Filling the Gap

Meeting Future Urban and Domestic Water Needs in Southwestern New Mexico

WESTERN RESOURCE
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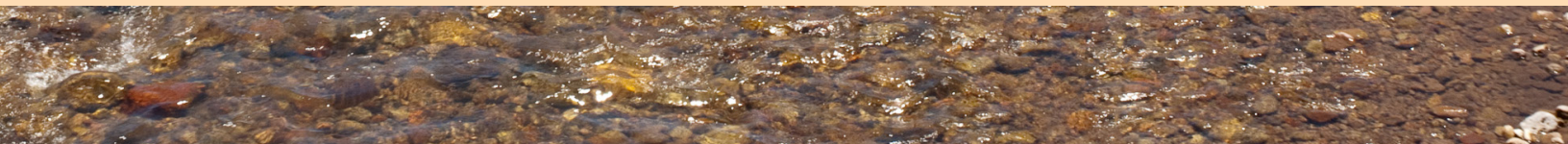

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acre-foot	325,851 gallons (the amount of water 2-4 families use in 1 year)
AF	acre-foot or acre-feet
AF/yr	acre-feet per year
ag/urban	agricultural and urban (in reference to cooperative agreements between these two sectors)
ABCWUA	Albuquerque Bernalillo County Water Utility Authority
AWSA	Arizona Water Settlements Act
BOR	Bureau of Reclamation (U.S.)
E.O.	executive order
GPCD	gallons per capita per day
M&I	municipal and industrial
NMED	New Mexico Environmental Department
ISC	New Mexico Interstate Stream Commission
OM&R costs	operation, management, and replacement costs
passive conservation	Conservation that results from new development and the replacement of inefficient fixtures and appliances over time in existing buildings.
SFR	single-family residential (water user)
SS commercial	self-supplied commercial (water user)
SS residential	self-supplied residential (water user)
Planning Region	Southwest New Mexico Water Planning Region – an area that encompasses Catron, Grant, Hidalgo,
and	Luna counties
SWSI	Statewide Water Supply Initiative of Colorado
WRA	Western Resource Advocates
WWTP	wastewater treatment plant

Executive Summary

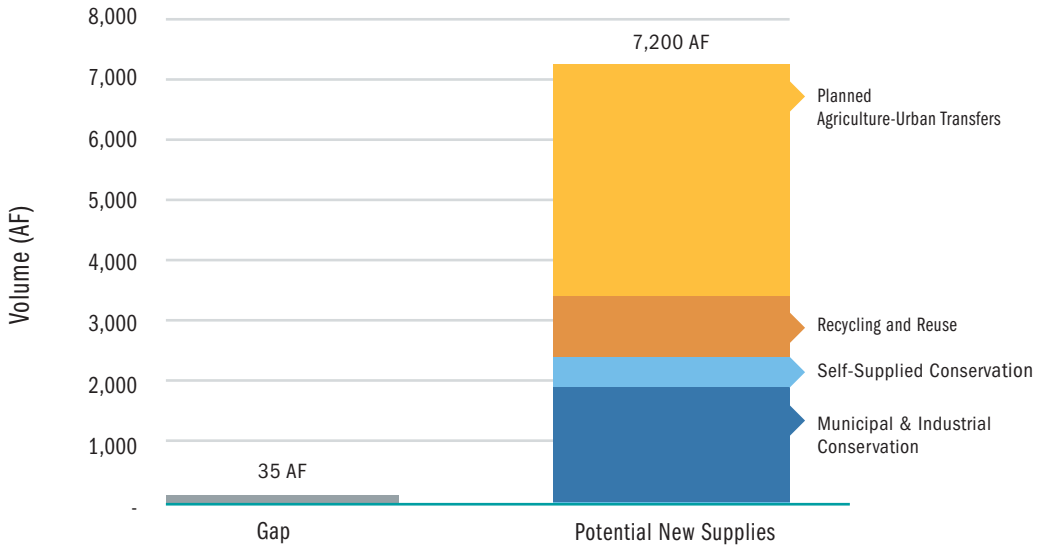
Various stakeholders in New Mexico, from the City of Deming to the Interstate Stream Commission (ISC), have proposed developing 10,000 acre-feet per year (AF/yr) of water* from the Gila River in Southwestern New Mexico, which would entail much larger annual diversion and storage requirements. Even with the potential federal subsidies available under the Arizona Water Settlements Act (AWSA), the project's development would burden local utility customers and state taxpayers with hundreds of millions of dollars of debt. More importantly, this costly project could have severe impacts on the Gila River—the last wild river in New Mexico.

Western Resource Advocates (WRA) evaluated the potential for alternative strategies to meet the water needs of Southwestern New Mexico's communities. Our analysis focuses solely on municipal demands because under the most current cost estimates from the Bureau of Reclamation and others, project water would likely be prohibitively expensive for agricultural users. We found that for communities in the Southwest New Mexico Water Planning Region ("Planning Region"), conservation can meet the entire supply-demand "gap" between cities' existing supplies and new demands. Adding investments in recycled water and municipally-owned agricultural water rights that are already planned to be converted to municipal use would provide 7,240 acre-feet per year of new water to the region by 2050—exceeding the additional water needed to meet the gap in 2050 by over 7,000 AF (Figure 1).

These measures can meet the water needs of Southwestern New Mexico's cities and protect the Gila River. As non-diversion alternatives, they are also eligible for federal funding from the AWSA and would not place a heavy debt burden on the communities. Below, we describe how these strategies can meet the region's water needs and mitigate the financial risk of pursuing an expensive capital project.

* Proposed average yield; proponents have not, at present, demonstrated a reliable firm yield of the project.

FIGURE Nº 1 AFFORDABLE WATER SUPPLY STRATEGIES EXCEED SOUTHWESTERN NEW MEXICO'S URBAN AND DOMESTIC WATER GAP



Southwestern New Mexico Needs Just 35 Acre Feet of Municipal Water in 2050

Population growth is the key driver of new water demands in the Southwest New Mexico Water Planning Region, an area that encompasses Catron, Grant, Hidalgo, and Luna counties. According to the U.S. Census, New Mexico's 2000-2010 population growth rate of 13% ranks New Mexico as the 15th fastest growing state in the United States. However, during this same period, the planning region counties had a net population loss. Despite these trends, the most recent projections of the ISC predict a moderate increase in population and water demand over the coming decades in the region.

The 2010 Regional Water Demand Study, produced by AMEC Earth & Environmental, Inc. for the ISC, projects an increase of 30,000 residents in the region from 2010 to 2050, to a total of 93,200 people by mid-century. Taking into account passive conservation savings, which occurs when inefficient water appliances and fixtures are replaced over time with new, more water-efficient ones, water demand for the projected 93,200 people in the region will be approximately 16,730 acre-feet in 2050. With existing supplies and additional permitted water rights totaling 16,695 acre-feet, the

region will need an additional 35 acre-feet per year by 2050 to fully meet projected demands.

It is worth noting that this analysis informs water supply planning from a regional perspective, and the data presented herein should not supplant individual water provider information for local planning purposes. Furthermore, the water supply gap is projected for the Southwest New Mexico Water Planning Region as a whole and does not take into account more localized water supply and demand issues, such as local climate variations and water infrastructure system flexibility. This aggregation of data to a multi-county level assumes a more dynamic and integrated water system across the region, a goal the New Mexico Office of the State Engineer and communities in the four-county region are already pursuing (see "Regional Infrastructure and Reuse" section).

WRA evaluates the potential for three key strategies to meet the region's water needs: conservation, reuse, and agricultural/urban (ag/urban) water transfers.

Conservation Can Meet Most Future Urban Water Needs

The Southwest New Mexico Regional Water Plan estimates communities in the SWPR can reduce water demands by an average of 33% through water conservation programs; several other pieces of published literature and multiple studies comport with that finding, including the water conservation assumptions of AMEC/ISC's Regional Demand Study. A 33% per capita reduction between 2010 and 2050 would reduce total annual municipal water demands by approximately 5,550 acre-feet by 2050. Almost one-third of this reduction would require no effort from water providers, for it would be achieved from passive conservation that results from new development and the replacement of inefficient appliances and fixtures over time. (Passive conservation savings are incorporated in the demand projections for the region.) The remainder, 3,960 AF/yr, could be gained by cost-effective, active conservation programs that permanently reduce per capita water usage through the long-term implementation of water-saving practices and technologies. WRA assumes that only a portion of active conservation savings (60%) would be used to meet new water demands. The other active conservation savings (40%) are allocated to system reliability to support water utilities' desire to meet water demands consistently across uncertain and variable climatic conditions, population and economic growth, increasingly stringent water quality and quantity regulations, and catastrophic events (Table 1). By dedicating a little more than half of active water conservation savings to meeting future needs, 2,370 acre-feet of additional water supply will be made available annually by 2050.

TABLE Nº 1 CONSERVATION SAVINGS MEET FUTURE NEEDS & IMPROVE SYSTEM RELIABILITY

	M&I Passive Conservation	M&I Active Conservation	Total Acre-Feet
Savings allocated as reduction in future demand projections	100%	0%	1,590
Savings allocated to meeting future demands	0%	60%	2,370
Savings allocated to system reliability	0%	40%	1,590
Total			5,550

Regional Infrastructure and Reuse Can Close the Gap

As highlighted in the ISC's 2010 Regional Water Demand Study for the Southwest New Mexico Water Planning Region, reuse is increasingly becoming an important strategy to meet growing demands. The development of a regional infrastructure system to improve access to public water supplies is also critical to meeting future potable water needs of the region. The Grant County Commission's AWSA proposal for regional infrastructure and reuse would construct a pipeline that would link the water supplies of Hurley, Bayard, Santa Clara, and Silver City, providing drinking water for communities that need it.† Based on the proposed AWSA projects, new reuse in the Planning Region can be expected to reach approximately 1,090 AF/yr by 2050.

Agriculture-to-Urban Water Transfers are Already Planned

As discussed in its 40-Year Water Plan, the City of Deming owns 3,780 acre-feet of consumptive use in irrigation water rights that it plans to convert to municipal use in the future, if necessary. Even though these transfers do not exemplify the most flexible and innovative ag/urban cooperation strategies (e.g., rotational fallowing and dry-year leasing), the City of Deming's water supply assets and plans cannot be ignored. Therefore, we include it as a separate wedge in the gap assessment. As a core part of its water planning strategy, Deming anticipates continuing to acquire additional agricultural water rights to meet future municipal demands.

† This proposal would develop a new wellfield that would make 193 AF/yr of permitted water rights available to Hurley, which does not have its own supply of water. This permitted water right is accounted for in the additional permitted water rights wedge (Figure 1 above). The proposal would also provide 750 AF/yr of reuse by recharging a regional aquifer with treated wastewater effluent for return flow credits.

Proposed Diversion Projects Would Have Significant Financial Impacts

Alternatives for the proposed Gila diversion project are estimated to cost between $400 million and $500 million, according to analyses conducted for the ISC. Federal subsidies provided through the AWSA may provide as much as $136 million (in 2013 dollars), which will cover only a fraction of the capital cost and will not cover ongoing operation, management, and replacement (OM&R) costs to Central Arizona Project users in Arizona. The project cost estimates may also exclude important components, such as municipal treatment and distribution facilities, which would further increase costs.

Southwest New Mexico's municipal water customers, agricultural water subscribers, and local taxpayers would pay the balance of the project's cost, which is likely to triple or quadruple the average customer's water bill. Using conservative economic assumptions,‡ we analyze the cost impacts to customers.

In 2014, Bohannan-Huston estimated the preferred alignment for the Deming diversion proposal would cost approximately $437 million, to deliver a firm yield 10,000 AF of water per year to communities in the region ("Recommended Alternative 2B," developed for the ISC§). As proposed, the project would provide 5,500 AF of water per year to Deming to meet

‡ We make the following assumptions:

(a) Project proponents would pay the capital debt over a 30-year period at a 3.5% interest rate.

(b) Preliminary permitting activities would occur in 2015–2017, and the main construction costs would be incurred over the period from 2018–2021. This permitting and construction time frame reflects the fastest possible time frame; a longer permitting and design period, which is more likely, would postpone the main construction activities by several years. In this case, the main cost impacts would also be delayed by several years.

§ The BHI analysis appears to have an unrealistically low annual OM&R cost. We use the Bureau of Reclamation's estimated O&M cost of $6.28 million/year (which includes Central Arizona Project replacement costs).

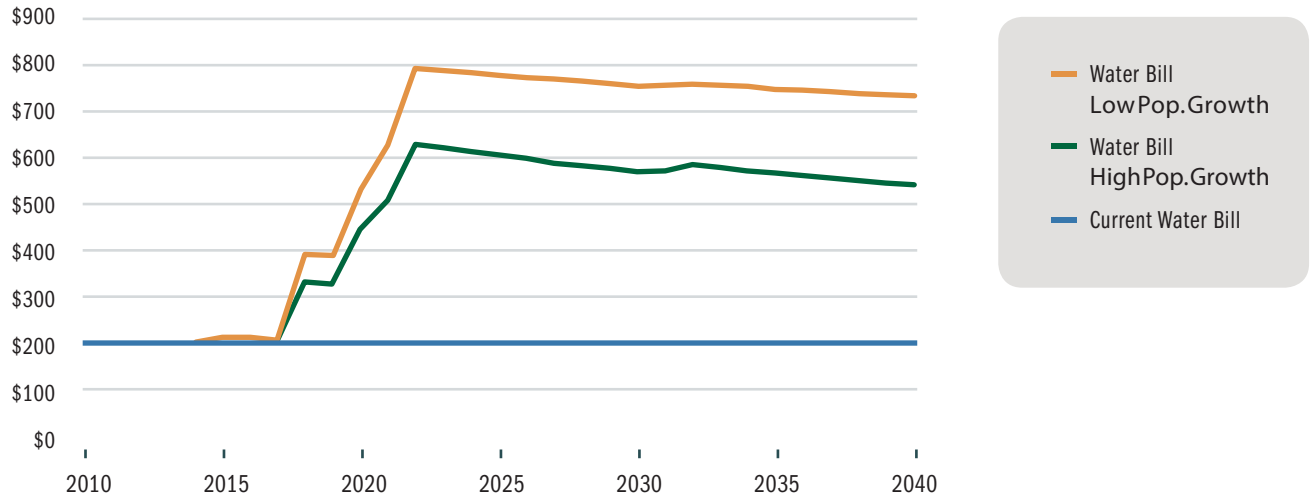
Conservation and Utility Revenue Requirements

Some utility managers may pause before investing in robust conservation programs, thinking they will have to increase their water rates to compensate for the loss of revenue resulting from reducing demand. This concern is often misplaced because conservation programs reduce or eliminate the need to develop new water resources and infrastructure, thus saving money over the long run. Some of the utilities that have looked deeper into this issue have found that their water rates would actually be much higher in the absence of their conservation programs. For example, a recent study conducted by the City of Westminster, Colorado, found that if the city had not invested in water conservation, tap fees would have increased by 80% and water rates by 95%, compared to their current rates and fees.* There are also proven methods and best practices to structure water rates such that utilities can sustain their revenue while investing in conservation programs.

* Feinglas, S., C. Gray, and P. Mayer. 2013. Conservation Limits Rate Increases for Colorado Utility. Chicago: Alliance for Water Efficiency. November.

FIGURE Nº 2 DIVERSION PROJECT WOULD TRIPLE TO QUADRUPLE WATER BILLS

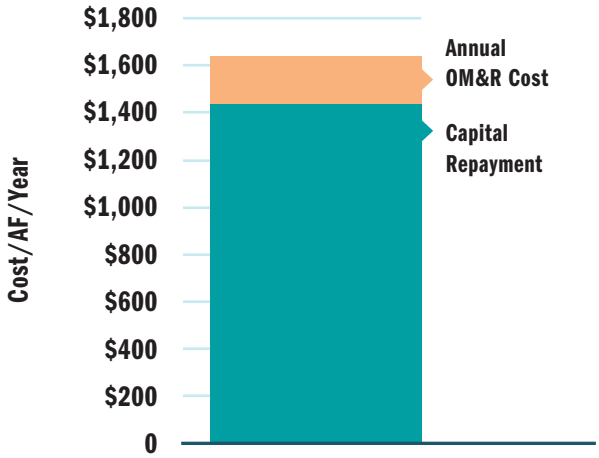
Annual household water cost in Deming, N.M. (5,000 Tap Fee, 55% of Project for Deming)



municipal water needs. To cover the cost of this water, the typical Deming household's water bill would increase significantly, from the current average of $200/year to over $630/year. If population follows a low-growth trajectory, water costs will be even higher—near $800 per household per year in 2023 (Figure 2).

FIGURE Nº 3 WATER DIVERSION PROJECTS WOULD LIKELY BE PROHIBITIVELY EXPENSIVE FOR FARMERS

The annual cost of water to agricultural users, based on Bohannan-Huston Inc.'s (BHI) capital and Operations, Management, and Replacement (OM&R) cost estimates.



This assumes Deming—and other cities—can cover a portion of the project's costs with "tap fees" or new connection fees. In this analysis, Deming's tap fees would need to be increased to $5,000/new household. For reference, prior to 2012, a new residential tap fee in Deming cost $400.¶ While WRA evaluated the impact on customers only in the City of Deming, we expect the other cities that might subscribe to the remaining 4,500 AF of water would see similar impacts on municipal water bills and tap fees. Of note, these cities have not yet committed to purchasing water from the project.

The Bureau of Reclamation developed an independent analysis of the cost of this proposed alternative. Its

¶ Tap fees were increased in 2012, based on property size.

estimate, with a capital cost of $440 million for 10,000 AF of water, would place a comparable cost burden on participating utilities' customers.

Importantly, customers would have to pay for the capital cost of the infrastructure regardless of the volume of water delivered by the project. If fundamental engineering challenges, climate change, or long-term drought reduced water deliveries, customers may avoid the annual OM&R costs of the project, but could not default on the infrastructure payments.

Federal Funds Can Support Non Diversion Alternatives

Stakeholders also have proposed numerous non-diversion alternatives, which would be eligible for funding from the AWSA. The federal allotment for non-diversion alternatives is approximately $90 million ($66 million in 2004 dollars, adjusted to 2013 dollars). With this amount, all of the Tier 2 proposed projects, which include reuse, watershed restoration, and regional water distribution projects, could be funded. In addition, the AWSA funding would cover virtually all of the conservation savings needed to help meet the future supply-demand gap (2,370 AF of active water conservation). In sum, while each of these non-diversion projects merits a more detailed assessment of environmental impacts and local benefits, stakeholders could pursue all of them or pursue alternative strategies to meet local water needs and improve the watershed with the existing AWSA funding.

Communities and decision-makers need to better understand the willingness of New Mexicans to fund water conservation. The 2014 Conservation in the West Poll found that almost half of New Mexico voters believe low levels of water in rivers is an extremely serious problem, compared to slightly more than one-third who show the same level of concern with unemployment—which tends to be the most dominant economic concern for voters.

And, according to a 2013 survey by Public Opinion Strategies, New Mexicans also overwhelmingly want the state's decision-makers to first invest in water conservation and reuse before even considering diverting more water from rivers to urban communities: 85% of respondents supported "Using our current water supply more wisely, by continuing to conserve water, using new technology to help reduce wasted water, and increasing recycling of water"; and only 12% supported "Diverting more water from New Mexico's rivers to communities where more people live."

FIGURE Nº 5

WHAT NEW MEXICO VOTERS WANT

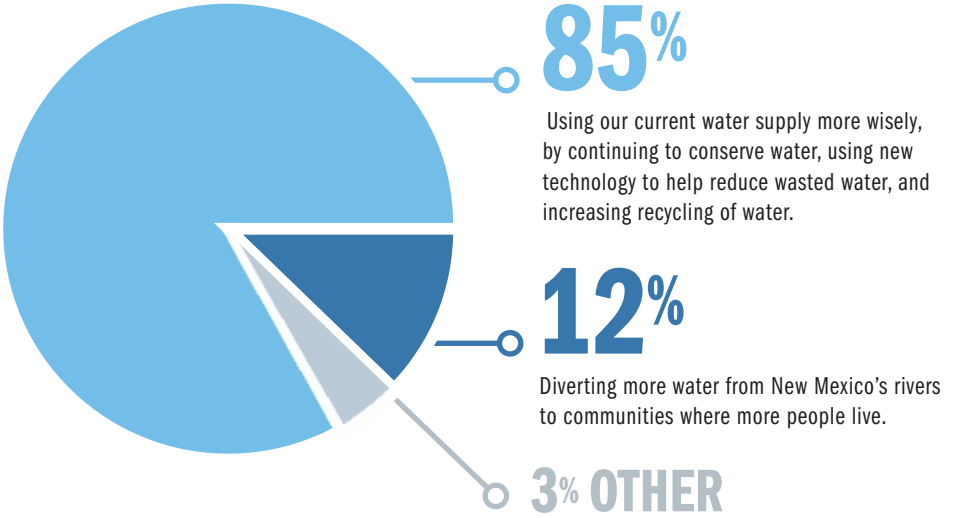


TABLE Nº 2 AVAILABLE FEDERAL FUNDING COULD COVER ALMOST ALL OF THE PROPOSED NON-DIVERSION PROJECTS

The available AWSA funding could cover a significant portion of the non-diversion proposals submitted to the New Mexico Interstate Stream Commission and WRA's proposed level of municipal conservation. All cost estimates are from the Bureau of Reclamation, unless otherwise noted.

Category	Proposal	Cost	Volume (AF)
Municipal Conservation[1]	WRA Conservation Strategy (Active, M&I, and SS)	$ 15,600,000 NPV	2,370
Regional Infrastructure and Reuse[2]	Grant County Water Utilization Alternative	$ 16,473,700 capital costs; $ 29,270,000 NPV	943
	Deming Reuse	$ 4,086,000 capital costs; $ 6,780,000 NPV	336
Ditch Improvements	Pleasanton Ditch Improvements[3]	$ 2,142,500 capital costs; $ 2,685,000 NPV	1,575
	Luna Ditch Improvements	$ 1,307,600 capital costs; $ 1,640,000 NPV	419
	Sunset/New Mexico New Model Pipeline[4]	$ 9,671,150 capital costs; $ 12,105,000 NPV	2,495
Watershed Restoration/ Forest Thinning[5]	NMFIA Watershed Restoration	$ 2,140,800 NPV	173
	NMSU Watershed Restoration	$ 1,851,200 NPV	
	Grant Soil & Water Conservation District Forest Restoration	$ 1,168,400 NPV	
	USFS Watershed Restoration	$ 7,087,000 NPV	
	Catron County/San Francisco Watershed Restoration	$ 12,091,000 NPV	2,000
	Total	$ 92,418,400 NPV	10,311

1. Two entities, the City of Deming and the Gila Conservation Coalition, submitted proposals to the ISC that would fund municipal conservation; these proposals funded less conservation than the WRA strategy, but could be included in the proposed WRA conservation estimate. Additionally, the WRA conservation line does not include passive conservation savings, which would be acquired as older fixtures and appliances are replaced by newer, more efficient ones. The cost estimate reflects a conservative (i.e., likely more expensive) approach, based on the 2010 Colorado Water Conservation Board's Statewide Water Supply Initiative medium-level cost estimates for conservation, or $7,296/AF in 2010. Costs of conservation are spread throughout the 40-year period and discounted at a 3.5% discount rate.
2. The initial list of reuse proposals included the Grant County Recharge and Reservoir project, which would have relied on reuse water from the Bayard wastewater treatment plant. The project has since changed and will no longer rely on reuse water; it is now considered a "diversion alternative" by the Bureau of Reclamation. For those reasons, we do not include it in this list of non-diversion alternatives.
3. Cost reflects the average of high- and low-cost estimates from the Bureau of Reclamation.
4. Cost reflects the average of high- and low-cost estimates from the Bureau of Reclamation.
5. Most of the watershed restoration project proposals do not estimate potential water savings.

Diversion Projects Are Economically Infeasible for Agricultural Water Users

WRA did not evaluate the potential for non-diversion strategies to reduce the supply-demand gap in the agricultural sector in Southwestern New Mexico. However, we note that the proposed diversion projects would likely be prohibitively expensive for farmers to fund, without significant state or local subsidies. Figure 3 illustrates the annual cost for water from a $437 million diversion project, Bohannan-Huston's "Recommended Alternative 2B".

This cost of water would exceed the value of most, if not all, crops. Furthermore, it assumes farmers could acquire long-term, low-interest loans; if that is not possible, participants would face a high up-front cost for initial construction.

Recommendations

This assessment leads to several key recommendations for water planners and policy makers when forging the Southwest New Mexico Water Planning Region's water future. These recommendations can help New Mexico chart a path forward to meet the water needs of the region without sacrificing the state's important freshwater resources.

1. Do not burden Southwestern New Mexico customers or New Mexico state tax payers with an expensive and unnecessary diversion project. Cheaper and more flexible alternatives can meet the region's future water needs.

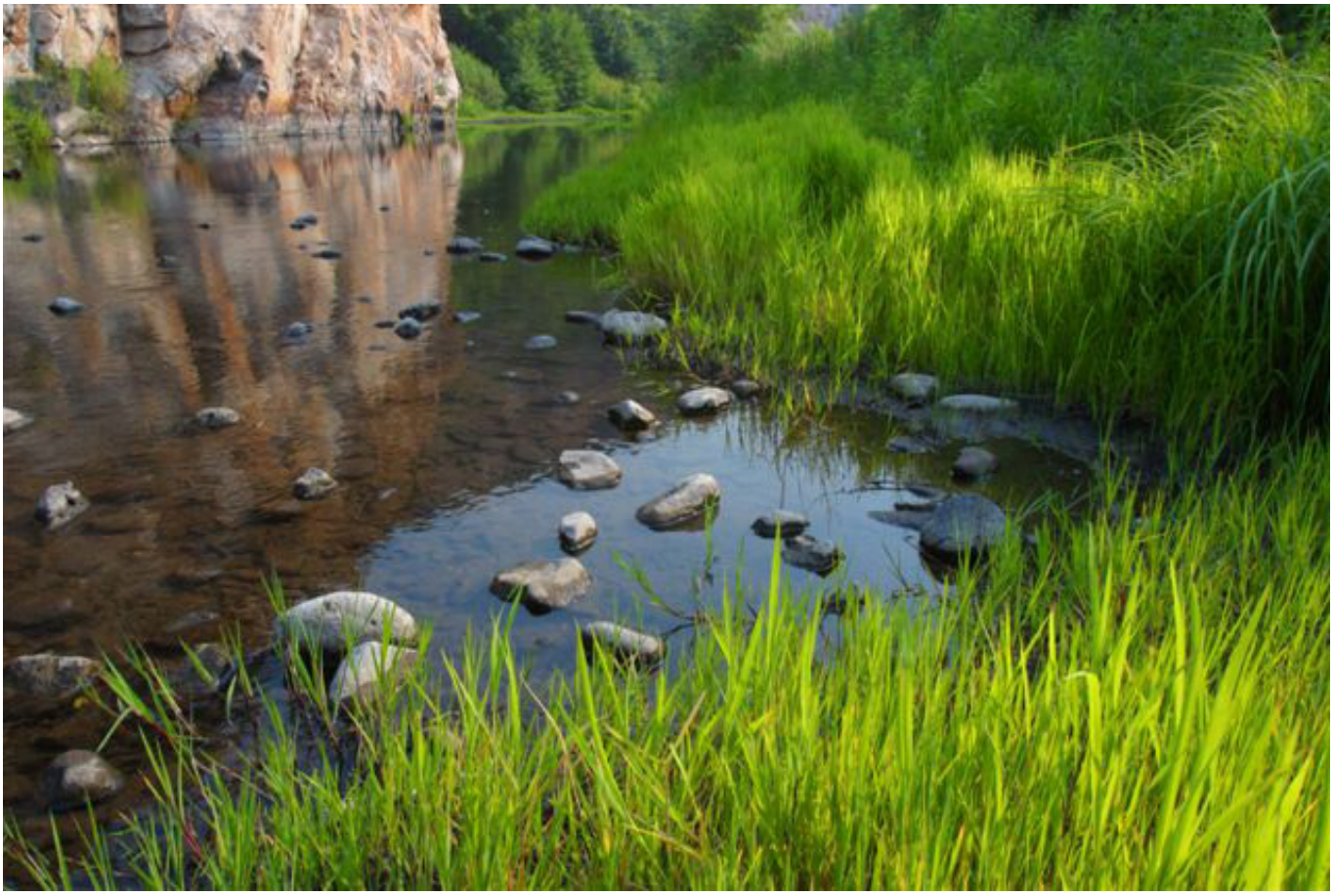
2. Meet the projected gap with conservation. Utilities have significant opportunities to boost their existing water conservation efforts. Conservation is the cheapest and fastest way to stretch water supplies, and conservation measures can be developed incrementally and over time, as population (and demands) grow, which does not financially commit communities—and future generations—to large, expensive, and unnecessary structural projects.

3. Maximize the role of water reuse to meet the future needs of the region's residents, and work to improve public perception and acceptance of reuse projects.

4. Protect the region's freshwater resources as an integral part of any future water development strategy. Outdoor recreation and non-consumptive uses of water for fishing, rafting, and other uses are worth billions of dollars annually to the state's economy** and are critical to New Mexico's quality of life.

Taken together, these strategies will protect the Gila River, and can help protect local water customers and New Mexico tax payers from the financial impacts of an expensive structural diversion.

** Outdoor Industry Association. 2012. The Outdoor Recreation Economy: New Mexico. Boulder, Colo. http://outdoorindustry.org/images/ore_reports/NM-newmexico-outdoorrecreationeconomy-oia.pdf.



Municipal Water Needs

Southwestern New Mexico Needs Just 35 Additional Acre Feet of Municipal Water in 2050

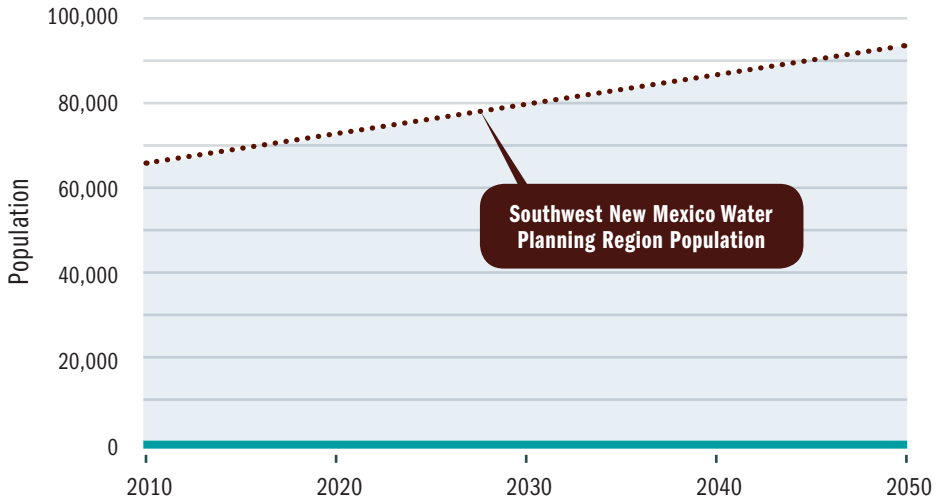
Municipal water demands are influenced by population growth, existing supply reliability, and water use efficiency or conservation. Each of these elements is discussed in greater detail below.

Population in the Region Drives New Demands

Population growth is the key driver of new water demands in the Southwest New Mexico Planning Region ("Planning Region"). According to the U.S. Census, New Mexico's 2000-2010 population growth rate of 13% ranks New Mexico as the 15th fastest growing state in the United States.[1,2] During this same period, the Planning Region—Catron, Grant, Hidalgo, and Luna counties—had a net population loss. According to the most recent projections of the New Mexico Interstate Stream Commission (ISC), a moderate increase in population and water demand over the coming decades is expected in the region.[3] Specifically, population in the Planning Region is projected to increase by 30,000 residents from 2010 to 2050, to a total of 93,200 people by mid-century (Figure 1).[4]

Previous population projections for the study area[5] were developed before the beginning of the recession of 2008 through 2010, and before the most recent downturn in copper mining activity in Grant County. This report adopts the population projections of the ISC, which the agency developed through 1) a review of the three aforementioned demographic studies, 2) a review of recent economic trends in the area and across the country, and 3) an analysis of demographic trends in nearby communities and regions in the Intermountain West - as well as in analogous recreational "gateway" communities. Additionally, we have calibrated the ISC's population projections by using the official 2010 U.S. Census population for the four counties as the 2010 baseline (which is slightly less than AMEC's 2010 baseline, published prior to the 2010 U.S. Census data).

FIGURE Nº 1 POPULATION IN THE SOUTHWEST NEW MEXICO WATER PLANNING REGION IS PROJECTED TO INCREASE BY 30,000 PEOPLE BY 2050.



Modest Growth in Water Demands Is Projected for the Planning Region

Increasing population will be a primary driver for growing water demands in the residential and commercial sectors in the Planning Region. Water demand calculations for the Planning Region presented in this assessment rely on population and water demand data from 2005, and population and water use projections for 2050 published in the ISC Regional Demand Study for the following sectors:

- All public water supply systems (using high municipal and industrial demand projections)
- Self-supplied commercial (high demand projections)
- Self-supplied residential (low demand projections)

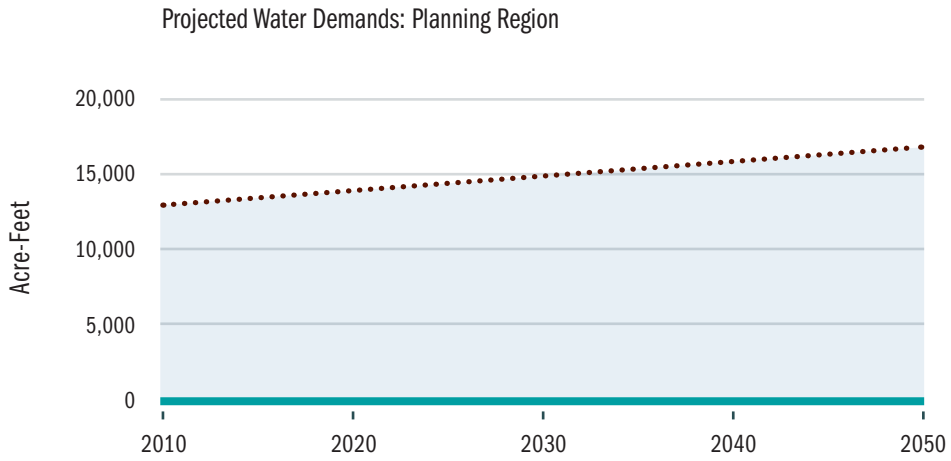
Table 1 below provides the demand projections for each sector. Water demand for other sectors, including mining, industrial uses, and power generation, are not included in this assessment for several reasons: the state expects a reduction in mining water demands over the next decades;[6] projected industrial water demand is expected to decrease (under the ISC low scenario) or only slightly increase (high scenario) in the next 40 years;[7] and the water needs of the energy sector are beyond the scope of this assessment.[8]

TABLE Nº 1 WATER WITHDRAWALS IN THE REGION FOR KEY SECTORS ARE PROJECTED TO GROW MODESTLY.

Sector	2010 Withdrawals (AF)		2050 Withdrawals (AF)	
	WRA*	AMEC, 2010	WRA*	AMEC, 2010
Public water supply systems†	9,160	9,300	13,380	13,630
Self-supplied commercial†,‡	1,190	1,190	1,560	1,560
Self-supplied residential†,§	2,510	2,510	3,380	3,380
Total	12,860	13,000	18,320	18,560
With passive conservation¤	12,860	13,000	16,730	16,950

* Estimates rely on AMEC, 2010 data.
† Figures do not account for passive or active conservation savings.
‡ ISC Regional Demand Study, 2010 high projections for the self-supplied commercial sector.
§ ISC Regional Demand Study, 2010 low bound (low scenario) projections for the self-supplied residential sector.[9]
¤ Passive conservation savings are applied only to public water supply systems and self-supplied residential use.

FIGURE Nº 2 WITH PASSIVE CONSERVATION, WATER DEMANDS FOR THE MUNICIPAL AND INDUSTRIAL, AS WELL AS SELF-SUPPLIED COMMERCIAL AND RESIDENTIAL SECTORS ARE PROJECTED TO GROW BY 3,870 ACRE-FEET BY 2050.



Water conservation can be characterized in two primary ways: passive and active. Passive conservation occurs when inefficient water appliances and fixtures are replaced over time with new, more water-efficient ones. Active conservation, on the other hand, is achieved by deliberately investing in policies, rebates, incentives, or other measures. In this analysis, WRA assumes that passive conservation reduces per capita demands by 9.5% between 2010 and 2050. Accordingly, when accounting for passive conservation savings, total water demand for the Planning Region in 2050 will be approximately 16,730 acre-feet (5.45 billion gallons), an increase of approximately 3,870 acre-feet (1.26 billion gallons) from current use (Figure 2).

Existing Water Supplies

Most of the current water supply of the four counties comes from groundwater.[10] WRA uses 2010 demands as a proxy for permitted water supplies. Because the City of Deming and the Town of Silver City have additional permitted water rights and the ability to collect and deliver these with existing infrastructure, we include these in the gap analysis under the *additional permitted water rights* wedge (Figure 3).[11]

Areas of Greatest Concern and Associated Groundwater Depletion

For this gap analysis to be reliable, it is important to determine the ability of groundwater supplies to meet current municipal permitted use on a long-term basis. The Bureau of Reclamation (BOR) report on *Supply and Demand Correlation for the New Mexico-Gila Basin-Arizona Water Settlement Act* ("Correlation Study") sheds some light on this important issue. Below is a list of the areas of greatest concern identified in BOR's Correlation Study, together with the study's groundwater depletion assessment for each area.[12]

SILVER CITY

"Assuming groundwater declines continue at current rates, by 2050 groundwater would be between 34 and 68 feet lower than today. These wells are from 550 feet to over 1,000 feet deep and penetrate 200 to 600 feet of the Gila Group aquifer. A simplified analysis would indicate this rate of groundwater decline could continue for over 100 years before impacting wells, other than increased energy costs associated with the higher lift. [13]

"Silver City is permitted to use 4,566.64 acre-feet per year. Silver City's 40-year water plan estimates that sometime between 2021 and 2043 demand will exceed permitted water rights owned by the city. So, it appears Silver City is limited more by permitted withdrawals than by the availability of groundwater."[14]

ITC

"Depending on actual well configurations, the current rate of groundwater decline could continue for over 100 years before impacting wells, other than increased energy costs associated with the higher lift. The aquifer depth underlying Deming's well fields is estimated at 2,500 feet thick, indicating wells/pumps could be deepened if necessary."[15]

LORDSBURG

"Water demand is not expected to increase in Lordsburg over the next 40 years. Annual withdrawals are about 610 acre-feet. The municipal well field for the municipal system is not currently experiencing significant groundwater decline."[16]

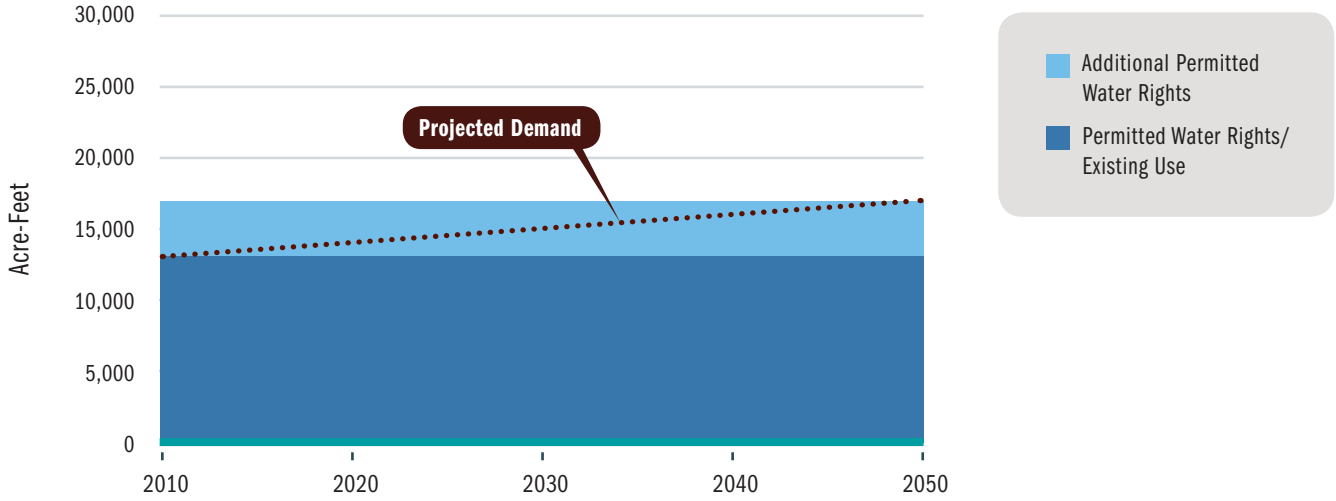
COLUMBUS

"Although Columbus is experiencing the fastest growth rates in the region, annual withdrawals total only about 240 acre-feet/year. Groundwater withdrawals associated with Columbus are probably relatively insignificant to the overall aquifer, although additional study is recommended."[17]

RURAL AREAS

"Self-supplied domestic rural users account for less than 1% of total groundwater withdrawals in the region. Concentrations of self-supplied

FIGURE Nº 3 FUTURE WATER NEEDS OF THE SOUTHWEST WATER PLANNING REGION.



wells near population centers contribute to local groundwater declines, but more isolated wells have minimal impacts to regional groundwater basins. A 1964 United States Supreme Court Decree, and subsequent adjudication, prohibit outdoor use of withdrawals in the Gila Basin. However, outdoor use could be provided through a transfer from existing agriculture water rights to domestic wells. The transferred agriculture water would be replaced by diversion and use of AWSA water."[18]

The ISC Regional Demand Study acknowledges that local water managers desire to preserve agriculture and upgrade non-consumptive wells to consumptive wells using AWSA water. It also recognizes, however, that there is an ongoing water market through which existing surface water supplies (consumptive use water) is being transferred to these non-consumptive wells.

Although BOR's Correlation Study identifies data gaps, particularly with regards to data gathering and analysis of groundwater levels and ground-

water trends for the entire Mimbres Basin, the study does not identify any serious water quality or quantity issues that would prevent the areas of concern from continuing to use their current permitted water rights for existing groundwater supplies on a long-term basis. Furthermore, because the four counties have additional permitted water rights that have not been included in the supply baseline, the existing supply calculation likely underestimates existing permitted water rights.

Municipal Water Needs Summary

Taking into account the effect of passive conservation on future water demands, WRA projects water demand in the Planning Region in 2050 will be 16,730 acre-feet per year. With existing supplies and additional permitted water rights totaling 16,695 acre-feet per year, the Planning Region will need an additional 35 acre-feet by 2050 to fully meet projected annual demands (Figure 3).

It is important to note that this gap assessment is meant to inform water supply planning from a state- and basin-wide perspective. The water supply gap is projected for the Planning Region as a whole and does not take into account more localized water supply and demand issues, such as climate variations and water infrastructure system flexibility. This assessment assumes a more dynamic and integrated water system (i.e., a regional water system) along the Planning Region than what currently exists today. A good example of a regional water system has been submitted by the Grant County Water Commission and its members in its AWSA application to formally develop a Regional Water Supply and Distribution System to meet existing and future demand for drinking water for the municipalities of Grant County and adjacent unincorporated areas.

Conservation

Conservation Can Meet Most Future Urban Water Needs

Based on a review of water use in the Planning Region and surrounding communities and on conservation program examples from around the country, the Southwest New Mexico Regional Water Plan estimates an average of 33% of water savings can be achieved by communities in the Planning Region through water conservation programs.[19] Other pieces of published literature and multiple studies also indicate that water conservation can reduce per capita water use in the Planning Region by 33% over the next 40 years. A 33% per capita reduction between 2010 and 2050 would reduce system-wide annual water demand by approximately 5,550 acre-feet by 2050. This conservation strategy corresponds to a 1% reduction in per capita use per year, with 2010 as the baseline year.

Almost one-third of this reduction would require no effort from water providers, for it would be achieved from passive conservation resulting from new development and the replacement of inefficient appliances and fixtures over time. (These savings are incorporated in the demand projections for the region.) The remainder, 3,960 AF/yr, could be gained through cost-effective, active conservation programs. WRA assumes that only a portion of active conservation savings (60%) would be used to meet new water demands. The other active conservation savings (40%) are allocated to system reliability to support water utilities' desire to meet water demands consistently across uncertain and variable climatic conditions, population

TABLE Nº 2 CONSERVATION SAVINGS COULD MEET FUTURE WATER NEEDS AND IMPROVE SYSTEM RELIABILITY.

	M&I Passive Conservation	M&I Active Conservation	Total Volume (Acre-Feet)
Savings allocated as reduction in future demand projections	100%	0%	1,590
Savings allocated to meeting future demands	0%	60%	2,370
Savings allocated to system reliability	0%	40%	1,590
Total			**5,550**

and economic growth, increasingly stringent water quality and quantity regulations, and catastrophic events (Table 2).[20]

Achieving water savings from our conservation strategy will require an immediate and enduring investment in conservation programs. The estimated passive and active conservation reductions apply to all public water supply systems (within incorporated and unincorporated communities) and to the self-supplied (SS) residential sector, but not to the self-supplied commercial sector.

TABLE Nº 3 WATER CONSERVATION TARGETS IN SOUTHWESTERN NEW MEXICO AND OTHER CITIES IN THE REGION

City	2005 GPCD*	Southwest New Mexico Regional Water Plan/WRA Conservation Strategy's 2050 GPCD Target
Deming, NM	235	150
Lordsburg, NM	204	150
Silver City, NM	223	150
	Current GPCD	
Albuquerque, NM	150	
Aurora, CO	121	
Santa Fe, NM†	107	

Water Conservation Strategy Targets and System-Wide Gallons Per Capita Day (GPCD) in the Planning Region and Other Communities in the Southwest.

* 2005 GPCD is used for the 2010 Planning Region demand baseline calculations. GPCD data from the ISC Regional Demand Study, 2010.

† GPCD data from City of Santa Fe, Water Division website page, http://www.santafenm.gov/water_conservation, accessed January 6, 2014.

After conducting a robust stakeholder process and a technical feasibility assessment, the Southwest New Mexico Regional Water Plan adopted the same conservation levels as WRA's conservation strategy for the Planning Region, concluding that these levels of water savings are both technically and legally feasible and have been done throughout the Southwest.[21] Of note, the City of Albuquerque, which has adopted aggressive conservation goals and effective programs, has reduced per capita water use by approximately 40% between the mid-1990s and today, to the city's current rate of 150 gallons per capita per day (GPCD) (Table 3).[22]

The federal government serves as an additional example on the reasonableness of a 1% reduction in water use per year. The federal government provides financial and technical support for state and city-level water conservation programs. [23] One of the most important water conservation programs at the federal level was established by President George W. Bush: Executive Order (E.O.) 13423, "Strengthening Federal Environmental, Energy, and Transportation Management."[24] This executive order lays the foundation for President Obama's E.O. 13514, "Federal Leadership in Environmental, Energy, and Economic Performance."[25] Together, these two executive orders mandate federal agencies to significantly reduce their potable water use in an economically and fiscally sound manner. Federal agencies must, among other things, reduce their potable water consumption intensity[26] by 2% per year, or by 26% from 2007-2020, and adopt and annually update a plan that prioritizes cost-effective actions to meet the executive order's goals and targets.[27,28] The Director of the Office of Management and Budget must publish scorecards providing periodic evaluations of compliance with E.O. 13514. A review of all of the published 2012 scorecards shows 85% of all federal agencies are meeting the federal government's mandate to reduce by 2% per year their potable water use intensity.[29,30] Eighty-five percent of all federal agencies reduced their potable water use by an average of 4% per year from 2007-2011. Two federal agencies achieved the 2007-2020 26% potable water use reduction goal in four years.

Water Conservation Sustains Utility Revenue

Many utility managers are hesitant to invest in robust conservation programs, out of concern they will have to increase their water rates to compensate for the loss of revenue resulting from reducing demand. This concern is often misplaced. Because conservation programs reduce or eliminate the need to develop new water resources and infrastructure, some of the utilities that have looked deeper into this issue have found that their water rates would actually be much higher in the absence of their conservation programs. A recent study conducted by the City of Westminster (Colo.) found that if the city had not invested in water conservation, tap fees would have increased by 80% and water rates by 95%, compared to their current rates and fees.[31] There are also proven methods and best practices to structure water rates such that utilities can sustain their revenue while investing in conservation programs.[32]

Previous reports of the Filling the Gap series have addressed a number of other concerns raised around urban water conservation. These included demand hardening, permanency of conservation savings, and the uniqueness of water providers. For brevity's sake, these issues are not repeated here, but extensive experience and data demonstrate they need not serve as barriers to investing in long-term robust conservation programs.[33]

As demonstrated by the Southwest New Mexico Regional Water Plan, numerous cities in New Mexico and the Southwest, and federal government initiatives, reducing per capita water use by 1% per year is a reasonably achievable strategy. Meeting future water needs through conservation and efficiency measures has other, additional benefits. Perhaps most importantly, conservation measures can be developed incrementally and over time, as

population (and demands) grow, and do not financially commit communities—and future generations—to large, expensive, and unnecessary structural projects.

Conservation Goals Are Achievable

Achieving WRA's recommended levels of active conservation savings will require an increased and sustained effort by utilities and residential and nonresidential customers. The Southwest New Mexico Regional Water Plan estimates that our conservation goal can be achieved if all communities in the Planning Region reduce system-wide municipal and residential water use to approximately 150 GPCD and 100 GPCD, respectively.[35] Meeting this conservation goal will likely require improving water use efficiency in indoor and outdoor uses, as well as reducing water loss.

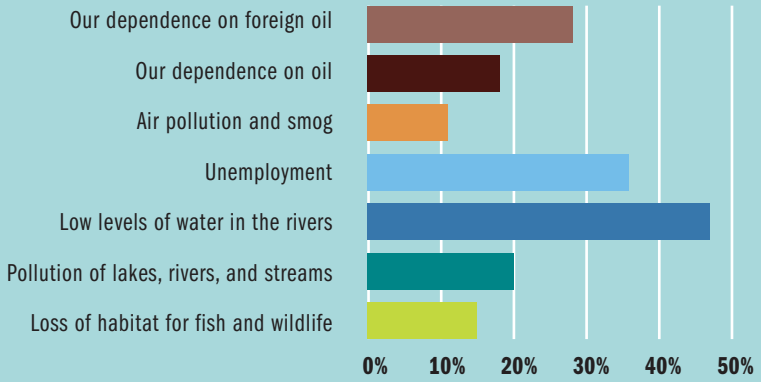
Indoor Use Conservation

For residential customers, utilities should establish a goal of reducing indoor water use to an average of 30-35 GPCD by 2050, and implement measures to meet that goal. Many households already use less than 35 GPCD today.

Citizens Support Water Conservation and Healthy Rivers

Communities and decision-makers need to better understand the willingness of their citizens to fund water conservation. Maintaining water and healthy flows in rivers is a very serious concern for New Mexico voters; according to a recent poll, healthy flows in rivers is a more serious concern—by a significant margin—than unemployment.

FIGURE Nº 4 PERCENTAGE OF NEW MEXICO VOTERS WHO BELIEVE THE ISSUE IS AN EXTREMELY SERIOUS PROBLEM.



The 2014 Conservation in the West Poll found that almost half of New Mexico voters believe low levels of water in rivers is an extremely serious problem, compared to slightly more than one-third who show the same level of concern with unemployment, which tends to be the most dominant economic concern for voters.[34]

Because people typically do the same things inside a home (cook, clean, wash clothes, shower, etc.), the variation of indoor residential per capita water use across the U.S. is low. Indoor water use is commonly determined through end-use studies. In an end-use study, data loggers are used to record flows at a household water meter in short time increments (10 seconds or less). This data can then be processed in a way that identifies which fixture or appliance in the home was using the water. By logging multiple homes over an extended period of time, a water provider can estimate the amount of water used by residential customers for various purposes.

A 2011 end-use study conducted by Aquacraft for Salt Lake City and the U.S. Environmental Protection Agency (EPA) found that new homes built with fixtures and appliances using the best available water efficiency technology (similar to those built to the EPA WaterSense New Home specification) *currently* achieve an indoor GPCD of 36.[36] Existing homes can also reduce their current water use to 35 GPCD through existing retrofit technology. In 2011, the Albuquerque Bernalillo County Water Utility Authority (ABCWUA) conducted a retrofit study with high single-family residential (SFR) water users to estimate the conservation potential of high-efficiency retrofits and appliances. ABCWUA found that its high SFR water users achieved a GPCD of 31 after implementing a retrofit program.[37] The medium, long-term conservation strategy of the Statewide Water Supply Initiative (SWSI) of Colorado establishes a 35 GPCD goal for indoor residential water use. SWSI's conservation study describes the methodology to achieve this level of savings and provides extensive documentation that supports this demand reduction strategy.[38]

Key measures for indoor conservation include installing high-efficiency fixtures in new housing developments and retrofitting many existing homes over the next 20 years. Several different ordinances and rebate programs can achieve this outcome in residences. For nonresidential customers, indoor use can be reduced through similar ordinance and rebate programs, as well as through water audits and business-specific water rates.

Outdoor Use Conservation

Outdoor irrigation typically uses at least half of the annual potable water supply in municipal water systems. Similar to how ordinances affect indoor water use, land use ordinances affecting new construction (such as irrigation design, turf restrictions, or plant lists appropriate for the community) can play a significant role in reducing water demands for homes that are yet to be built. For example, the City of Deming has numerous landscape standards and outdoor water conservation programs that ensure water conservation by limiting turf and encouraging the use of native and low-water-use plants. The standards stipulate that all landscape plant material in the city must be of low-water-use type and drought-tolerant, with the following exceptions:[39]

- **Single and Two-Family Residences**: Up to 50% of landscape can be turf, but turf area cannot exceed 3,000 square feet.[40]
- **Subdivision Common Areas**: A maximum of 15% may be devoted to turf.[41]
- **Multiple Dwellings, Mobile Home Parks, and Institutional Developments**: 25% of total lot or site area must be landscaped with low-water-use or drought-tolerant plants, and no more than 20% of the remaining

lot area (excluding concreted and paved areas) may be planted in turf. Turf cannot exceed 20% of common areas.[42]

Currently, the City of Deming also has a voluntary turf-to-xeriscape conversion rebate program being funded as a pilot project of the AWSA planning process. Water audits, budget-based rates, and incentives to replace high-water-using landscapes can all be used to reduce outdoor use in existing homes.

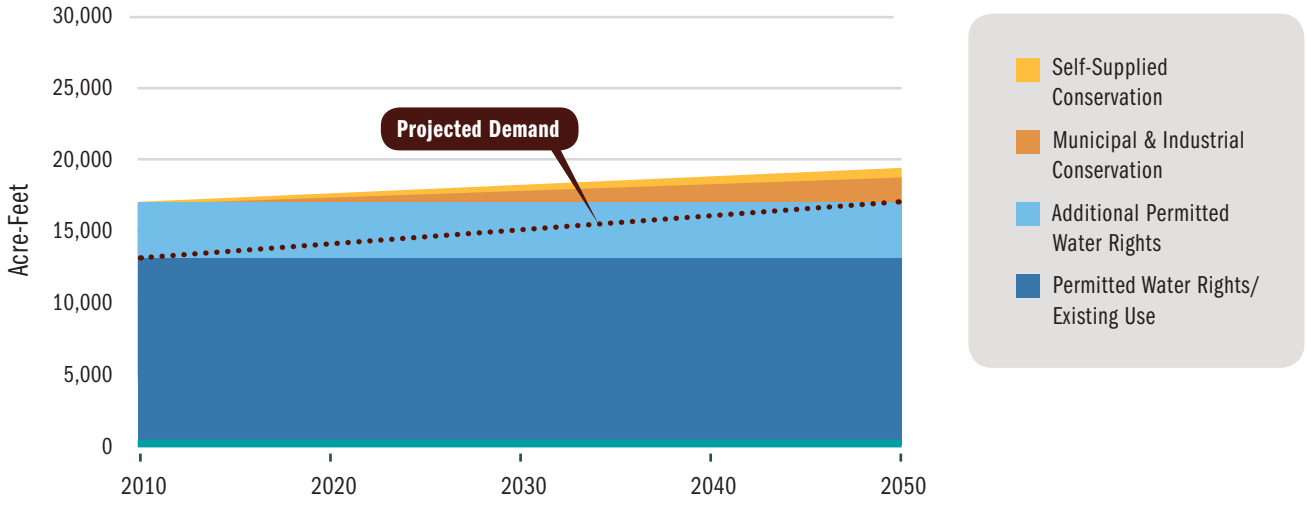
Reducing Water Loss

Utilities can identify and reduce system water losses. Water loss control means system auditing, loss tracking, and infrastructure maintenance, and ensures water providers are fully paid for the services they deliver.

The Southwest New Mexico Regional Water Plan provides a more comprehensive description of both the water sectors and water conservation programs that can be implemented in the Planning Region to achieve the conservation strategy.[43]

FIGURE Nº 5 NON-DIVERSION STRATEGIES MEET AND EXCEED FUTURE WATER DEMANDS

Estimate of Water Needs for the Planning Region, Including Additional Permitted Water Rights and Active Conservation Strategies.



Conservation Summary

By dedicating a little more than half of active water conservation savings to meeting future needs, 2,370 acre-feet of "new" water will be made available annually by 2050, which is represented by the orange wedges in Figure 5 below.

Achieving the proposed conservation levels will require a sustained, coordinated effort between utilities, the state, city planners, private industry, the general public, and the conservation community. The available AWSA funds could likely cover much, if not all, of the costs of active conservation.

Regional Infrastructure and Reuse

As the costs and challenges of developing new water supplies mount, reuse is increasingly becoming an important strategy to meet growing demands. This is recognized in the report *Regional Water Demand Study for Southwest New Mexico Catron, Grant, Hidalgo and Luna Counties*, which states "Wastewater reuse is a popular method for public water supply systems to reduce their total withdrawals. While treating then reusing wastewater will decrease the need for additional water to be withdrawn, more of that water will be depleted especially if it is used for outdoor irrigation."[44]

The development of a regional infrastructure system to improve access to public water supplies is also critical to meeting future potable water needs of the region. Regional infrastructure and cooperation can support multiple interests. It can improve the ability of local communities to effectively manage and pool their resources to provide a more reliable, high-quality water supply to the public at a reasonable cost, while promoting a sustainable environment and a vibrant economy.[45] Below we list examples of regional infrastructure and reuse projects, as described in AWSA proposals. Additional reuse beyond that specified in the proposals may be possible, especially when uses beyond irrigation are considered, such as industrial, cooling, and even potable uses.

Available Federal Funding Could Support Stakeholders' Proposed Reuse Projects

The City of Deming and Grant County have proposed two projects for increasing the use of reuse water in the region. Those projects, described below, could be supported by the AWSA funding.

City of Deming

The City of Deming's AWSA Tier 2 funding proposal for a reuse alternative would expand the city's existing reuse program. Treated return flows are currently the use of recycled water for irrigating parks, athletic fields, and the court house, reducing demands on diminishing groundwater supplies. The AWSA proposal would increase the use of recycled water for park, athletic field, and court house irrigation, reducing demands on diminishing groundwater supplies. In its proposal, the city estimates that reuse at these new facilities could further reduce city groundwater demands by as much as 820 acre-feet per year. The project is also described as an alternative that

will result in over 300 acre-feet of supply for municipal irrigation purposes.

The city currently reuses 336 acre-feet each year. Assuming 300 acre-feet of new yield from the proposed project, total city reuse would increase to 636 acre-feet. The city also notes that storm water could be used to supplement the project, further increasing the yield.[46]

Grant County

The Grant County Commission's AWSA Tier 2 application includes the development of a new well field near the Grant County Airfield. In addition to providing a new supply for the City of Hurley, the well field would provide a point of diversion for 750 acre-feet per year of return flows credits from the Silver City wastewater treatment plant.[47]

The project would include the development of an intercommunity pipeline that would link the water supplies of Hurley, Bayard, Santa Clara, and Silver City, providing drinking water for communities that need it.[48] There would be several pumping stations and a tank site near Silver City associated with the pipeline.

The proposal also notes other supplies could be used to increase the project yield. Here we use the county's assumed reuse project yield of 750 acre-feet, which does not include an additional 193 acre-feet of new supply for Hurley that would be provided by the proposed well field and other project infrastructure.[49]

TABLE Nº 4 REUSE SUPPLIES COULD INCREASE SIGNIFICANTLY

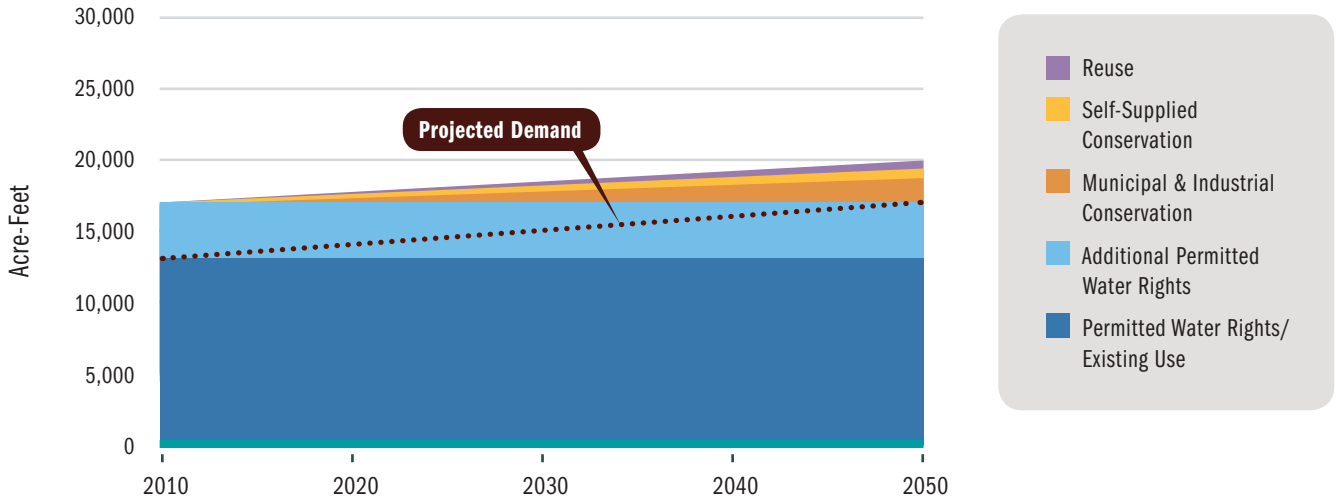
	Annual Reuse Project Yield (AF/yr)		
AWSA Project Applicant	Existing	New (proposed)	Total
City of Deming	336	300	636
Grant County Commission/ Grant County	---	750	750
Total	**336**	**1,050**	**1,386**

The Proposed AWSA Projects Would Increase Reuse Supplies from 336 AF/year to 1,386 AF/year.

Regional Infrastructure and Reuse Can Close the Gap

The City of Deming is the only municipality in the Southwest New Mexico Water Planning Region with a significant existing reuse program. Table 4 includes existing reuse and future reuse opportunities estimated in AWSA reuse proposals. As represented by the purple wedge in Figure 6, we assume new reuse in the Planning Region will reach 1,050 acre-feet per year by 2050.

FIGURE Nº 6 ACTIVE CONSERVATION, REUSE STRATEGIES AND ADDITIONAL PERMITTED WATER RIGHTS EXCEED THE ESTIMATE OF WATER NEEDS FOR THE PLANNING REGION.

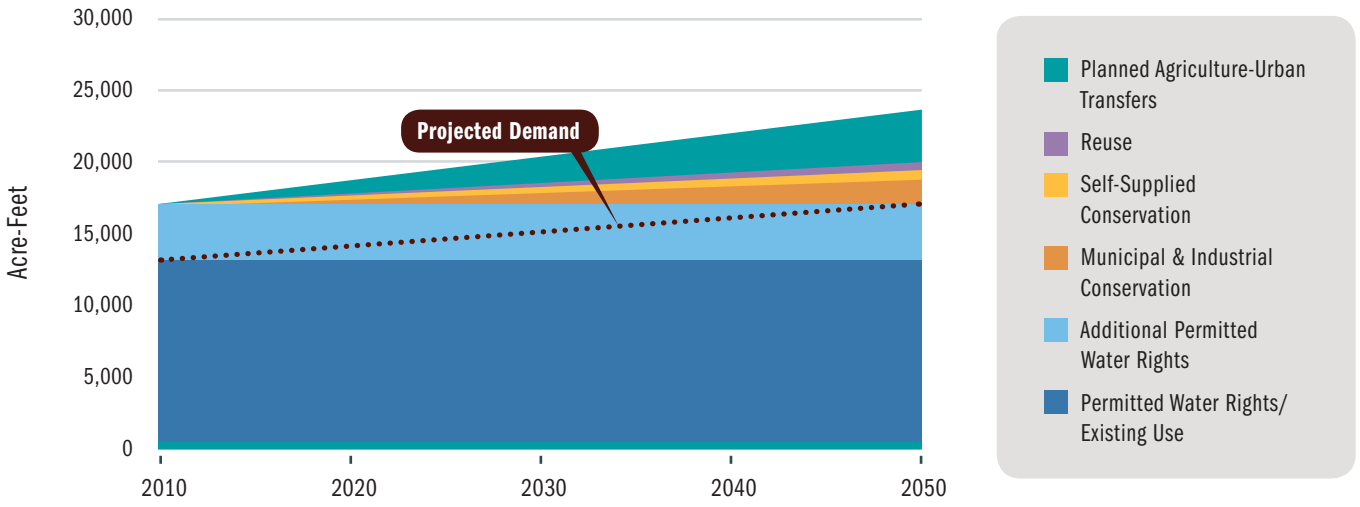


Planned Ag-Urban Water Transfers

Planned Ag-Urban Transfers Need to be Included in Needs Assessment

As discussed in its 40-Year Water Plan, the City of Deming owns 3,780 acre-feet of consumptive use in irrigation water rights that it plans to convert to municipal use in the future if necessary (Figure 7*)*.[50,51] Even though these transfers do not exemplify the ag/urban cooperation strategy promoted by WRA, this water supply of the City of Deming should be accounted for and is, therefore, included as a separate wedge in the gap assessment. As a core part of its water planning strategy, Deming anticipates to continue to acquire additional agricultural water rights to meet future municipal demands.

FIGURE Nº 7 **ACTIVE CONSERVATION, REUSE STRATEGIES, PLANNED AG-URBAN TRANSFERS, AND ADDITIONAL PERMITTED WATER RIGHTS SIGNIFICANTLY EXCEED THE ESTIMATE OF WATER NEEDS FOR THE PLANNING REGION.**



Our conservation and reuse strategies, together with municipally owned agricultural water rights that are already planned to be converted to municipal use would provide 200 times the additional water needed to meet the 2050 gap.

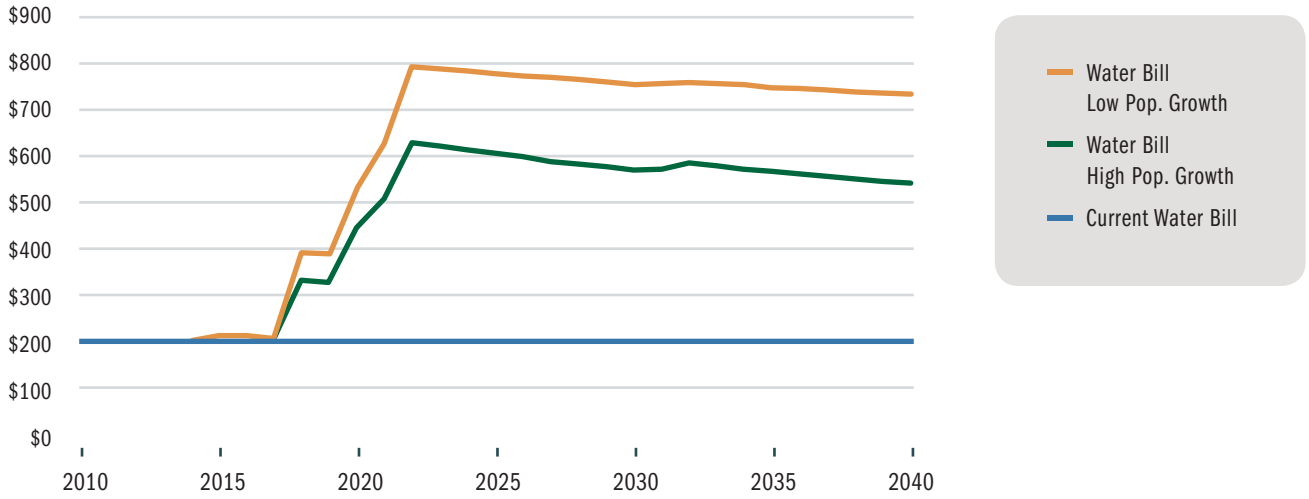
Financial Impacts of Proposed Projects

Alternatives for the proposed Gila diversion project are estimated to cost between $400 million and $500 million, according to analyses conducted for the NMISC. Federal subsidies provided through the AWSA may provide as much as $136 million (in 2013 dollars), which will cover only a fraction of the capital cost, and will not cover ongoing operation, management, and replacement (OM&R) costs to Central Arizona Project users in Arizona. The project cost estimates also may exclude important components, such as municipal treatment and distribution facilities, which would further increase costs.

Southwest New Mexico's municipal water customers, agricultural water subscribers, and local taxpayers would pay the balance of the project's cost, which is likely to triple or quadruple the average customer's water bill.

FIGURE Nº 8 DIVERSION PROJECT WOULD TRIPLE TO QUADRUPLE WATER BILLS

Annual household water cost in Deming, N.M. (5,000 Tap Fee, 55% of Project for Deming)



Using conservative economic assumptions*, we analyze the cost impacts to customers.

In 2014, Bohannan-Huston estimated the preferred alignment for the Deming diversion proposal would cost approximately $437 million to deliver a firm yield 10,000 AF of water per year to communities in the region ("Recommended Alternative 2B," developed for the ISC†). As proposed, the project would provide 5,500 AF of water per year to Deming to meet municipal water needs. To cover the cost of this water, the typical Deming household's water bill would increase significantly, from the current average of $200/year to over $630/ year. If population follows a low-growth trajectory, water costs will be even higher—near $800 per household per year in 2023 (Figure 8).

This assumes Deming—and other cities—can cover a portion of the project's costs with "tap fees" or new connection fees. In this analysis, Deming's tap fees would need to be increased to $5,000/ new household. For reference, prior to 2012, a new residential tap fee in Deming cost $400.‡ While WRA evaluated the impact on customers only in the City of Deming, we expect the other cities that might subscribe to the remaining 4,500 AF of water would see similar impacts on municipal water bills and tap fees. Of note, these cities have not yet committed to purchasing water from the project.

The Bureau of Reclamation developed an independent analysis of the cost of this proposed alternative. Its estimate, with a capital cost of $440 million for 10,000 AF of water, would place a comparable cost burden on participating utilities' customers.

Importantly, customers would have to pay for the capital cost of the infrastructure regardless of the volume of water delivered by the project. If fundamental engineering challenges, climate change, or long-term drought reduced water deliveries, customers may avoid the annual OM&R costs of the project, but could not default on the infrastructure payments.

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* We make the following assumptions:

(a) Project proponents would pay the capital debt over a 30-year period, at a 3.5% interest rate.

(b) Preliminary permitting activities would occur in 2015–2017, and the main construction costs would be incurred over the period from 2018–2021. This permitting and construction time frame reflects the fastest possible time frame; a longer permitting and design period, which is more likely, would postpone the main construction activities by several years. In this case, the main cost impacts would also be delayed by several years.

For a detailed methodology, please contact WRA.

† The BHI analysis appears to have an unrealistically low annual OM&R cost. We use the Bureau of Reclamation's estimated O&M cost of $6.28 million/ year (which includes Central Arizona Project replacement costs).

‡ Tap fees were increased in 2012, based on property size.

Federal Funds Can Support Non-Diversion Alternatives

Stakeholders also have proposed numerous non-diversion alternatives, which would be eligible for funding from the AWSA. The federal allotment for non-diversion alternatives is approximately $90 million ($66 million in 2004 dollars, adjusted to 2013 dollars). With this amount, all of the Tier 2

TABLE Nº 5 AVAILABLE FEDERAL FUNDING COULD COVER ALMOST ALL OF THE PROPOSED NON-DIVERSION PROJECTS

The available AWSA funding could cover a significant portion of the non-diversion proposals submitted to the New Mexico Interstate Stream Commission and WRA's proposed level of municipal conservation. All cost estimates are from the Bureau of Reclamation, unless otherwise noted.

Category	Proposal	Cost	Volume (AF)
Municipal Conservation[1]	WRA Conservation Strategy (Active, M&I, and SS)	$ 15,600,000 NPV	2,370
Regional Infrastructure and Reuse[2]	Grant County Water Utilization Alternative	$ 16,473,700 capital costs; $ 29,270,000 NPV	943
	Deming Reuse	$ 4,086,000 capital costs; $ 6,780,000 NPV	336
Ditch Improvements	Pleasanton Ditch Improvements[3]	$ 2,142,500 capital costs; $ 2,685,000 NPV	1,575
	Luna Ditch Improvements	$ 1,307,600 capital costs; $ 1,640,000 NPV	419
	Sunset/New Mexico New Model Pipeline[4]	$ 9,671,150 capital costs; $ 12,105,000 NPV	2,495
Watershed Restoration/ Forest Thinning[5]	NMFIA Watershed Restoration	$ 2,140,800 NPV	173
	NMSU Watershed Restoration	$ 1,851,200 NPV	
	Grant Soil & Water Conservation District Forest Restoration	$ 1,168,400 NPV	
	USFS Watershed Restoration	$ 7,087,000 NPV	
	Catron County/San Francisco Watershed Restoration	$ 12,091,000 NPV	2,000
	Total	$ 92,418,400 NPV	10,311

1. Two entities, the City of Deming and the Gila Conservation Coalition, submitted proposals to the ISC that would fund municipal conservation; these proposals funded less conservation than the WRA strategy, but could be included in the proposed WRA conservation estimate. Additionally, the WRA conservation line does not include passive conservation savings, which would be acquired as older fixtures and appliances are replaced by newer, more efficient ones. The cost estimate reflects a conservative (i.e., likely more expensive) approach, based on the 2010 Colorado Water Conservation Board's Statewide Water Supply Initiative medium-level cost estimates for conservation, or $7,296/AF in 2010. Costs of conservation are spread throughout the 40-year period and discounted at a 3.5% discount rate.
2. The initial list of reuse proposals included the Grant County Recharge and Reservoir project, which would have relied on reuse water from the Bayard wastewater treatment plant. The project has since changed and will no longer rely on reuse water; it is now considered a "diversion alternative" by the Bureau of Reclamation. For those reasons, we do not include it in this list of non-diversion alternatives.
3. Cost reflects the average of high- and low-cost estimates from the Bureau of Reclamation.
4. Cost reflects the average of high- and low-cost estimates from the Bureau of Reclamation.
5. Most of the watershed restoration project proposals do not estimate potential water savings.

proposed projects, which include reuse, watershed restoration, and regional water distribution projects, could be funded. In addition, the AWSA funding would cover virtually all of the conservation savings needed to help meet the future supply-demand gap (2,370 AF of active water conservation). In sum, while each of these non-diversion projects merits a more detailed assessment of environmental impacts and local benefits, stakeholders could pursue all of them or purse alternative strategies to meet local water needs and improve the watershed, with the existing AWSA funding.

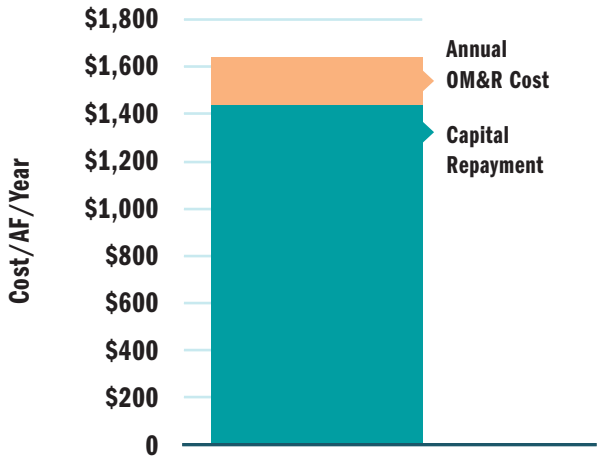
Diversion Projects Are Economically Infeasible for Agricultural Water Users

WRA did not evaluate the potential for non-diversion strategies to reduce the supply-demand gap in the agricultural sector in Southwestern New Mexico. However, we note that the proposed diversion projects would likely be prohibitively expensive for farmers to fund without significant state or local subsidies. Figure 3 illustrates the cost—per AF, per year—for water from Bohannan- Huston's "Recommended Alternative 2B" proposal, with capital costs of $437 million.

This cost of water would exceed the value of most, if not all, crops. Furthermore, it assumes farmers could acquire long-term, low-interest loans; if that is not possible, participants would face a high up-front cost for initial construction.

FIGURE Nº 9 WATER DIVERSION PROJECTS WOULD LIKELY BE PROHIBITIVELY EXPENSIVE FOR FARMERS

The annual cost of water to agricultural users, based on Bohannan-Huston Inc.'s (BHI) capital and Operations, Management, and Replacement (OM&R) cost estimates.



Recommendations

This assessment leads to several key recommendations for water planners and policy makers when forging the Southwest New Mexico Water Planning Region's water future. These recommendations can help New Mexico chart a path forward to meet the water needs of the region without sacrificing the state's important freshwater resources.

1. **Do not burden Southwestern New Mexico customers or New Mexico state tax payers with an expensive and unnecessary diversion project.** Cheaper and more flexible alternatives can meet the region's future water needs.

2. **Meet the projected gap with conservation.** Utilities have significant opportunities to boost their existing water conservation efforts. Conservation is the cheapest and fastest way to stretch water supplies, and conservation measures can be developed incrementally and over time, as population (and demands) grow, which does not financially commit communities—and future generations—to large, expensive, and unnecessary structural projects.

3. **Maximize the role of water reuse** to meet the future needs of the region's residents, and work to improve public perception and acceptance of reuse projects.

4. **Protect the region's freshwater resources as an integral part of any future water development strategy.** Outdoor recreation and non-consumptive uses of water for fishing, rafting, and other uses are worth billions of dollars annually to the state's economy§ and are critical to New Mexico's quality of life.

Taken together, these strategies will protect the Gila River and can help protect local water customers and New Mexico tax payers from the financial impacts of an expensive structural diversion.

§ Outdoor Industry Association. 2012. The Outdoor Recreation Economy: New Mexico. Boulder, Colo. http://outdoorindustry.org/images/ore_reports/NM-newmexico-outdoorrecreationeconomy-oia.pdf.

Notes

1 U.S. Census Bureau. 2012. 2010 Census of Population and Housing, Population and Housing Unit Counts, CPH-2-33, New Mexico. Washington, D.C.: U.S. Government Printing Office.

2 New Mexico Department of Workforce Solutions, and Bureau of Economic Research and Analysis. 2013. New Mexico Annual Social & Economic Indicators. Albuquerque, N.M.

3 AMEC Earth & Environmental, Inc. 2010. Regional Water Demand Study for Southwest New Mexico Catron, Grant, Hidalgo and Luna Counties. Prepared for New Mexico Interstate Stream Commission, New Mexico Office of the State Engineer. Socorro, N.M. October 10.

4 Ibid.

5 See 1) Daniel B. Stephens & Associates, Inc. 2005. Southwest New Mexico Regional Water Plan. Prepared for the Southwest New Mexico Regional Water Plan Steering Committee, City of Deming, New Mexico, Fiscal Agent. Albuquerque, N.M. May; 2) McDonald, Brian. 2007. Long Term Outlook for Population and Water Demand in Grant County, New Mexico; and 3) Alcantara, Adelamar. 2008. A Report on Historical and Future Population Dynamics in New Mexico Water Planning Regions. Prepared for New Mexico Interstate Stream Commission. Albuquerque, N.M.: Bureau of Business and Economic Research, University of New Mexico. August.

6 AMEC Earth & Environmental, Inc. 2010. Regional Water Demand Study for Southwest New Mexico Catron, Grant, Hidalgo and Luna Counties. Prepared for New Mexico Interstate Stream Commission, New Mexico Office of the State Engineer. Socorro, N.M. October 10.

7 Ibid., Table 3.23.

8 ISC's Regional Water Demand Study done by AMEC (see footnote 6) provides dramatic variation between the projected low bound (no change) demands and high bound, green energy development demands (an increase of more than 20,000 acre-feet). We expect most of this new water use for "green energy" would be used at solar thermal or concentrating solar power plants. Of note, since AMEC published its 2010 Demand Study, photovoltaic solar prices have dropped dramatically and the installed capacity has increased substantially. In addition, numerous concentrating solar plants in the Southwest have relied on dry cooling, which typically uses 90% less water than a conventional, wet-cooled plant. Therefore, we assume the AMEC, 2010 low bound projection is more likely than the same report's high bound green energy development scenario and its respective water demand.

9 ISC's Regional Water Demand Study done by AMEC (see footnote 6) indicates Gila-San Francisco Basin restrictions exist that prevent domestic well users from using water for outdoor watering, and that there is a growing demand in the four-county area by domestic well owners for additional agricultural water rights to allow irrigation of small outdoor gardens. AMEC's high bound projections of withdrawals by domestic wells take into account the potential that some well owners could transfer agricultural water rights to their non-consumptive wells (or alternatively acquire AWSA rights for that purpose) and, as a group, become significant water consumers. While this Water Demand Study acknowledges that the Catron County Land and Water Plans describe a desired future condition that includes preserving production agriculture and a preference that non-consumptive wells be upgraded to consumptive wells via AWSA water, it also recognizes that there is an ongoing water market that is transferring surface water off of ditches to these non-consumptive wells.

10 Johnson, M.S., L.M. Logan, and D.H. Rappuhn. 2002. Analysis of Effects of Ground-Water Development to Meet Projected Demands in Regional Planning District 4, Southwest New Mexico. Santa Fe, N.M.: New Mexico Office of the State Engineer, Hydrology Bureau. Hydrology Report 02-04. March.

11 Deming and Silver City have the ability to collect and deliver additional water from their water supply portfolio that would not be represented in their 2010 demands. The City of Deming is permitted to divert up to 6,102 AF of municipal use water rights, and the Town of Silver City, 4,566 AFY. Technical studies conducted by Silver City estimate long-term sustainable yield for the town wells at 4,200 AFY. Because both Deming and Silver City intend to rely heavily on these supplies in the future, and can do so with their existing infrastructure, we have included these permitted water

supplies (3,839 AFY) in the additional permitted water rights category. See 1) Daniel B. Stephens & Associates, Inc. 2009. City of Deming 40 Year Water Plan. Deming, N.M. July; and 2) Balleau Groundwater, Inc. 2006. Supplement on Water Use and Wellfield Service – Town of Silver City Water Plan. Prepared for the Town of Silver City. Albuquerque, N.M. February.

12 U.S. Bureau of Reclamation. 2010. Supply and Demand Correlation for the New Mexico-Gila Basin-Arizona Water Settlement Act. Phoenix Area Office. December.

13 Ibid.

14 Ibid.

15 Ibid.

16 Ibid.

17 Ibid.

18 Ibid.

19 Daniel B. Stephens & Associates, Inc. 2005. Southwest New Mexico Regional Water Plan. Prepared for the Southwest New Mexico Regional Water Plan Steering Committee, City of Deming, New Mexico, Fiscal Agent. Albuquerque, N.M. May.

20 For system reliability definition, see San Francisco Public Utilities Commission. 2012. California Urban Water Agencies' Water Supply Reliability Report. http://www.cuwa.org/pubs/CUWA_WaterSupplyReliability.pdf. August.

21 Daniel B. Stephens & Associates, Inc. 2005. Southwest New Mexico Regional Water Plan. Prepared for the Southwest New Mexico Regional Water Plan Steering Committee, City of Deming, New Mexico, Fiscal Agent. Albuquerque, N.M. May.

22 Albuquerque Bernalillo County Water Utility Authority. 2014. "Conservation & Rebates." Accessed January 3. http://www.abcwua.org/Conservation_and_Rebates.aspx.

23 Most of the federal financial support for water conservation programs is available through the following programs (funding entity listed in parentheses): Drinking Water State Revolving Fund (EPA); Clean Water State Revolving Fund (EPA); WaterSMART (Sustain and Manage America's Resources for Tomorrow, Bureau of Reclamation); Title XVI - Water Reclamation & Reuse Program (Bureau of Reclamation); Water Conservation Field Services Grant Program (Bureau of Reclamation); Water and Environment Programs, Rural Utilities Service, (USDA); Rural Business-Cooperative Service (USDA); National Resources Conservation Service (USDA); Public Works and Development Facilities Grants (Department of Commerce); Community Development Block Grants (Department of Housing and Urban Development); and the Colorado River Basin Salinity Control Program (Bureau of Reclamation).

24 Exec. Order No. 13,423, 72 Fed. Reg. 3919 (Jan. 26, 2007).

25 Exec. Order No. 13,514, 74 Fed. Reg. 52,118-52,120 (Oct. 8, 2009).

26 Potable water use intensity is the amount of potable water used per square foot.

27 Exec. Order No. 13,514, 74 Fed. Reg. 52,118-52,120 (Oct. 8, 2009).

28 Exec. Order No. 13,514, 74 Fed. Reg. 52,122 (Oct. 8, 2009).

29 Exec. Order No. 13,514, 74 Fed. Reg. 52,121 (Oct. 8, 2009).

30 Exec. Order No. 13,514, 74 Fed. Reg. 52,120-52,121 (Oct. 8, 2009).

31 Feinglas, S., C. Gray, and P. Mayer. 2013. Conservation Limits Rate Increases for Colorado Utility. Chicago: Alliance for Water Efficiency. November.

32 Ash, Tom. 2012. "Funding Water Conservation." Journal AWWA. 104:2. February.

33 Western Resource Advocates, Trout Unlimited, and Colorado Environmental Coalition. 2011.

Filling the Gap: Commonsense Solutions for Meeting Front Range Water Needs. Boulder, Colo. February.

34 Public Opinion Strategies, and Fairbank, Maslin, Maullin, Metz & Associates. 2014. 2014 Western States Survey: Interview Schedule. Prepared for the Colorado College State of the Rockies Project.

35 Daniel B. Stephens & Associates, Inc. 2005. Southwest New Mexico Regional Water Plan. Prepared for the Southwest New Mexico Regional Water Plan Steering Committee, City of Deming, New Mexico, Fiscal Agent. Albuquerque, N.M. May.

36 Aquacraft. 2011. Analysis of Water Use in New Single-Family Homes. http://www.aquacraft.com/sites/default/files/pub/Analysis-of-Water-Use-in-New-Single-Family-Homes.pdf. July 20.

37 Aquacraft. 2011. Albuquerque Single-Family Water Use Efficiency and Retrofit Study. Prepared for Albuquerque Bernalillo County Water Utility Authority. http://www.aquacraft.com/sites/default/files/pub/Aquacraft-(2011)-Albuquerque-Single-Family-Water-Use-Efficiency-and-Retrofit-Study.pdf. December 1.

38 Colorado Department of Natural Resources, Colorado Water Conservation Board. 2011. "Appendix L – SWSI 2010 Municipal and industrial Water conservation Strategies." In Colorado's Water Supply Future, Statewide Water Supply Initiative 2010. Denver, Colo. January.

39 Deming, N.M., Code § 12-18-2(C)(2).

40 Deming, N.M., Code § 12-18-2(D)(2).

41 Deming, N.M., Code § 12-18-2(D)(3).

42 Deming, N.M., Code § 12-18-2(E)(2).

43 Daniel B. Stephens & Associates, Inc. 2005. Southwest New Mexico Regional Water Plan. Prepared for the Southwest New Mexico Regional Water Plan Steering Committee, City of Deming, New Mexico, Fiscal Agent. Albuquerque, N.M. May.

44 AMEC Earth & Environmental, Inc. 2010. Regional Water Demand Study for Southwest New Mexico Catron, Grant, Hidalgo and Luna Counties. Prepared for New Mexico Interstate Stream Commission, New Mexico Office of the State Engineer. Socorro, N.M. October 10.

45 Regional Water Authority of Northern California. 2009. Regional Water Authority Strategic Plan.

46 Per Deming's AWSA Tier 2 proposal, the city would also evaluate using storm water runoff to supplement its reuse system. The city's new storm water retention pond has a 50-acre-foot capacity and could potentially be refilled multiple times in a year.

47 Per Grant County's application, local groundwater levels are increasing in the Silver City area as a result of effluent discharge into the San Vicente Arroyo, which is eligible for return flow credits.

48 This proposal would develop a new well field that would make 193 AF/yr of permitted water rights available to Hurley, which does not have its own supply of water.

49 These 193 acre-feet of new supply consist of undeveloped, permitted water rights, and are assumed to be accounted for in our gap analysis as additional permitted water rights.

50 This total does not count the Murdock rights 16 miles outside the city limits that are too far to pipe into the city's municipal area.

51 Daniel B. Stephens & Associates, Inc. 2009. City of Deming 40-Year Water Plan. Prepared for the City of Deming. Deming, N.M. July.

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