ESG Research

Western U.S. Drought: Declining Supply, Rising Challenges

Prudent supply and demand management, solid financial margins, and rate-setting capacity will be critical to rating stability.

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This report does not constitute a rating action

Credit Ratings
U.S. Public Finance

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Key Takeaways

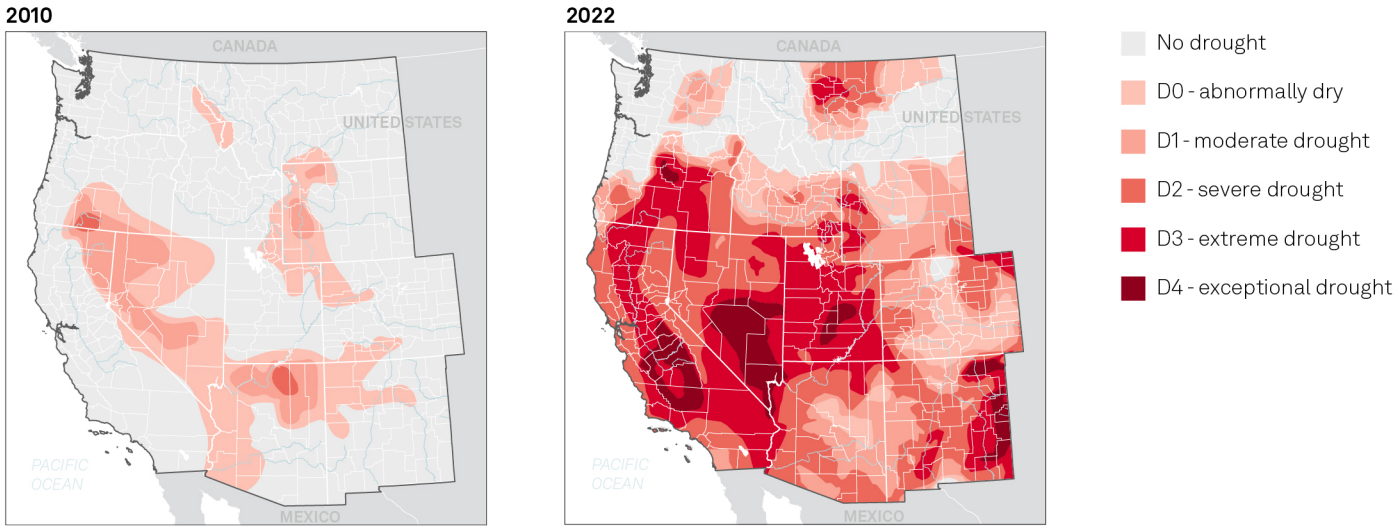
- Our historical analysis suggests that the influence of hydrological volatility on revenue is manageable for most western region utilities; however, as issuers make investments in more resilient supply and infrastructure, leverage ratios may increase.
- Accurate data and forecasting are key to measure asset adequacy and drought management: Utilities with drought contingency plans and optimized rate structures will be better positioned to withstand longer-term revenue and supply volatility.
- Affordability may become a challenge for utilities across the west in the longer term, given the significantly higher cost of developing robust alternative supplies as well as inflationary pressures potentially compounding the financing costs of a new supply.
- Water rights that were once viewed as certain may be questioned or superseded by state or federal efforts, leading to potential changes in credit rating fundamentals.

As severe drought conditions continue in the western United States and water curtailments once deemed unprecedented increasingly become the norm, S&P Global Ratings believes most of our rated water and sewer utilities in U.S. public finance (USPF) remain positioned to weather the situation. Substantial rainfall occurred in July across parts of Arizona, New Mexico, Utah, Nevada, and far southeast California. The precipitation improved soil moisture and groundwater, reducing drought conditions regionally year-over-year. However, uneven precipitation, aridification, and extreme heat are expected to continue to challenge the region's water supply, necessitating significant changes to how utilities in the western states use, store, and conserve water.

We anticipate the financial and operational effects from the prolonged and intensifying droughts (chart 1) will vary based on local supply, storage, legal entitlements, and already implemented mitigation efforts. However, we believe issuers with narrow financial margins or limited rate-setting capacity could experience a disproportionate effect on their credit ratings from these challenges. Both supply and demand management will be critical to credit rating stability as utilities manage through what we believe will be increasingly frequent and prolonged drought conditions.

Chart 1

Western Region Is Experiencing Droughts Of Increasing Frequency, Length, And Intensity



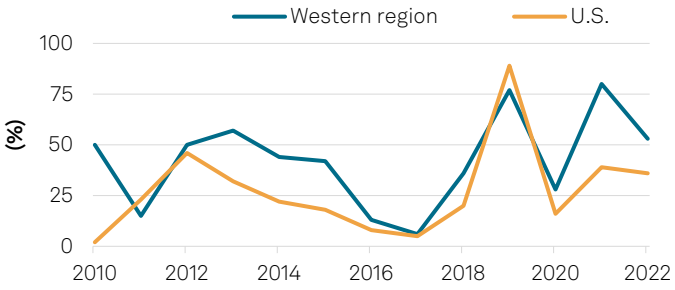
As of Aug. 2, 2022. Source: US Drought Monitor.

The unprecedented tier-two curtailments underscore that it's no longer merely managing hydrological volatility, but also the affects of warmer temperatures and soil degradation, that are exposing utilities to greater degrees of scarcity for prolonged periods. Failure to get ahead of the curve could result in utilities facing even greater challenges in achieving necessary levels of conservation, securing alternative supply, or investing in necessary infrastructure to respond to changing hydrological conditions.

Water providers have a history of managing through hydrological volatility (see chart 2). We note that utilities' credit quality (on a portfolio basis) did not deteriorate during prior drought periods. In fact, wet years generally resulted in weaker financials whereas dry years often displayed higher operating expenditures. Generally, the financial metrics for utilities in the western region are stronger than national medians, due to concerted efforts to maintain healthy liquidity and coverage cushions to support both wet and dry operating environments, as table 1 indicates. However, given the systematic stress on the western water supply, coupled with population growth, we expect scarcity could influence utilities' financial margins and growth potential if not mitigated.

Chart 2

Drought Conditions: The Western Region vs. The U.S.



Source: U.S. Drought Monitor.

Table 1

Western Region Coverage Ratios vs. The U.S. Median

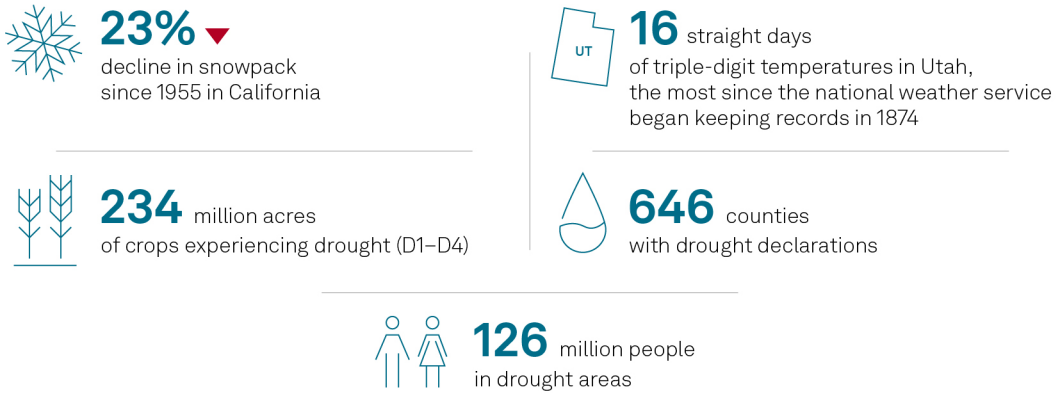
Ratio	Western median	U.S median
Coverage	2.3x	1.9x
Days liquidity	656	488
Debt to capitalization	32%	38%

As of Nov. 17, 2021. Source: S&P Global Ratings.

Drought risk and shifts in climate patterns can influence USPF credit ratings and an issuer's creditworthiness through the Operational Risk Management Assessment or through its influence on the enterprise risk and financial risk profiles. This commentary relates to our credit ratings on western region water utilities analyzed through the application of our criteria for municipal water, sewer, and solid waste utilities in the United States. These criteria describe how different factors, including those related to drought and shifts in climate patterns, can influence creditworthiness. These are further discussed in "How Western States Plan is Critical to Ratings as Colorado River Flows Slow to a Trickle", published Oct. 18, 2021.

Chart 3

Western Drought - By The Numbers



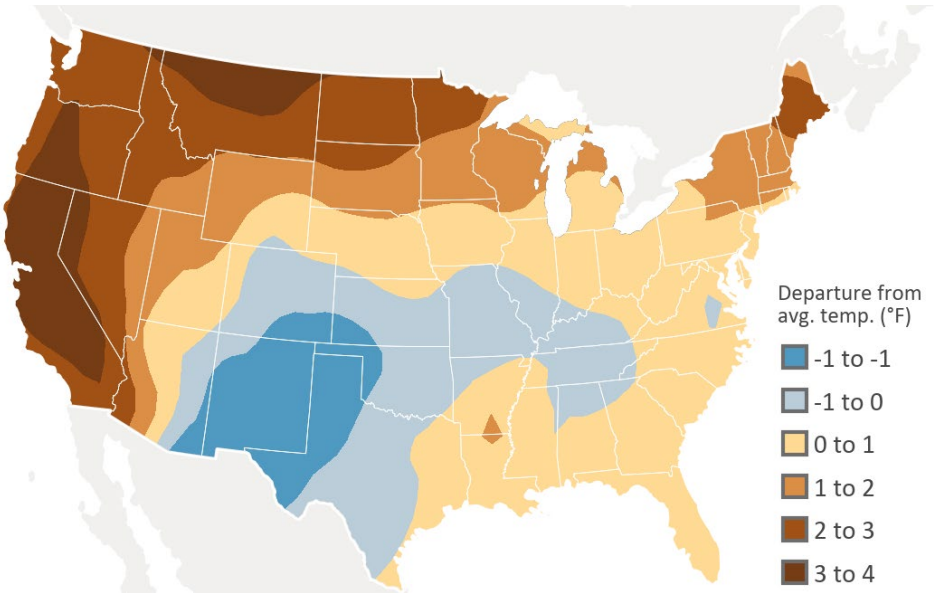
As of Aug. 12, 2022. Source: National Integrated Drought Information System (drought.gov).

Drought Expected To Continue Into 2023

Despite recent precipitation improvement, the west is experiencing one of the driest three-year periods since the 1976-1977 drought. This year is also likely to be among the top 10 warmest on record, according to the National Oceanic and Atmospheric Administration. The western and southwestern regions have been experiencing above-average temperatures, which are expected to continue (see map below) and pressure both water supply (evaporation) and water demand (residents watering lawns more frequently) which challenges water supply management.

Chart 4

September 2022's Temperature Forecast As Of Aug. 16, 2022



Sources: S&P Global Commodity Insights, Custom Weather.

On Aug. 16, 2022, the United States Bureau of Reclamation (USBR) released its 24-month study, requiring a second consecutive year of mandatory water curtailments, including unprecedented Tier 2 shortage conditions. As outlined in Table 2, Arizona will receive the largest curtailment (592,000 AF) followed by Nevada (25,000 AF). Mexico will also face cutbacks. In addition, in June,

the USBR requested a proposal from the seven states to save an additional 2 million-4 million AF, beyond what is outlined in the drought contingency plan (DCP). Given that many water sources throughout the western region are below average, negotiations have been challenging and after 60 days, the seven states have not yet reached an agreement.

Table 2

Total Colorado River Volume Curtailment Under The Existing Contracts

Lake Mead elevation (ft)	Arizona ('000 AF) (% decline)	Nevada ('000 AF) (% decline)	California ('000 AF) (% decline)	Lower Basin curtailment ('000 AF)	Mexico ('000 AF)
1,090 to >1,065	192 (6.8%)	8 (2.6%)	0	200	41
1,075 to >1,050	512 (18.2%)	21 (7.0%)	0	533	80
1,050 to >1,045	592 (21.1%)	25 (8.3%)	0	617	104
1,045 to >1,040	640 (22.8%)	27 (9.0%)	200 (4.5%)	867	146
1,040 to >1,035	640 (22.8%)	27 (9.0%)	250 (5.6%)	917	154
1,035 to >1,030	640 (22.8%)	27 (9.0%)	300 (6.8%)	967	162
1,030 to >1,025	640 (22.8%)	27 (9.0%)	350 (7.9%)	1,017	171
<1,025	720 (22.8%)	30 (10.0%)	350 (7.9%)	1,100	275

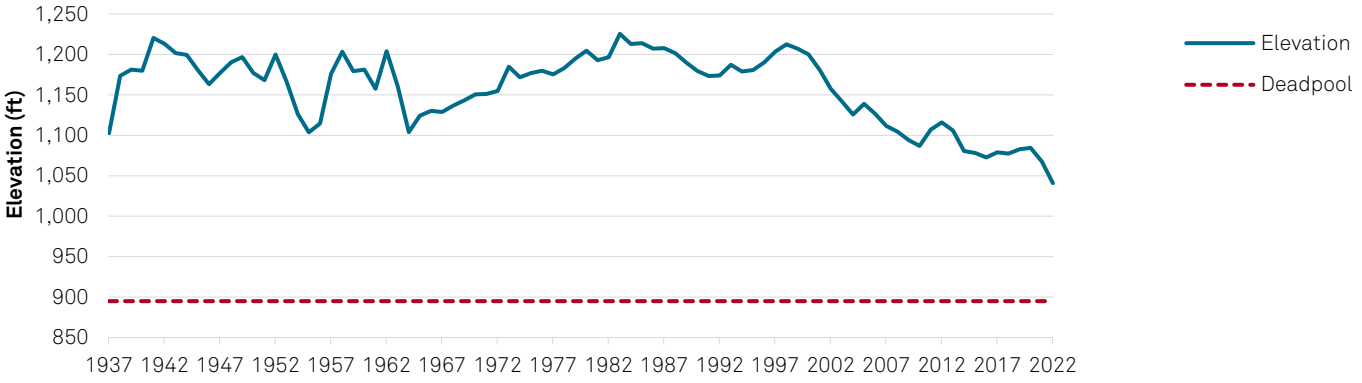
AF -- acre feet. Sources: CRS, Management of the Colorado River, Water Allocations, Drought, and the Federal Role, August 2021.

The inability to reach a consensus suggests a rising likelihood for federal intervention and potential litigation, which increases supply uncertainty and may have negative implications for issuers with significant exposure to Colorado River supply. This follows the bureau's unprecedented decision in 2022 to hold back 480,000 AF of water in Lake Powell to maintain the Glen Canyon Dam's ability to produce hydropower.

We believe the 2026 DCP renegotiations have the potential to be more challenging than when the original plan was negotiated, given the potentially divergent interests highlighted throughout the most recent discussions.

Chart 5

Lake Mead Elevation Drops To Lowest Point In Its History



Source: U.S Bureau of Reclamation.

As noted above, Lake Mead is projected to decline to 1,048 feet. Deadpool (895 feet) is the level at which water cannot flow to California, Arizona, or Mexico. While we do not believe this is a near-term risk based on USBR projections, if conditions persist, this could become a longer-term challenge.

As noted in "How Western States Plan is Critical to Ratings as Colorado River Flows Slow to a Trickle", published Oct. 18, 2021, Colorado River allocations to the seven basin states initially were assumed at 15 million AF. However, average yearly flow has been closer to 12 million AF during the past two decades. As levels decline, there are material risks to basic infrastructure--for both water and power. Given these risks, accurate data, forecasting, and planning will be characterizations of "strong" operational management assessments with respect to responding to potential water stress.

Infrastructure planning is critical

To address drought conditions and provide long-term protection of Southern Nevada's access to Lake Mead, the Southern Nevada Water Authority began construction in 2008 of a third drinking water intake.

The foresight to build this ensured access to supply and reduced water quality issues associated with declining lake levels.

Intake No. 3 began conveying water in 2015 and allows access to water when lake levels fall below 1,000 feet. The authority has used the third intake annually since 2015.

California is experiencing its third consecutive dry year following the driest January, February, and March on record. As indicated below (see chart 6), all the state's reservoirs are well below capacity, and most are significantly below 50% full. The Department of Water Resources (DWR) reduced the State Water Project (SWP) allocation to 5% of requested supplies for a second consecutive year. On average, SWP allocations have become significantly lower during the last decade. The Bureau of Reclamation's Central Valley Project (CVP) faces similar challenges, and for the fourth time in the last decade, south-of-Delta irrigation contractors received a 0% CVP allocation. Although hydrological volatility is not new, climate change is extending and intensifying drought conditions. This, coupled with recent biological opinions and related challenges associated with aging infrastructure in the Bay Delta (which is critical to both the SWP and CVP), means that future SWP and CVP allocations may remain unreliable, and will continue to test utilities that rely on both projects.

Irrigation districts face greatest procurement risk

Given pumping restrictions and groundwater limits, we believe future CVP water allocations are uncertain, raising the likelihood that agricultural portions of the Central Valley could be left fallow.

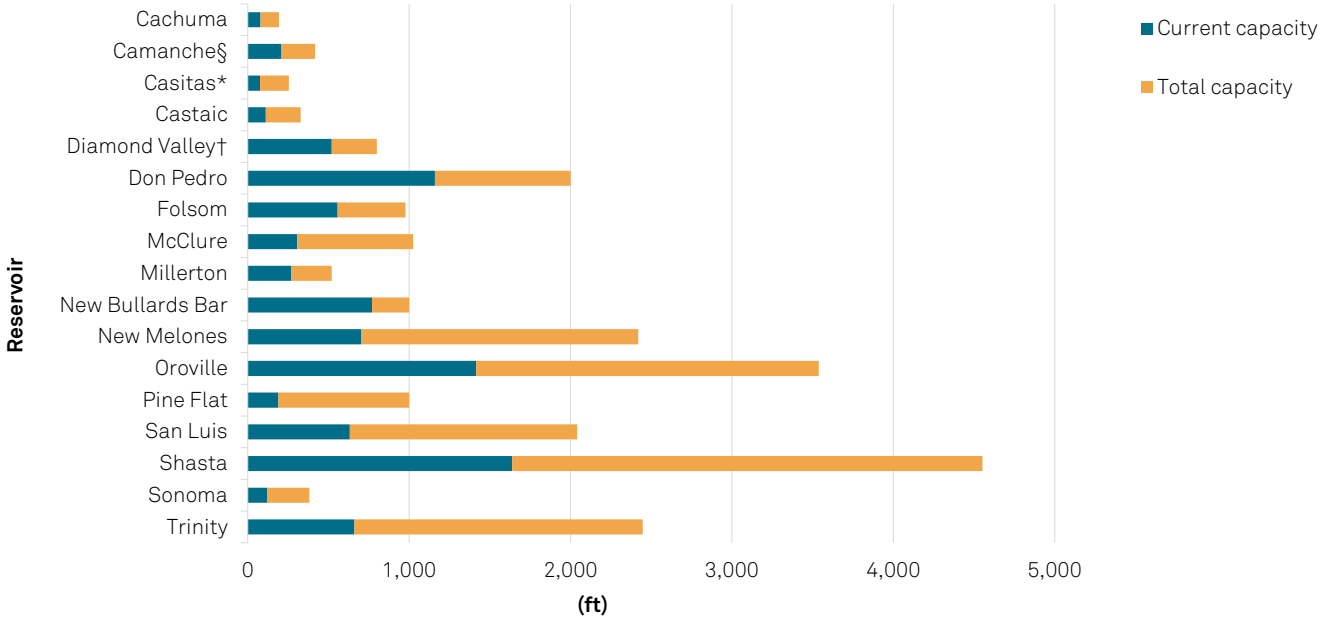
Due to the complexities of supplemental water procurement for irrigators, the skill and experience of the relevant utility's management team in the water industry will be a relevant factor for ongoing credit quality.

For more information, please see the article "20 California Irrigation District Rating Outlooks Revised To Negative From Stable On Rising Drought Severity, Pressure", published Oct. 29, 2021.

Chart 6

Most Of California's Reservoirs Are Below 50% Capacity

As of Aug. 7, 2022



*As of Aug 6, 2022. §As of Aug. 4, 2022. †As of Aug. 1, 2022. Source: California Department of Water Resources.

Scarcity Is Shaping Federal, State, And Local Policies

Current conditions have resulted in voluntary and mandatory water restrictions at both the local and state levels. However, not all states in the region have been similarly successful in demand management. While most rated utilities across the west have benefited from more stringent plumbing and building codes, which help reduce indoor water use, their ability to incentivize behavioral changes to reduce outdoor demand on an ongoing basis (e.g. shifts to more water efficient landscape irrigation) has not been uniform. Six western states have declared emergencies based on drought conditions while others have implemented some level of usage restriction or guidance, but successful enforcement can be challenging. The Inflation Reduction Act may be supportive to credit quality for issuers exposed to drought risk, with $4 billion available to potentially support agricultural business and rural communities, environmental risks related to inland water bodies, or other voluntary water reduction programs in the region.

California has fallen short of the 15% state conservation target and as a result, conservation measures have increasingly been shifted to local agencies to develop and enforce. The Metropolitan Water District of Southern California (MWD), for example, introduced sweeping outdoor watering restrictions in early June with a goal to reduce water use by 35%. For now, we believe the credit ratings on MWD, its members, and retail participants are showing resilience despite the mandate, as MWD largely benefits from fixed or automatic pass-through rate components that promote stability and cost recovery during periods of lower usage (such as drought restrictions) and on average, it maintains exceptional financial metrics.

On Aug. 11, 2022, the Newsom Administration released a 19-page plan to accelerate permitting for projects that capture more water in wet years to save for dry years, as well as recycled water

facilities to reuse wastewater that is currently discharged to the ocean, and increase financial assistance for local water projects, with a target to expand water supply across the state by 5 million acre-feet to 7 million acre-feet (or approximately 8%) by 2040.

In particular, the plan sets a target to double the amount of recycled water produced in the state by 2030, increase stormwater capture to 77% by 2030, and fast-track seven storage projects that have voter-approved funding.

Newsom's plan also calls on the Legislature to make changes, specifically to modify CEQA (the California Environmental Quality Act), to ease approvals for water and flood projects. While previous attempts to re-write CEQA have been unsuccessful, the severity of the drought may increase political momentum for its reform.

Nevada has successfully pursued lasting conservation measures. For example, the 2021 Nevada Legislature enacted AB 356, prohibiting use of Colorado River water delivered by the Southern Nevada Water Authority member agencies to irrigate nonfunctional turf not zoned exclusively for single-family residences effective Jan. 1, 2027. We view proactive demand management favorably, given that conservation is one of the lower-cost options available to mitigate a waning supply.

Arizona, arguably the state with the greatest initial exposure to Colorado River curtailments (given its more junior rights), has been successful in conservation measures, with usage below 1957 water levels, according to the Arizona Department of Water Resources. In addition, the state continues to have significant storage through direct aquifer recharge as well as indirect storage and potential drought-tolerant supply projects which are in the early planning stages. Several cities throughout the state have also implemented state-required drought plans. Agriculture remains the most exposed to cut-backs but certain cities and counties may also face reductions depending on the severity going forward.

Upper basin states, which consumed only 3.5 million AF in 2021 compared to 10.0 million AF consumed by the lower basin states, outlined a plan to support Colorado River supply challenges. The proposal includes more releases from local reservoirs to aid Lake Powell, reauthorization of a water-conservation research, and consideration of a demand management program. While overall use in the upper basin has been significantly lower, per capita use has generally been higher, according to a study done by the Environmental Protection Agency. Given that demand management is generally the lowest cost option for utility managers, we will continue to assess whether the lack of formal conservation requirements increases credit risks. In addition, Utah and Colorado passed significant legislation on water policy and/or investment in water-related infrastructure during the most recent legislative sessions. While sufficiency isn't a current credit risk, the impact of water scarcity on future development will be an important consideration.

Shrinking supplies can jeopardize water rights agreements

Although we have traditionally viewed issuers with senior water rights as better positioned with respect to supply and autonomy, this assumption may be less certain in times of drought when there is not enough water to satisfy demand. Water supply across the west is largely apportioned under complex and long-standing state and federal law and court decisions. Several U.S. Supreme Court cases dealing with water distribution from the Colorado River between various states are on file and the pending outcomes may change allocation rights and permit procedures, which could create credit rating risks.

Effective June 2022, the California Water Resources Board is making significant cuts to water users, primarily in the San Joaquin River watershed, which affect San Francisco, East Bay Municipal Utility District, and other senior water users, with curtailments affecting some users

whose water rights date as far back as 1900 in terms of priority and some subwatershed rights date from the 1910s to 1920s. While we consider the board's curtailment action manageable in the context of these users' strong water storage position, in the unlikely event that their diversions are reduced so significantly that these systems become unable to fulfill adequate drinking water demand in their service area, resulting in a drought emergency, it could result in negative rating pressure. We note that several of the affected senior water rights holders have sued the board, claiming that it violated state and federal due process laws when determining which users would be subject to curtailment.

Portfolio Review: Historically, Revenue And Hydrological Volatility Was Manageable For Most

Previous prolonged droughts heralded increased expenditures and curbed usage, which tempered longer-term usage for some

Given the western region's experience with extreme hydrological volatility, we analyzed revenue variation, expenditure trends, and liquidity during different hydrological periods since 2011. This period captured both prolonged drought environments and severe wet years. The data suggests that wet periods typically have a more immediate influence on financial performance.

- During a 10-year period, there were four years where median water revenues declined: 2012, 2015, 2018, and 2020. Three of the four years were wet years (measured by the 12-month period prior to the fiscal year-end) with very small portions of the region under drought conditions.
- Conversely, the highest coverage levels were generally exhibited during periods of extreme dry weather, including most recently in 2021.

That said, we believe prolonged droughts influence behavior (usage) and thus can temper longer term revenue growth long after a drought subsides. Further, we found that prolonged drought often increases expenditures, given the degradation in water quality, increased treatment costs, and pursuit of higher-cost alternative supply and infrastructure requirements to access said supply. Revenues of issuers with drought surcharges and higher fixed structures (with pass-throughs) exhibit stronger debt service coverage--a key parameter in our financial risk profile section--relative to issuers with fully volumetric structures. Issuers with decoupled rate structures or higher fixed components may demonstrate more nimble cost recovery and be better positioned to meet associated operating costs, infrastructure investment and alternative supply development to support dry water years. This is especially true given that conservation, which reduces volumetric charges, is a critical component of most drought plans.

"We believe prolonged droughts influence behavior (usage) and can thus temper longer term revenue growth long after a drought subsides."

Key Credit Considerations

Cost of water: Costs will likely increase as issuers rely on drought-tolerant sources, such as desalination and recycled water. These alternative sources will bolster reliability but may require significant rate increases when issuers are already facing pressure from rising inflation. Recycled and desalinated water is generally twice the cost of traditional sources.

Storage: From an asset adequacy perspective, our criteria views favorably issuers with sufficient storage to capture the benefits of wet years. This Improves hydrological management. Storing water during wet years shores up supply requirements in the dry years to follow.

Political obstacles: Investment in storage, recycling, or desalination plants will become an increasingly relevant part of adaptation efforts and effective planning. We are monitoring how local, state, and federal policies are supporting (or hindering) supply development, which will factor into our perspective regarding longer-term strategies.

Rate structure: We will monitor how utilities amend their rate structures to manage demand and stabilize potential financial stress from lower usage. To date, numerous utilities have implemented penalties to direct retail users who exceed penalty thresholds. From a credit perspective, we view rate structures that promote cost recovery and revenue stability positively.

Conservation: We will assess whether local utilities will increase required restrictions and impose stricter penalties on noncompliance in lieu of firmer state action--and whether local efforts are more successful. Longer-term scenario planning suggests even greater conservation needs. Achieving these goals will be important to maintaining credit quality.

Water rights uncertainty: Changes in water policy or litigation could influence local supply autonomy, creating supply uncertainty and thus credit rating quality. Further, current and future Colorado River negotiation outcomes will factor into our credit analysis as they can influence the cost of water as well as growth. While the Law of the River has been sufficient to govern water rights during past periods of scarcity, as previously noted, the assumptions may overstate future supply. Collaboration between the upper and lower basin state may become more challenging given competing interests and the potential for reduced water allotments.

State influence: Several states have implemented legislation to address land use, planning, and demand. Others are looking at significant projects (multi-state and even international) to augment supply. We will incorporate the influence of state policies into our analysis of drought planning.

Population growth: Several states throughout the western region lead the nation in population gains. For higher growth states, we are evaluating whether there is a proactive approach to water infrastructure and demand management. We will continue to track changes in water policy and conservation measures and how they influence water savings to meet growth needs, or if water scarcity dampens further development, which in turn could affect long-term planning and growth potential for those states if water supply is insufficient to support commercial and residential demand. In addition, certain sectors have greater exposure to current conditions. Given the outsized potential influence on the agricultural sector, and existing inflationary conditions, the drought could exacerbate the rising cost of food, as well as energy, among other pressures. Prolonged drought could also result in above-average unemployment or population shifts in areas that are dominated by agribusiness.

Sector Is Financially Prepared To Meet These Unprecedented Supply Challenges

While water managers have experience navigating variable weather and thus supply environments, we believe volatility will be more pronounced and prolonged as population growth and the effects of climate change strain available water resources in the west. The country and region have experienced catastrophic drought in the past. As demonstrated in the 1930s and again in the 1950s, drought can affect migration patterns, employment, and the economy, all of which influence credit quality for water issuers and the local governments that support them. From an asset management and drought management perspective, incorporating long-term and credible hydrology planning is an important consideration in our criteria to meet emerging supply risks. Rate structures that are supportive of conservation and financial sustainability are especially supportive to utilities as well due to the influence they can have over revenue stability. We generally believe utilities remain well positioned financially to meet near- and longer-term challenges. However, water supply conditions present significant challenges to western region utilities and we will continue to measure management's aptitude and financial capacity to weather this new normal.

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Related Research

- How Western States Plan is Critical to Ratings as Colorado River Flows Slow to a Trickle, Oct. 18, 2021.
- 20 California Irrigation District Rating Outlooks Revised To Negative From Stable On Rising Drought Severity, Pressure, Oct. 29, 2021.