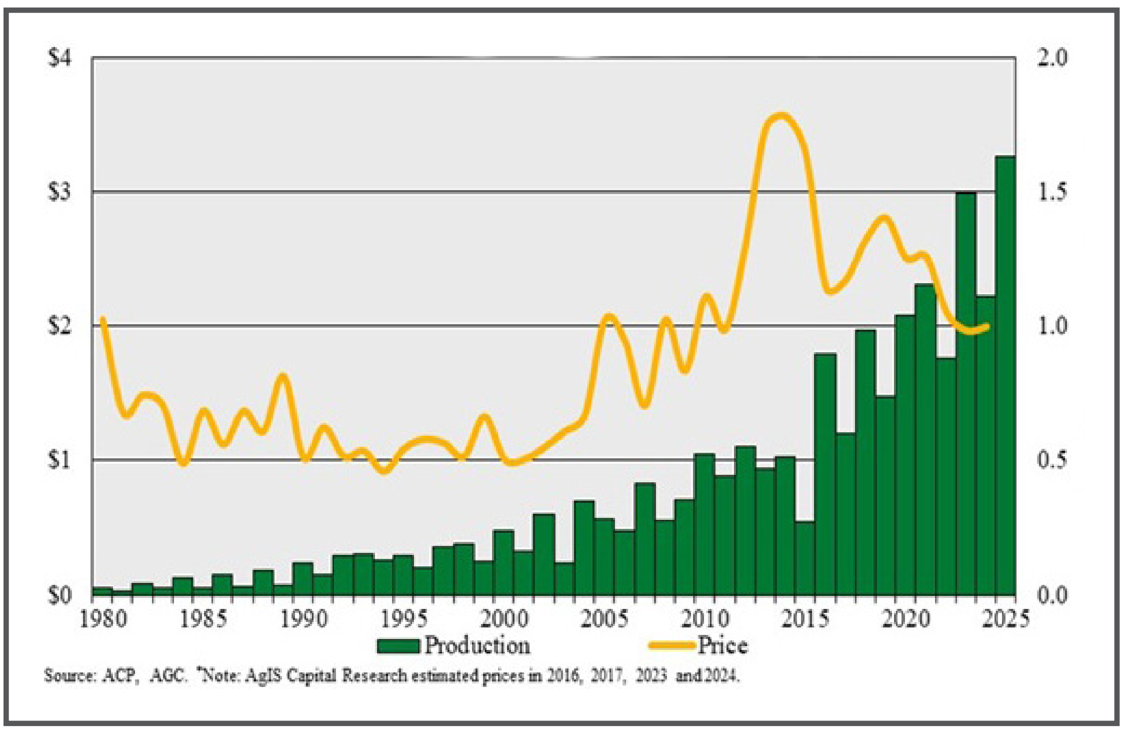

Figure 4. California pistachio price and production: 1980 to 2025, dollars per pound*, billion pounds

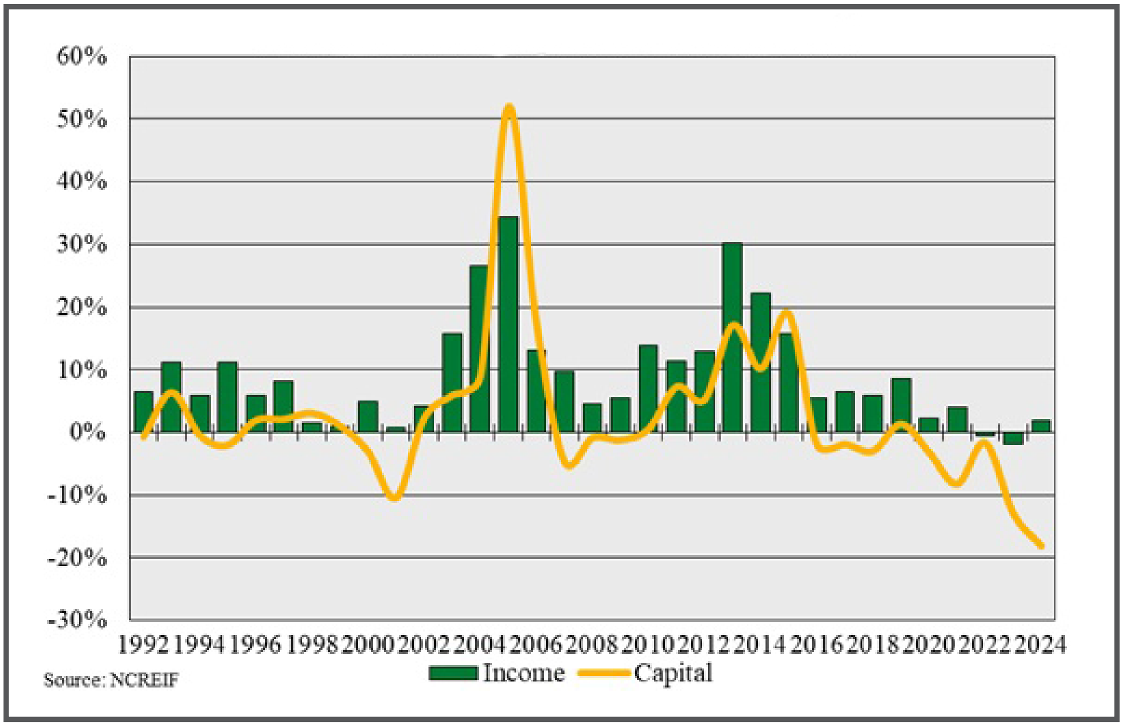

Figure 5. NCREIF Almond Index annual income and capital returns: 1992 to 2024

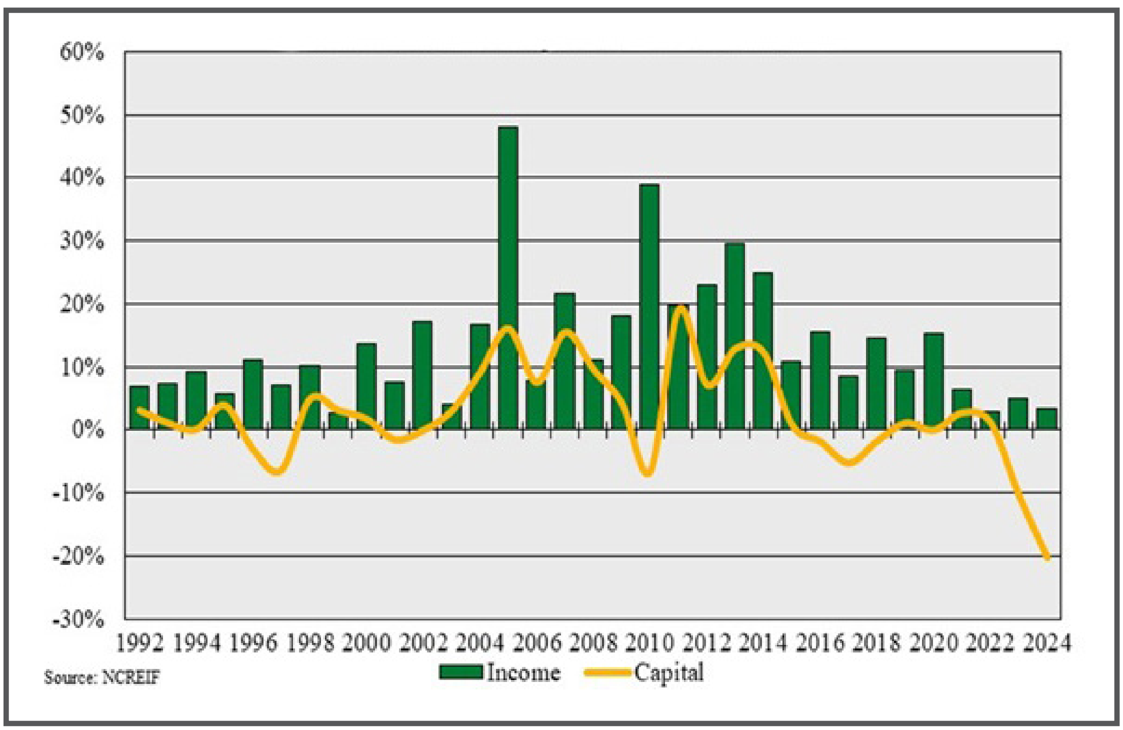

Figure 6. NCREIF Pistachio Index annual income and capital returns: 1992 to 2024

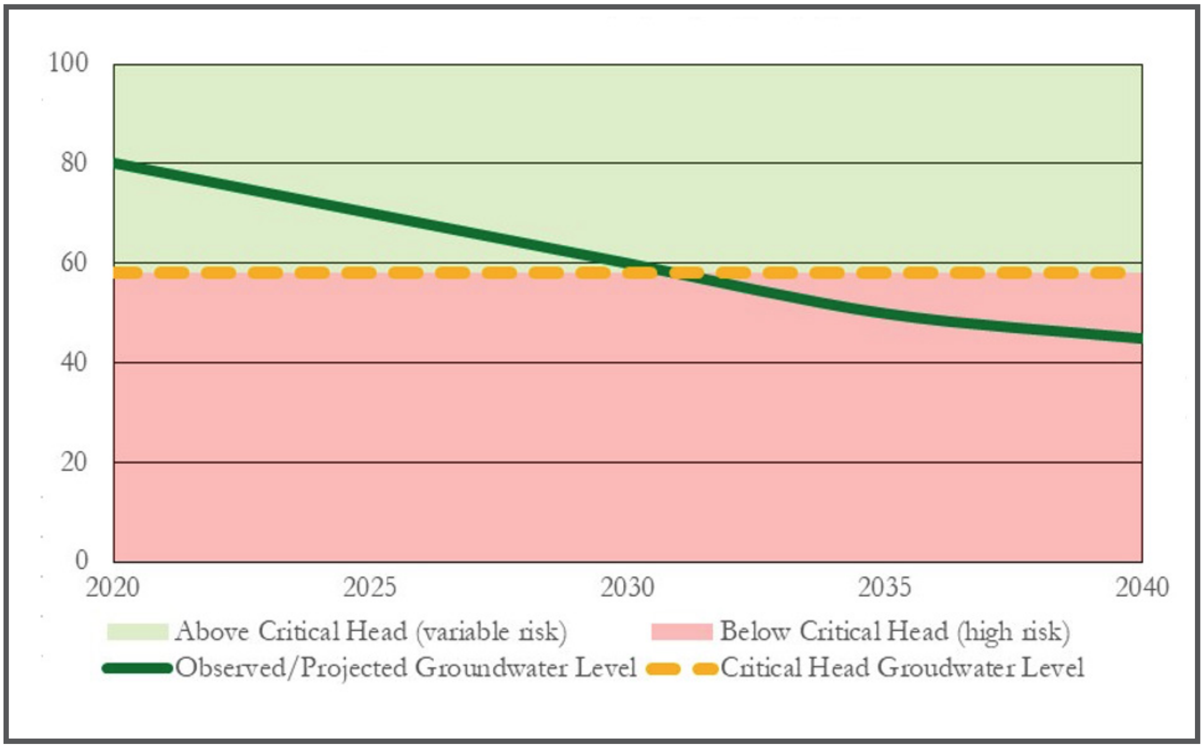

Figure 7. Visualizing critical head risk: 2020 to 2040, groundwater elevation in feet

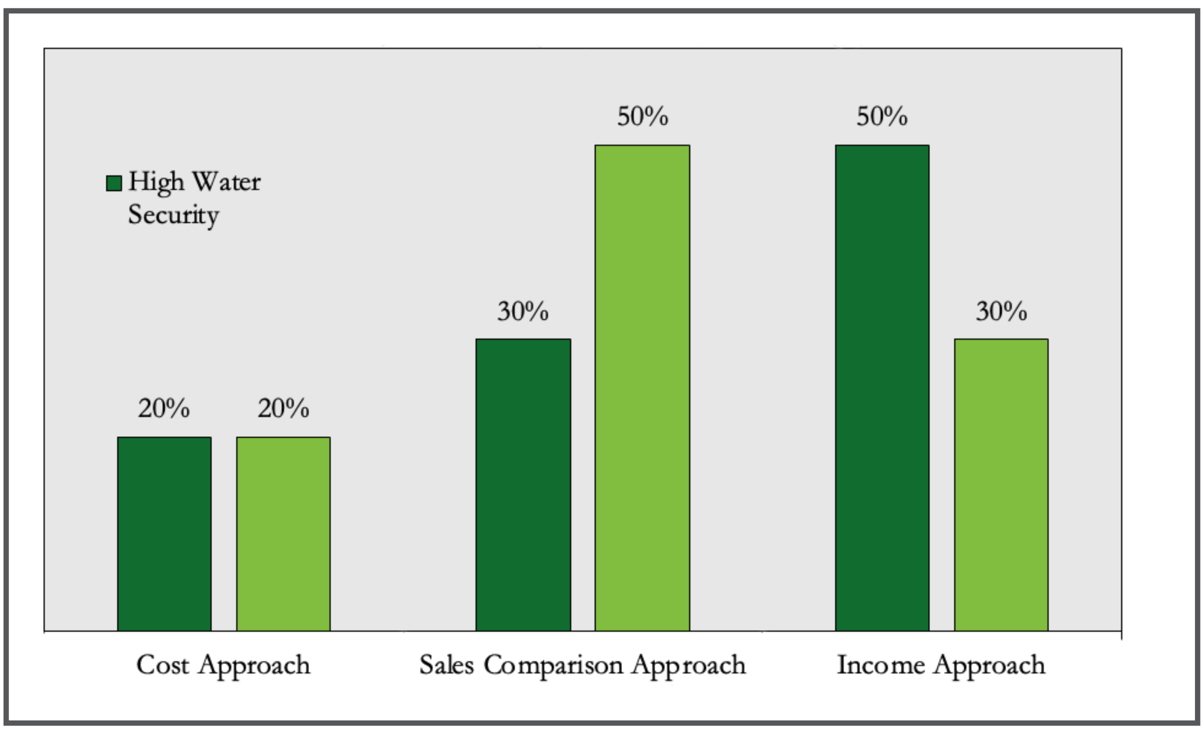

Figure 8. Reconciliation weighting by water security: relative weight (0% = low, 100% = high)

Table 1. Ranking the Reliability of Data sources for Use in Appraisals			
Rank	**Data Source**	**Reliability**	**Use in Appraisal**
1	Independent third-party expert reports (e.g., water rights attorneys, hydrologists, LandIQ)	Highest; most defensible in appraisal reports	Primary basis for water security conclusions
2	Owner-prepared or water-district analyses with reliable data	Moderate; credible if supported by reliable underlying data	Supplemental basis when expert data is unavailable
3	Appraiser-prepared water analysis	Lowest; must be logical, transparent, and clearly supported with readily available information	Minimum threshold analysis when no other data exists