



WATER RESOURCE

ECONOMIC AND FISCAL ANALYSIS

WORKING DRAFT | SUBJECT TO MATERIAL REVISION



January 31, 2017

Mr. Paul Monroe
Executive Director
Central Iron County Water Conservancy District
88 East Fiddlers Canyon Road, Suite A
Cedar City, Utah 84721

RE: Water Resource Economic and Fiscal Analysis

Dear Mr. Monroe:

In accordance with your request, Applied Analysis (“AA”) is pleased to submit this *Water Resource Economic and Fiscal Analysis*. AA was retained by Central Iron County Water Conservancy District (the “Company” or “CICWCD”) to review and analyze the economic impacts associated with water use within Iron County, Utah. In support of the requested analysis, AA worked with CICWCD to develop a supply-demand model to evaluate potential future water demand, while considering capacity within system. The modeling effort, while subject to a number of factors and assumptions, was designed to estimate when existing resources may be exhausted under a number of growth and conservation scenarios. The supply-demand model provides a range of long-term potential outcomes.

In addition to evaluating the supply-demand dynamics, the economic and fiscal implications of various alternatives were considered. From an economic perspective, estimates of ‘value’ were analyzed. From a fiscal perspective, potential revenue enhancements were evaluated. While the objective of this analysis is not to develop a comprehensive financial analysis for any particular project, this analysis provides a preliminary overview of water resource stability and the potential financial viability of alternative resource programming options.

This summary report is designed to outline the salient findings and conclusions of our review and analysis. The summary of findings contained in this letter are supported by additional materials considered, analyses conducted and findings contained in the accompanying presentation materials.

SUMMARY OF FINDINGS

The following summarizes the salient findings on our analysis.

- **Economic conditions in the region and within Iron County suggest growth is likely to continue over the long-run time horizon.** Key economic performance metrics such as population, employment, income and gross product within Iron County have been growing at or above regional and national levels. The outlook going forward includes continued growth and expansion of the local economy. Overall population is estimated to increase by 22.0 percent by 2025, and it is forecasted to more than double by the year 2050.¹
- **Water use currently exceeds the amount of recharge taking place in CICWCD's community, translating into depletion of the aquifer.** The Utah State Engineer identified sustainable safe yield at 21,000 acre-feet per year while the current depletion rate was stated at 28,000 acre-feet per year. The State Engineer also noted that approved well depletion is 50,000 acre-feet per year.²
- **Assuming continued economic growth within Iron County, the community's ability to provide safe and reliable water resources only shrinks.** A rising gap between demand and supply has the potential to create significant water quality and availability issues for Iron County going forward.
- **The economic ramifications of continuing to deplete water resources are substantial.** Iron County currently generates an estimated \$2.4 billion in gross product annually (based on the statewide per-capita gross product estimates applied to the local population base). Assuming growth is constrained due to a lack of available water resources, the cumulative amount of lost economic activity over the next 30 years could range from \$4 billion to nearly \$27 billion, depending on the timing of a halt in population growth.
- **In addition to the economic activity impacts, personal incomes in Iron County could be similarly impacted if a lack of water resources dictates a stoppage in overall population growth.** Personal incomes are currently estimated at approximately \$1.3 billion annually. The cumulative personal impacts could range from \$2.2 billion to \$14.7 billion over the next 30 years.
- **The costs of potential solutions to cure water availability challenges in the future pale in comparison to the economic losses of doing nothing.** The West Desert Pipeline project is a two-phased pipeline development from Pine Valley and Wah Wah Valley that has the potential to secure an additional 15,000 and 12,000 acre feet of water, respectively. The combined cost of the pipelines is estimated at approximately \$324 million. Based on the economic impacts (gross product) described above, the return on the public infrastructure improvements equates to a range from 12.3-to-1.0 to 83.0-to-1.0 over the next 30 years, depending on the scenario. The personal income returns translate into a low of 6.8-to-1.0 to a high of 45.4-to-1.0, depending on the scenario.
- **In addition to securing additional water resources, allowing for continued economic growth and providing a stable environment, investments in the West Desert Pipeline project would have significant one-time economic impacts.** While not the reason to embark on a \$324-million project, the construction of the pipelines is estimated to have a material economic impact - total economic output equates to \$463.5 million, generating over \$100 million in wages and salaries, and supporting over 3,700 person years of employment (one person employed full time for an entire year).
- **Financing the West Desert Pipeline project can be achieved with a sound, diversified mix of potential revenue sources.** One option for financing the project considers: (1) increased user fees (ranging from \$0.50 to \$2.60 per 1,000 used gallons per year); (2) increased impact fees of upwards of \$5,000 per new housing unit; and (3) a 1-percent allocation of property tax across all residents.

¹ Governors Office of Management and Budget.

² Utah Division of Water Rights, December 8, 2016 Cedar Valley Water Users meeting.

In conclusion, water demand within Iron County, Utah exceeds the renewable water supply, a condition that has resulted in depletion of the aquifer. The outlook for the region suggests that demand for water use will only continue to increase, creating an even more serious water resource issue. The reality of the situation is that more water is being used than is being captured, and that cannot continue into perpetuity. While water may continue to pour from residents' faucets, other potential issues are concerning, including subsidence and fissures. The West Desert Pipeline project has been identified by stakeholders and industry experts as a viable, and most appropriate, alternative to the current path. The economic ramifications of failing to act can be significant for Iron County. While the cost of investing in water infrastructure is significant, a financing alternative demonstrates the community's ability to fund the needed investment.

This report was designed by AA in response to your request. However, we make no representations as to the adequacy of these procedures for all your purposes. Generally speaking, our findings and estimates are as of the date of this letter and utilize the most recent data available. The information provided in this summary, and the conclusions reached herein, are based on the findings of our research and our knowledge of the market as of the date of this report. Our report contains economic, development and other predominant market data. This information was collected from our internal databases and various third parties, including the Company and other public data providers. The data were assembled by AA. While we have no reason to doubt its accuracy, the information collected was not subjected to any auditing or review procedures by AA; therefore, we can offer no representations or assurances as to its completeness.





This report is an executive summary. It is intended to provide an overview of the analyses conducted and a summary of our salient findings. AA will retain additional working papers relevant to this study. If you reproduce this report, it must be done so in its entirety. We welcome the opportunity to discuss this report with you at any time. Should you have any questions, please contact Jeremy Aguero or Brian Gordon at (702) 967-3333.

Sincerely,









Applied Analysis
Applied Analysis

Attachment

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-  **Summary of Findings**
-  Identifying the Issue
-  Iron County's Economic Climate
-  Iron County's Water Demand Outlook
-  Iron County's Water Supply Outlook
-  Supply-Demand Dynamics and Potential Solutions
-  Economic Impacts of Investments in Infrastructure
-  Fiscal Considerations



Summary of Findings

- Historical growth and other factors gave rise to the establishment of the CICWCD to study and further address issue challenges in Iron County
- Research suggests groundwater levels have been eroding for the better part of the past half century
- Iron County's economic climate supports continued growth, which will place additional pressures on the region's water supply-demand balance
- The long-term outlook for water demand in the region is expected to exceed capacity, a condition that can have significant economic and ecological implications
- Potential economic returns sourced to expanded water infrastructure investments are estimated to far exceed the public's cost of developing an expanded system
- A sound funding model has the potential to mitigate the risks of future water shortfalls
- **The cost of doing nothing exceeds the cost of investing in additional water infrastructure**





Summary of Findings

Identifying the Issue

Iron County's Economic Climate

Iron County's Water Demand Outlook

Iron County's Water Supply Outlook

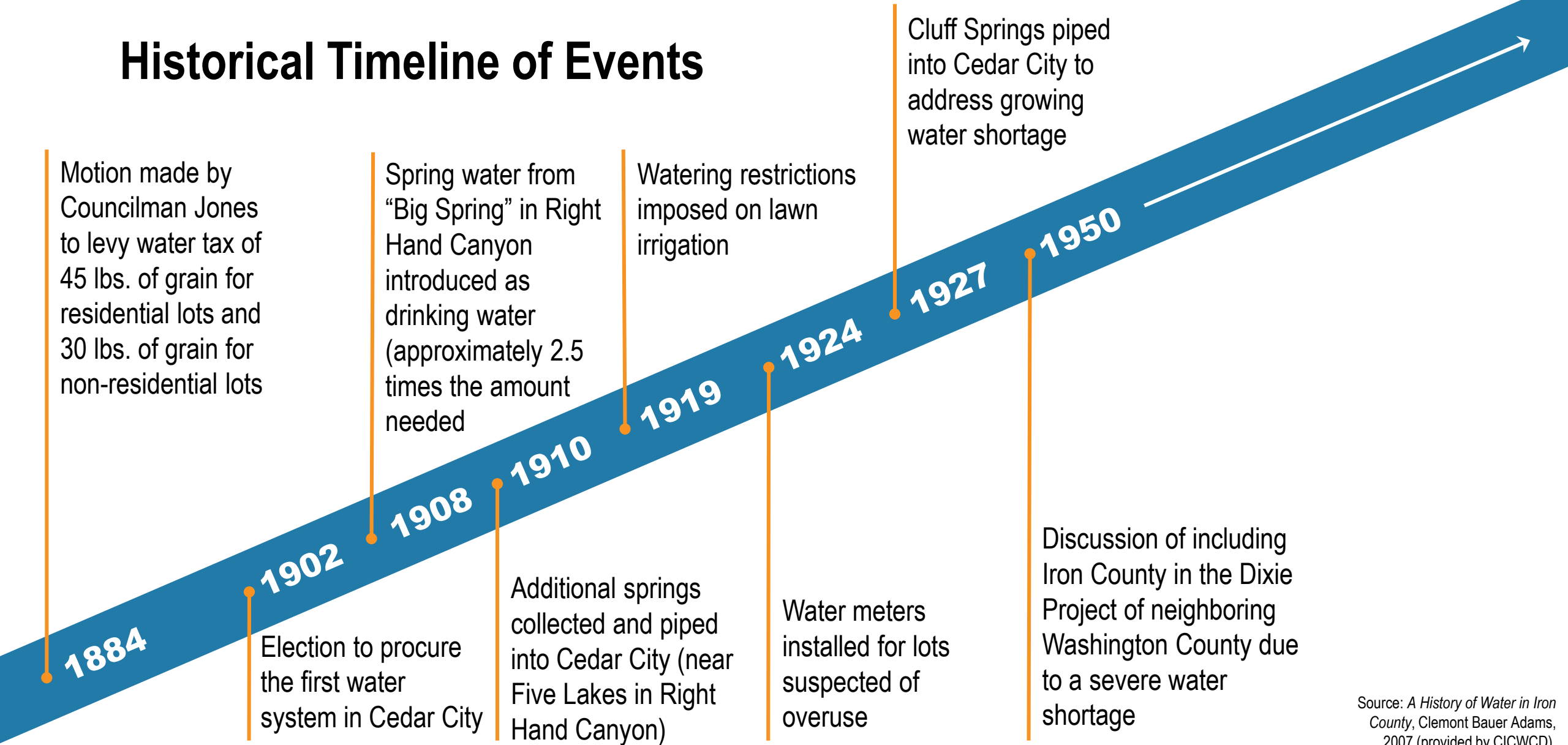
Supply-Demand Dynamics and Potential Solutions

Economic Impacts of Investments in Infrastructure

Fiscal Considerations



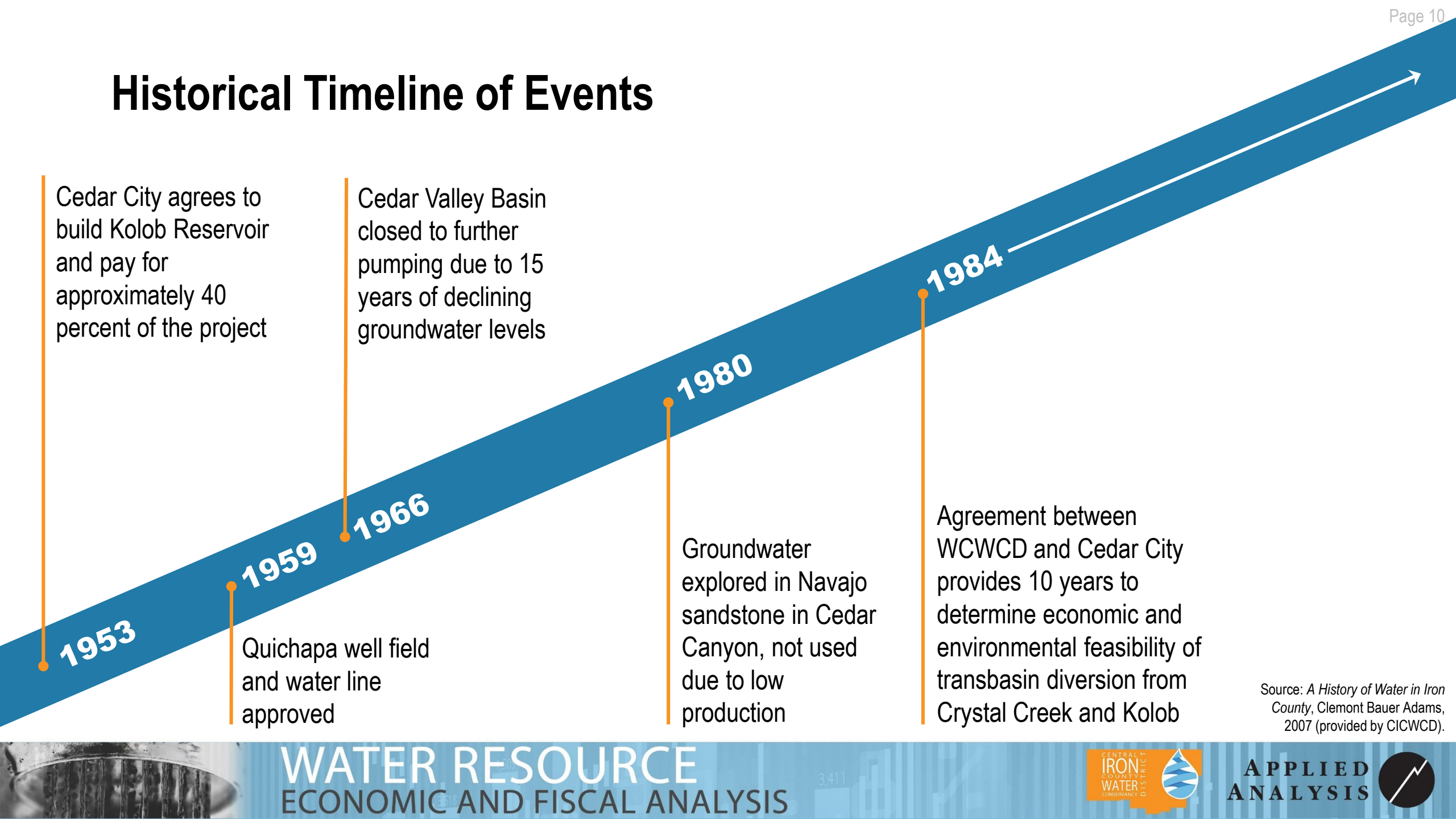
Historical Timeline of Events



Source: *A History of Water in Iron County*, Clemont Bauer Adams, 2007 (provided by CICWCD).



Historical Timeline of Events



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Historical Timeline of Events

Historical growth patterns combined with dry conditions and other factors translated into more water being used in the Iron County area than was being put back into the system

1970s & Prior

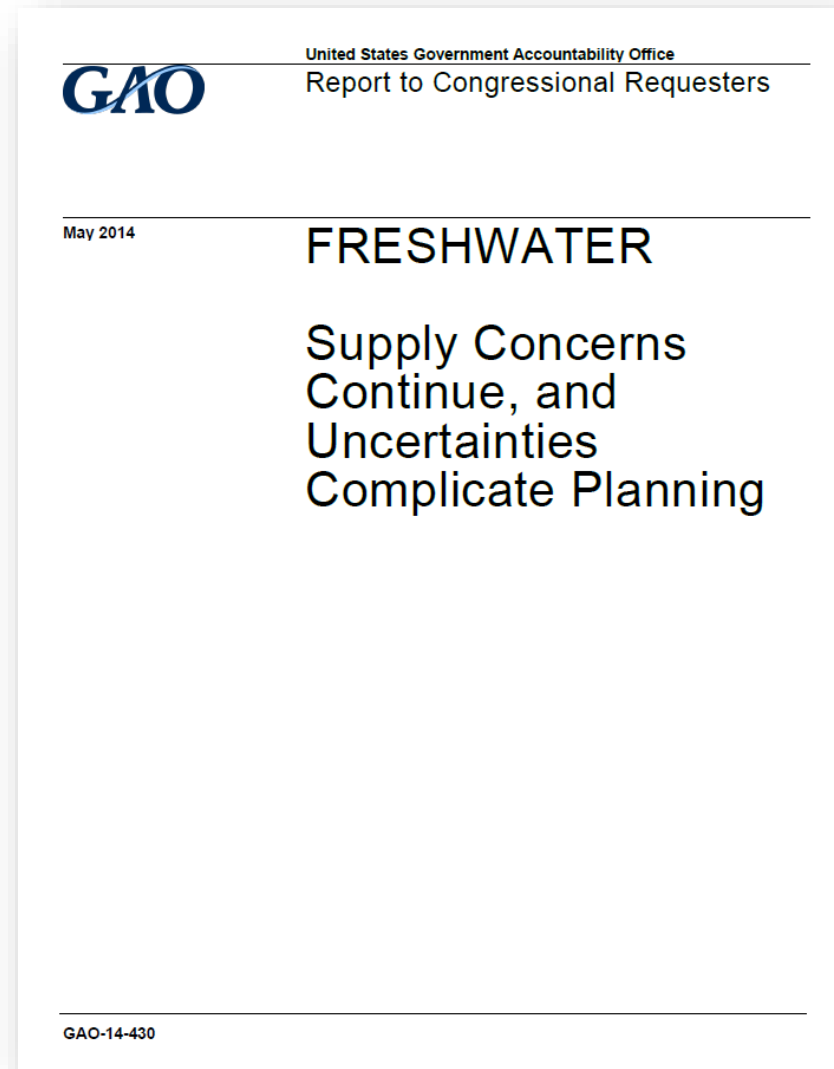


Identifying the Issue

Nationally, Regionally and Locally

Water resource stability is a vital concern for Iron County, the state of Utah and the United States as a whole. A recent report by the Government Accountability Office (GAO) of the United States concluded:

According to state water managers, experts and literature GAO reviewed, freshwater shortages are expected to continue into the future. In particular, 40 of 50 state water managers expected shortages in some portion of their states under average conditions in the next 10 years. However, uncertainty stemming from factors, such as patterns of economic growth and land use change, is likely to complicate future state water managers' planning efforts.



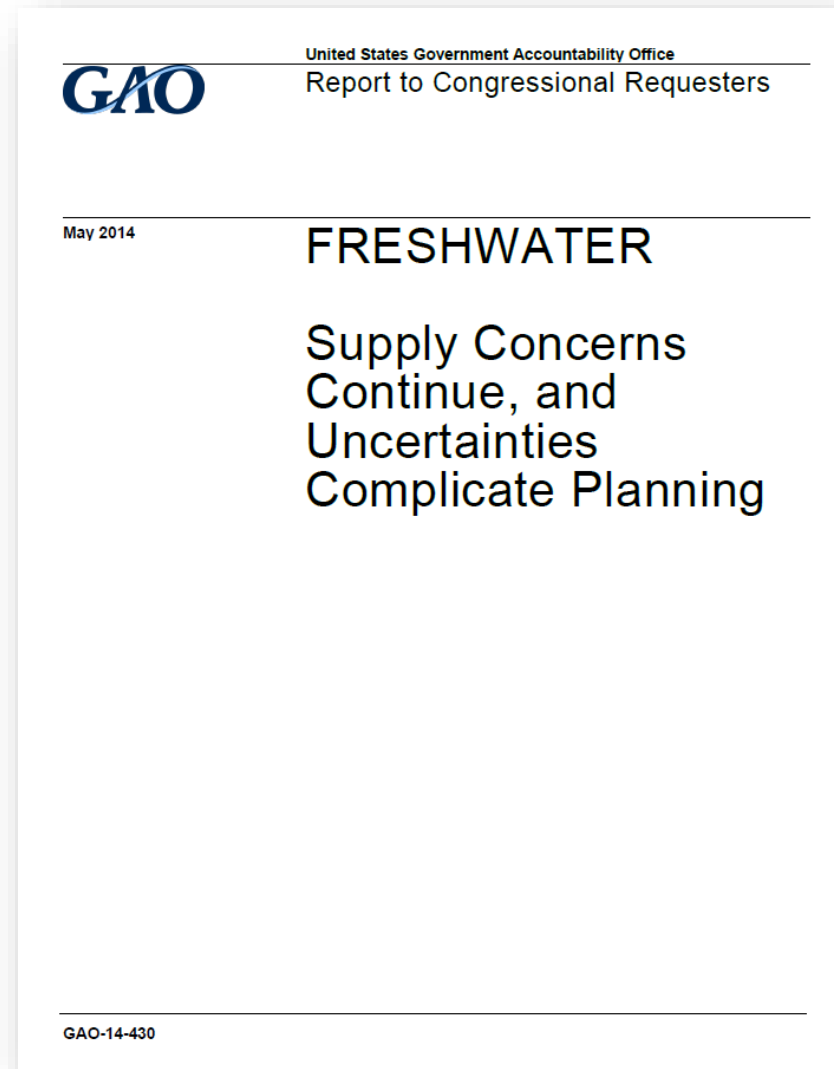
Source: Freshwater: Supply Concerns Continue, and Uncertainties Complicate Planning GAO-14-430: Published: May 20, 2014. Publicly Released: May 22, 2014.



Identifying the Issue

Nationally, Regionally and Locally

The GAO report makes it clear that there are a number of factors complicating the nation's water resource challenges, including economic, geographic, climate, conservation and commodity-pricing considerations. Also included are infrastructure-related concerns specific to the system by which water is captured, processed and delivered to the end consumer. The GAO cited the American Society of Civil Engineers rating the nation's water resource infrastructure at a "D" or below, the U.S. Environmental Protection Agency's estimating a cost of \$384 billion to upgrade domestic drinking water infrastructure during the next 20 years, and a similar report by the American Water Works Association forecasting that it will cost more than \$1 trillion over the next 25 years to replace and expand the nation's buried water infrastructure.



Source: Freshwater: Supply Concerns Continue, and Uncertainties Complicate Planning GAO-14-430: Published: May 20, 2014. Publicly Released: May 22, 2014.

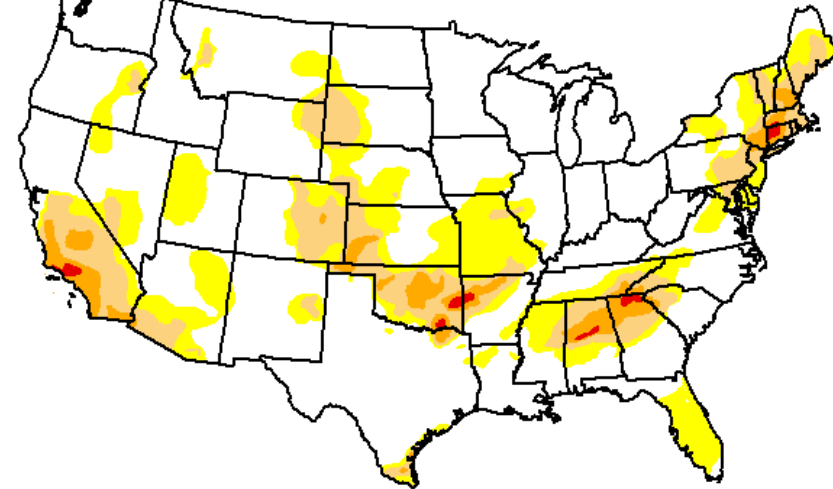


Identifying the Issue

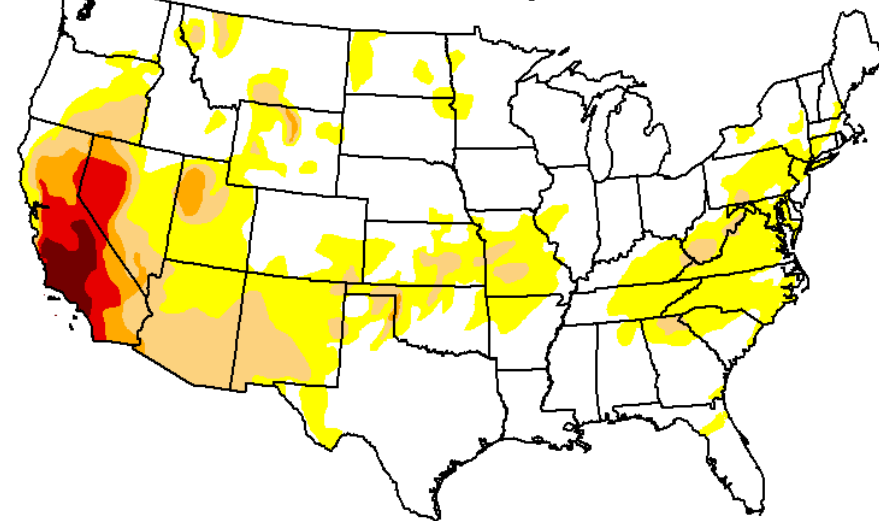
United States Drought Monitor

“Drought conditions remain a concern through the southwestern region, including the State of Utah”

United States, January 2017



United States, April 2016



Intensity:

- D0 (Abnormally Dry)
- D2 (Severe Drought)
- D4 (Exceptional Drought)
- D1 (Moderate Drought)
- D3 (Extreme Drought)

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying [text summary](#) for forecast statements.

Estimated Population in Drought Areas, 2017: 88,800,370

Source: <http://droughtmonitor.unl.edu/>






Note: Seasonality, weather patterns and snow pack in any given year can impact reported drought conditions, but drought conditions remain a concern.

Identifying the Issue

United States Drought Monitor

“Drought conditions remain a concern through the southwestern region, including the State of Utah”

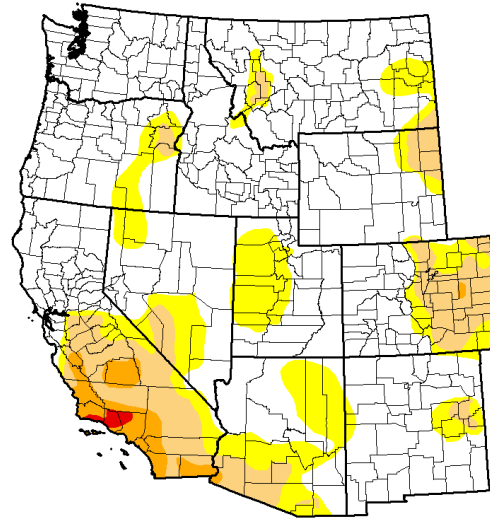
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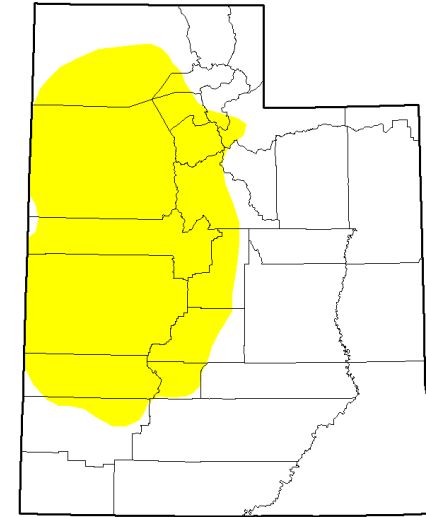
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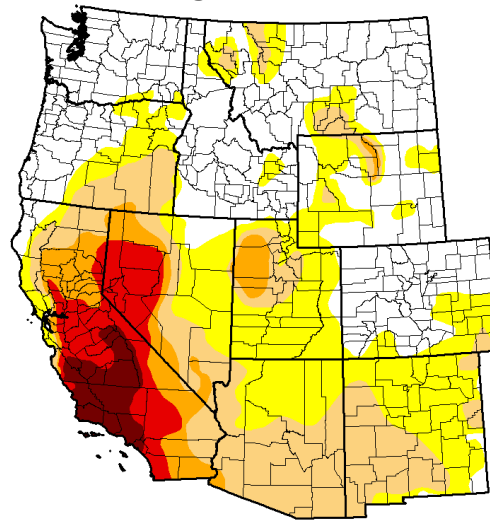
West Region, January 2017



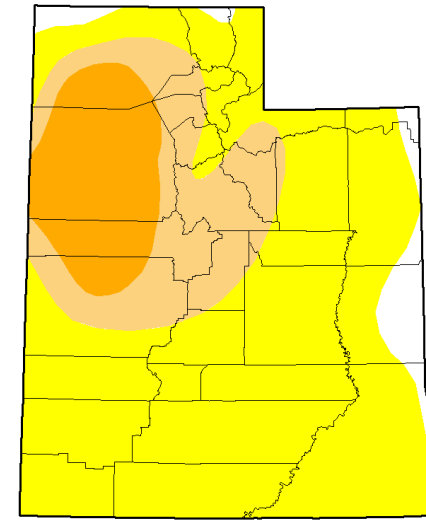
State of Utah, January 2017



West Region, April 2016



State of Utah, April 2016



Source: <http://droughtmonitor.unl.edu/>

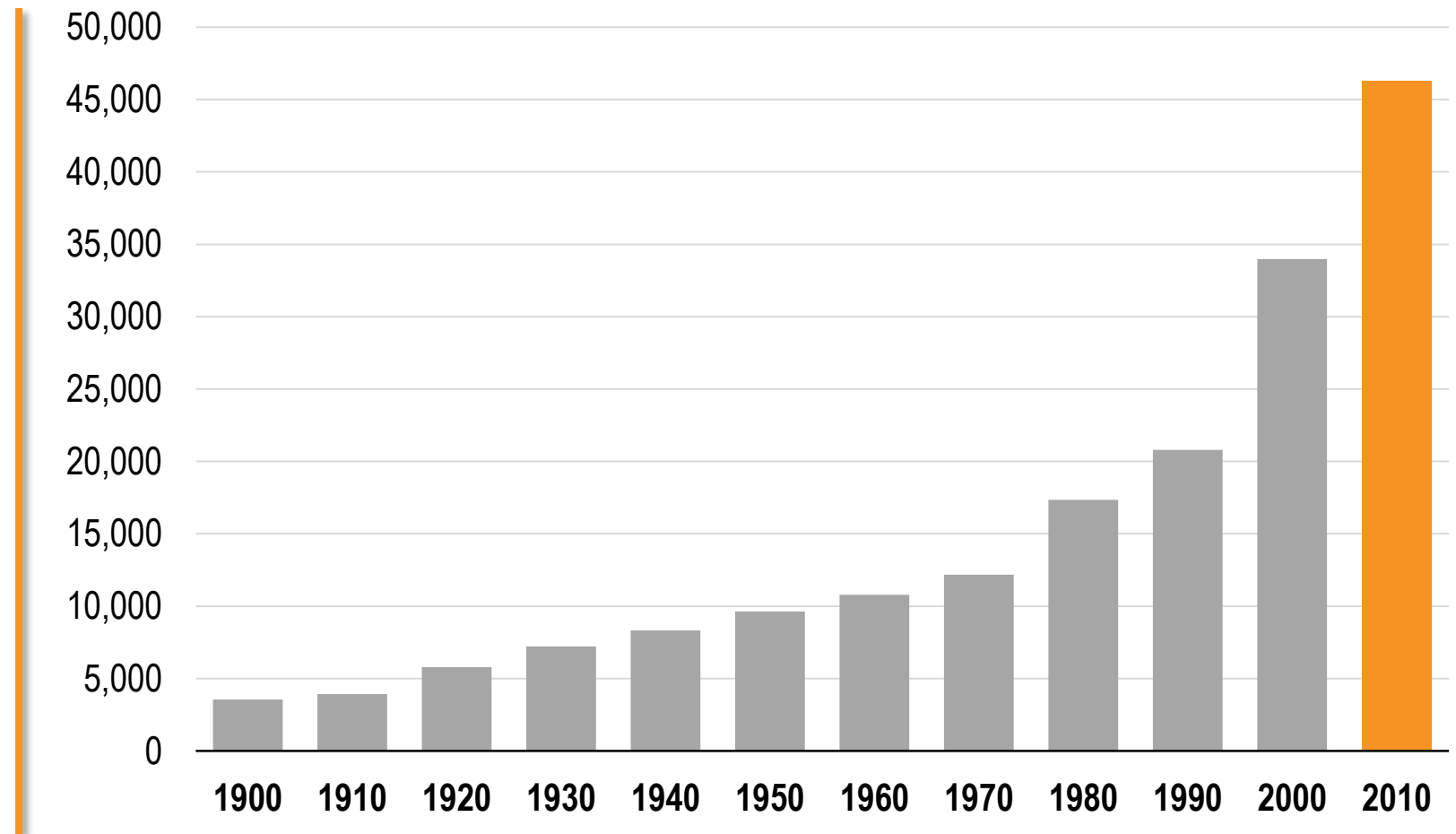
Note: Seasonality, weather patterns and snow pack in any given year can impact reported drought conditions, but drought conditions remain a concern.



Identifying the Issue

Iron County: Historical Population Growth

- While Iron County is situated in a region surrounded by drought conditions, the resident base has grown at a compound annual growth rate (CAGR) of approximately 2.4 percent during the century.
- Expectations for continued growth have raised concerns about the sustainability of safe and reliable water resources going forward.



Source: US Census



Historical Timeline of Events

Historical growth patterns combined with dry conditions and other factors translated into more water being used in the Iron County area than was being put back into the system

The Central Iron County Water Conservancy District was established in 1997 to manage the water demands and plan for the future water needs of the community

1970s & Prior

1997



Responding to the Issue

The Creation of the CICWCD District



- Serves the Cedar Valley area
 - Established 1997 to benefit the people and municipalities within the CICWCD boundaries
 - 1,380 square miles (approximately 81 percent vacant)
 - Incorporated approximately 15 existing subdivisions with water systems into a basin-wide public water supply
- Existing water systems in the District
 - Currently, there are about 45 residential subdivisions, cities, towns, or entities with approximately 4,415 Equivalent Residential Units (ERCs) (excluding Cedar City, Enoch City, and Kanarraville) in the Cedar Valley area
 - These entities are under the jurisdiction of the District and are potential water customers of the District in the future.

Source: CICWCD Conservation Plan (2011); see <http://www.cicwcd.org/Documents/2011%20CICWCD%20Final.Conservation.Plan.pdf>



Responding to the Issue

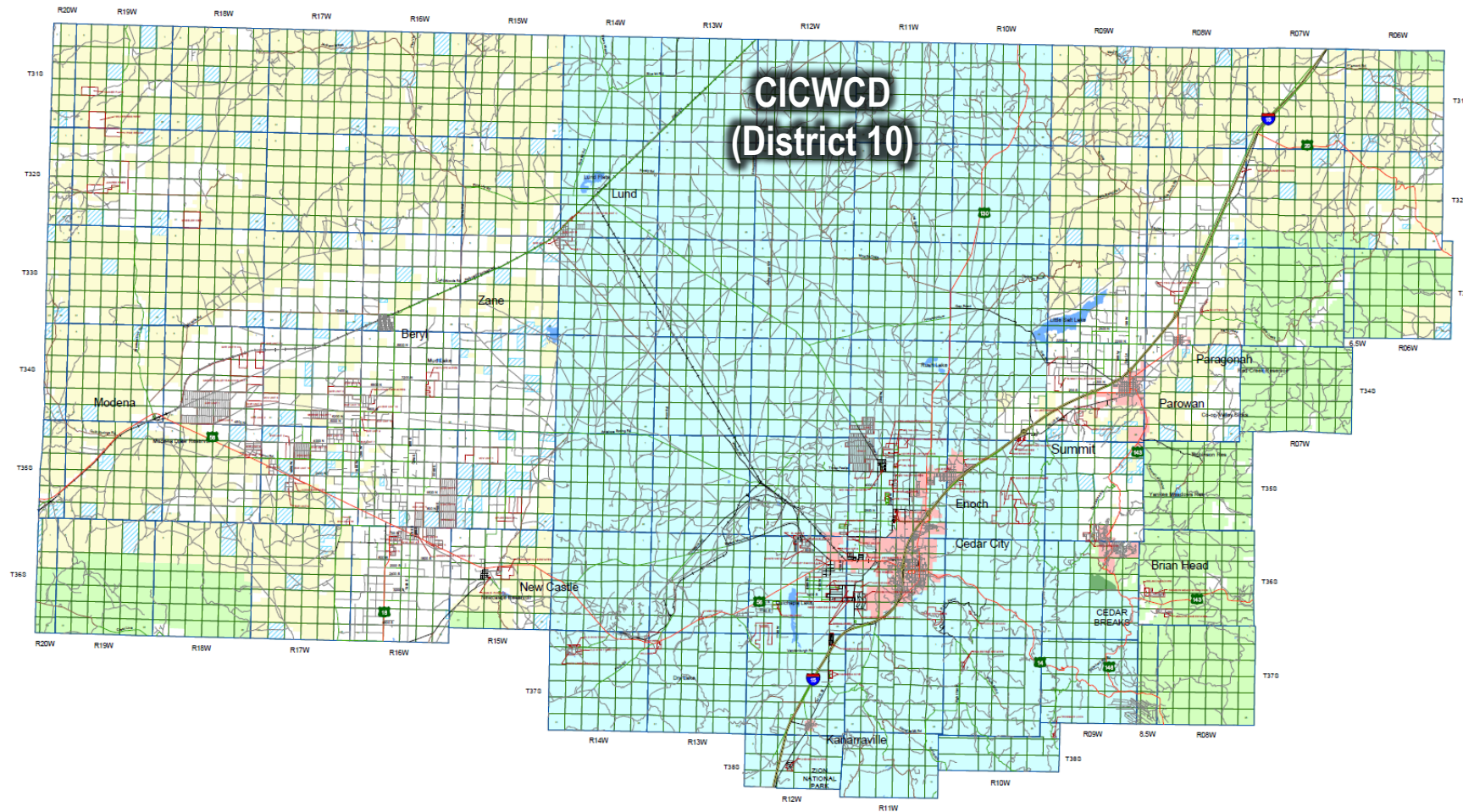
The District: Goals and Objectives



- With the availability of diverse resources, develop and maintain a regional water system which distributes system costs across a larger population.
- Leverage financial and other resources to establish itself as a reputable and sustainable water purveyor in Iron County.
- Develop a centralized water infrastructure and technical resources with adequate quantity and quality water supply in Iron County.
- Provide an alternative for consolidation of existing independent water systems rather than costly rehabilitation for many of these infrastructures.
- Be the primary water provider to serve District residents and be considered a supplemental water provider to other municipalities (such as Enoch City, Cedar City and ultimately Kanarrville).
- Propose construction standards and specification for smaller systems within the District's boundary. Using the District's standards and specifications, these systems will be able to upgrade and maintain its systems.
- Allocate resources efficiently, enforce standards and promote water conservation.

Source: CICWCD Conservation Plan (2011); see <http://www.cicwcd.org/Documents/2011%20CICWCD%20Final.Conservation.Plan.pdf>

The District: Approximate Boundaries (Blue Shading)



IRON COUNTY WATER DISTRICT MAP

MAP PROJECTION INFORMATION
PROJECTION: NAD 1983 StatePlane
ZONE: Utah South FIPS 4303

1 2 Miles

W N E S

SUBDIVISIONS ARE MAINTAINED BY IRON COUNTY

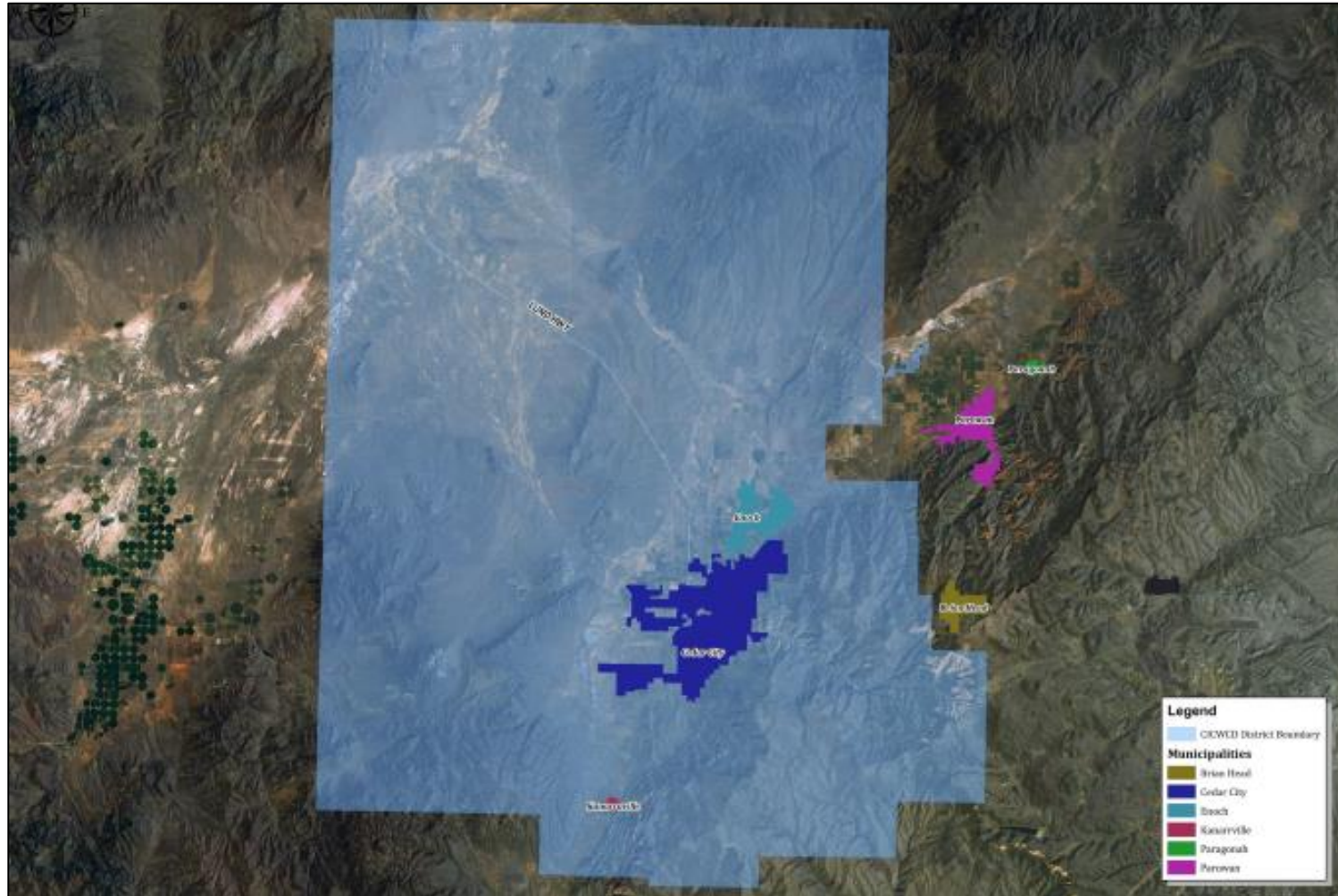
RAILROAD	BLM
LOCAL ROAD/TRAIL	FOREST
PAVED ROAD	INDIAN
GRAVEL ROAD	PARKS
DIRT ROAD	STATE
INTERSTATE 15	WILDERNESS
STATE HIGHWAY	CITY BOUNDARY
SUBDIVISIONS	WATER BODIES
SECTIONS	WATER DISTRICT 10
TOWNSHIPS	

Iron County cannot be held responsible for the data shown on this map. Any corrections should be directed to the Iron County Data Processing Department and the GIS Lab. 435-477-6271. gislab@ironcount.net

IRON COUNTY GIS

Source: Iron County (<https://www.ironcounty.net/wp-content/uploads/waterdistrict.pdf>)

The District: Approximate Boundaries (Blue Shading)



Source: Water Master Plan Report, 2014;
Ensign Engineering & Land Surveying.

Historical Timeline of Events

Historical growth patterns combined with dry conditions and other factors translated into more water being used in the Iron County area than was being put back into the system

The Central Iron County Water Conservancy District was established in 1997 to manage the water demands and plan for the future water needs of the community

USGS study SIR 2005-5170 concludes that a water shortage is inevitable given expected market expansion of consumption levels

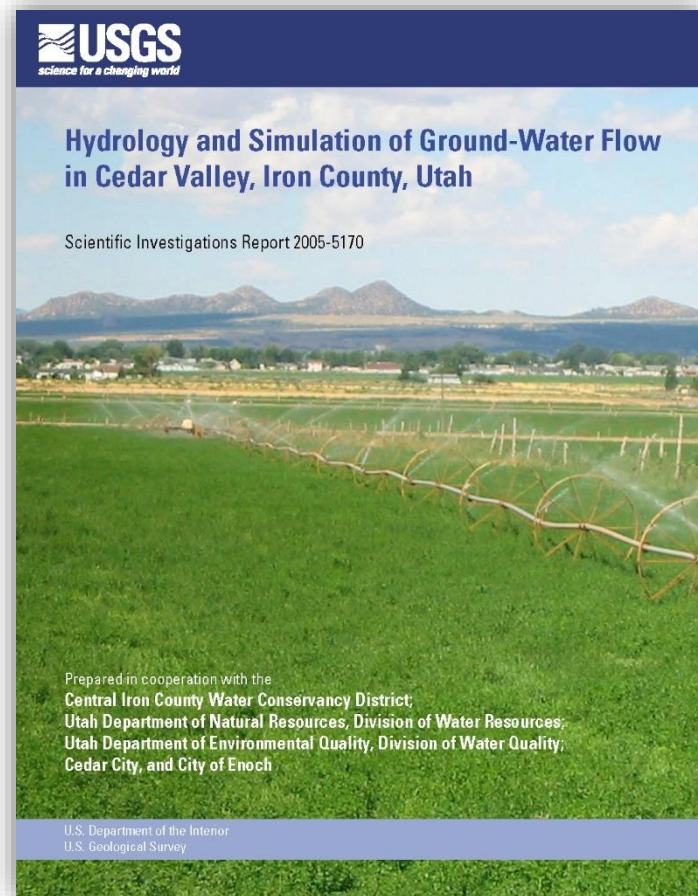
1970s & Prior

1997

2005



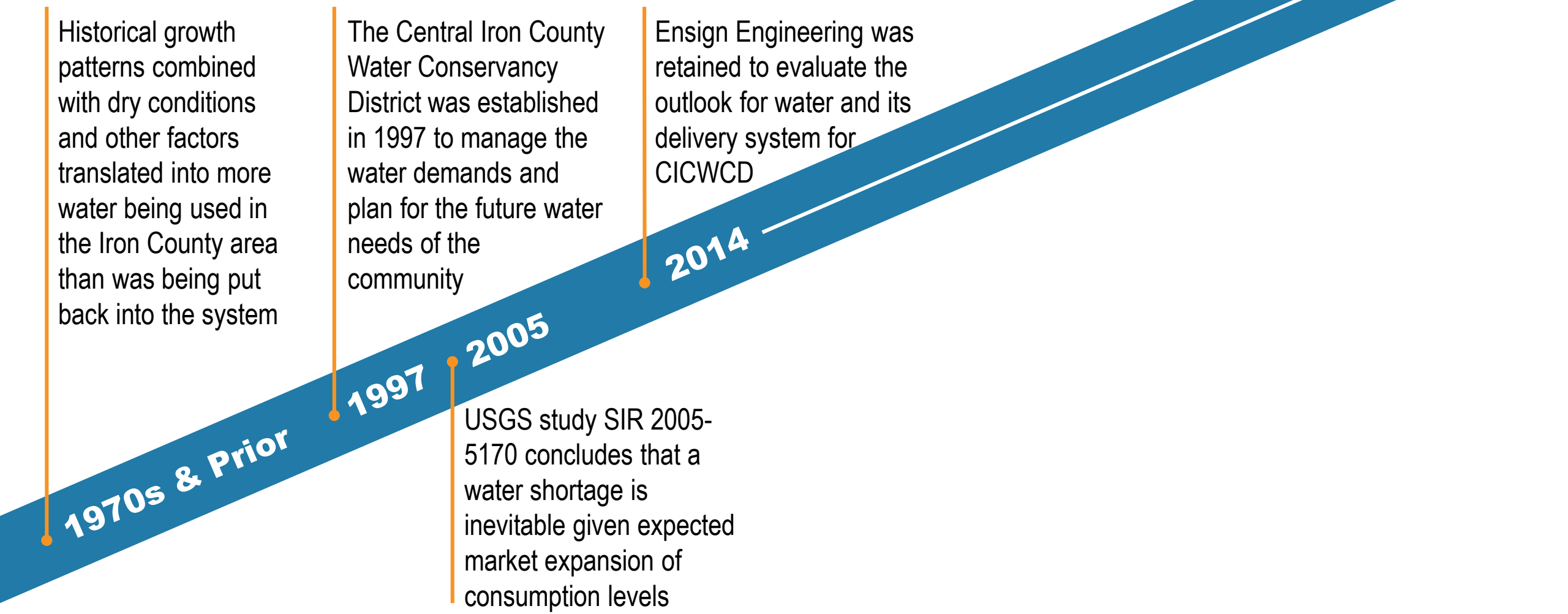
USGS Hydrology Report on Cedar Valley



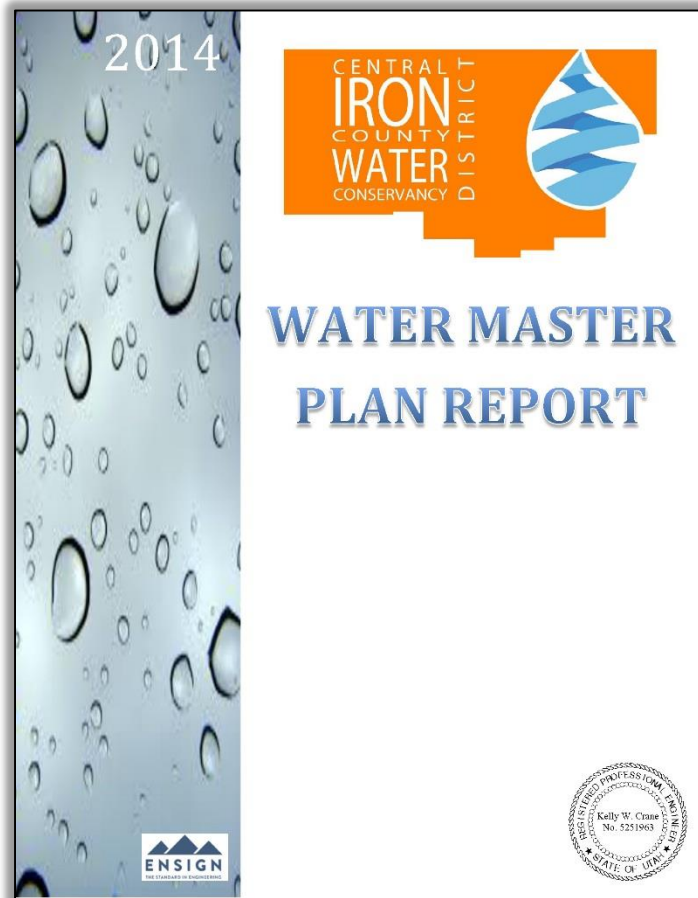
“Cedar Valley, located in the eastern part of Iron County in southwestern Utah, is experiencing rapid population growth that needs a larger share of the available water resources.”

Source: Scientific Investigations Report 2005-5170

Historical Timeline of Events



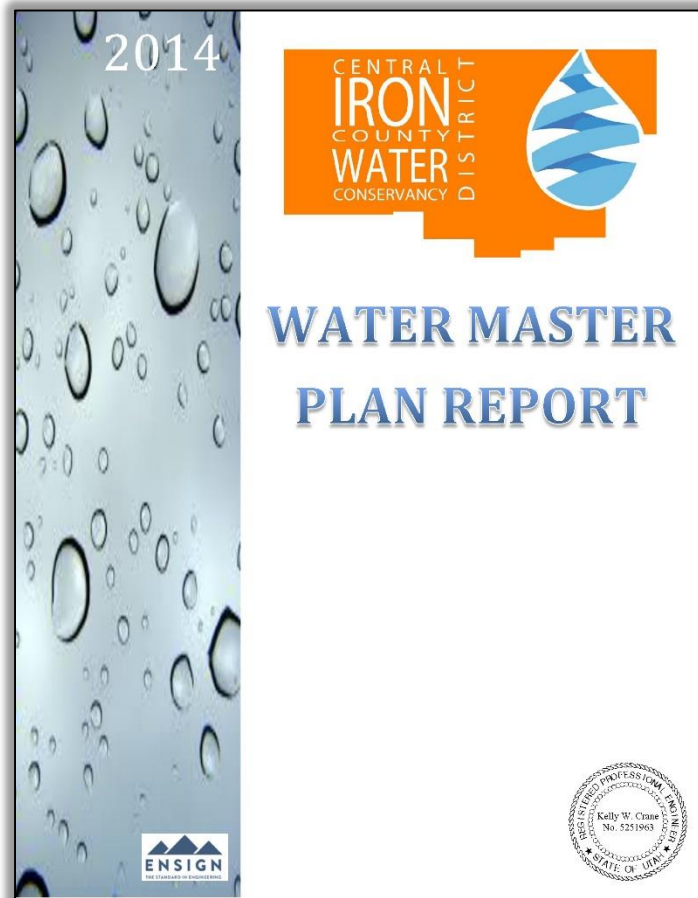
Water Master Plan Report



- In 2014, Ensign Engineering & Land Surveying prepared a master plan update to evaluate the current water delivery system and the long-term outlook for CICWCD

“The groundwater level in the Cedar Valley is slowly dropping annually due to increased pumping for domestic and agricultural use.”

Water Master Plan Report

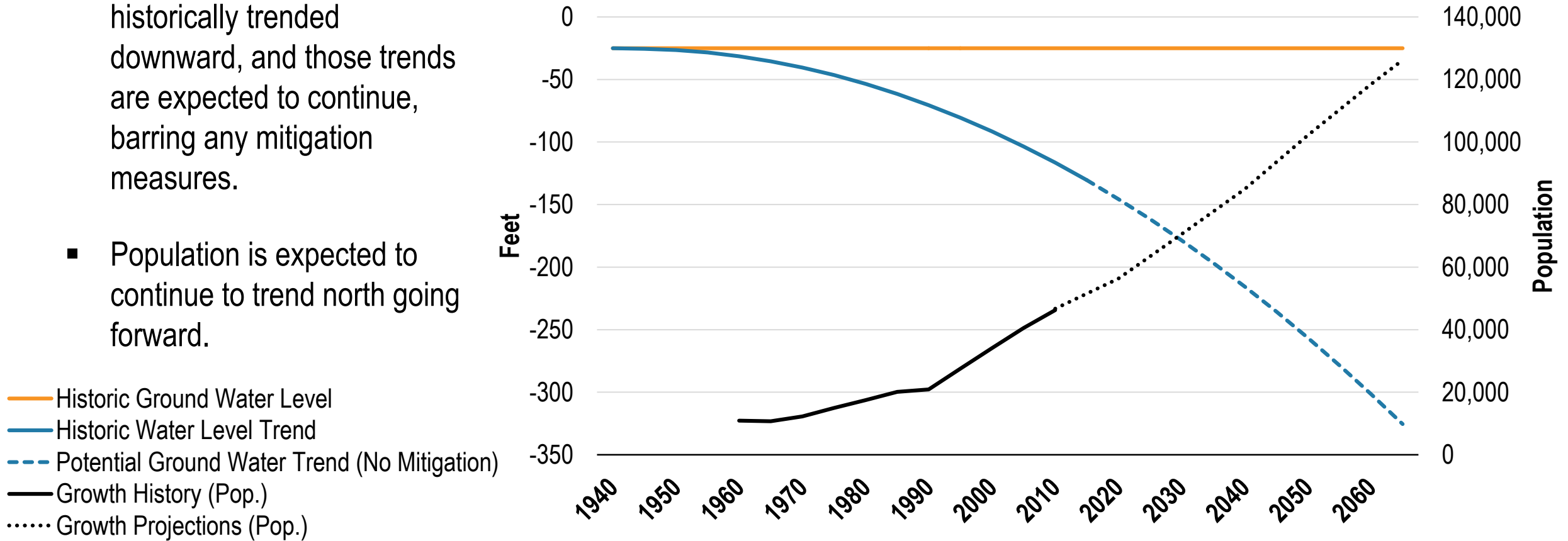


“...the Cedar Valley is overdrawing from the aquifer an estimated 9,100 acre-feet annually. This is in addition to the required municipal and agricultural demand. By the year 2060 the population within the Cedar Valley is projected to be 118,491 people. To support this population it requires approximately 73,000 acre-feet. Currently there are 33,500 acre-feet available for use within the basin leaving an approximate 39,500 acre-foot deficit from the projected 73,000 acre-foot requirement. With limited water right available and the aquifer already being mined at a current rate of 9,100 acre-feet annually, the ground water level will continue to drop and accessibility of water will decline.”

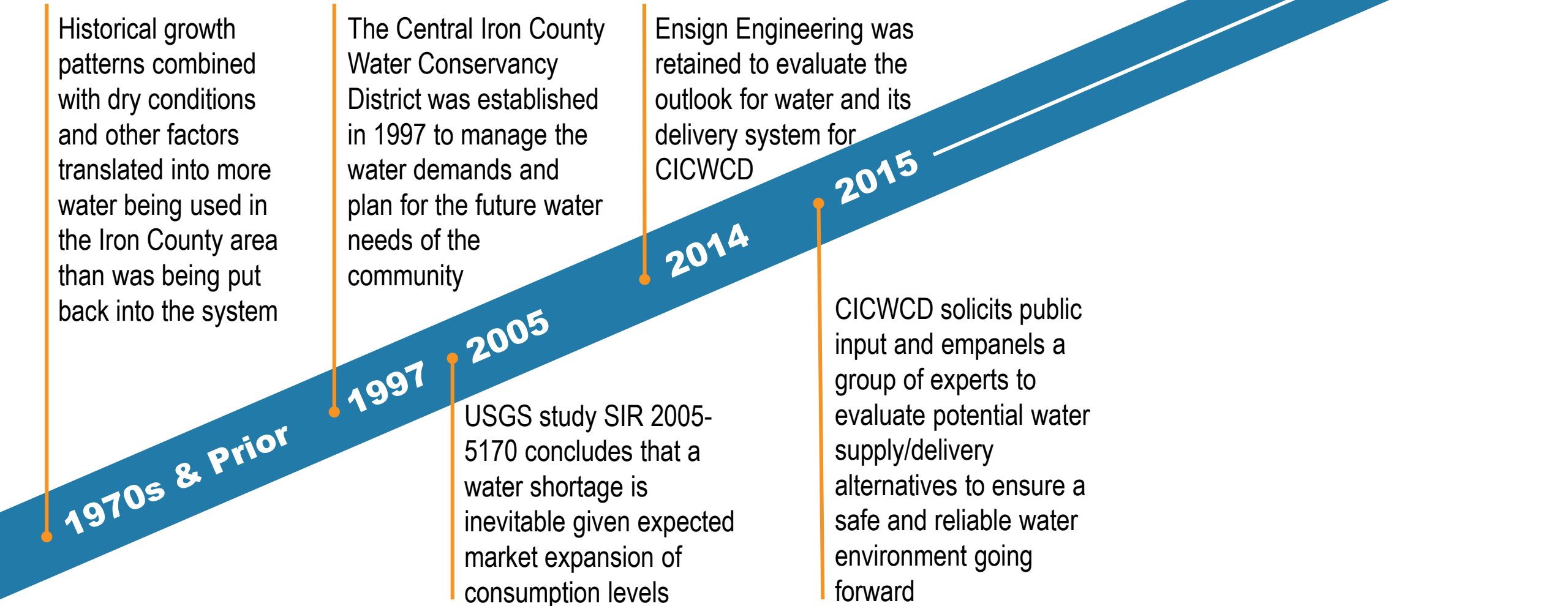
Water Master Plan Report

- Ground water levels have historically trended downward, and those trends are expected to continue, barring any mitigation measures.
- Population is expected to continue to trend north going forward.

Ground Water Level Trend vs. Population Trend



Historical Timeline of Events



Potential Solutions

Concepts to Ensure Clean and Reliable Water Resources

Potential Need:

Additional water resources will be necessary to sustain the growth and further development of the Cedar Basin. Without these additional resources, future economic development will be impacted by the availability and costs of existing water supplies in order to merely accommodate the growth capable within CICWCD's current water budget.

Addressing the Issue:

In August 2015, the CICWCD approached the public for ideas to ensure clean and reliable water will be available in the future. An independent review panel of professionals reviewed a wide range of proposals for sustainability and feasibility. Eight (8) projects have been prioritized and recommended to the CICWCD to assist in providing a safe and reliable water source for the next 50 years.

Potential Solutions:

- Conservation
- Sharing Resources
- Managing Water on a Regional Basis
- Developing Additional Waters
- Increasing Storage





Potential Solutions

Identified Prioritized Projects by Independent Review Panel

Projects

1. West Desert Pipeline
2. Aquifer Recharge Projects
3. Aquifer Balance Project
4. West Well
5. ARCo Three Peaks Well Re-Entry
6. Quichapa Creek Well Re-Entry
7. Cretaceous Well #1 at Shepherders Cabin Road
8. Winn Gapp Reservoir

Panel Members

- Kerry Carpenter, retired Professional Engineer (Division of Water Rights)
- Hugh Hurlow, Senior Scientist of the Utah Geological Survey
- Phil Gardner, Hydrologist, USGS
- Russ Barris, the area specialist for the Cedar/Beaver basin for the Division of Water Resources
- Russell Hadley, Division of Water Resources
- Dan Aubrey, Division of Water Resources

Note: Details about the first three projects are included on the following pages.
Additional information about the remaining projects can be found at:
<http://www.cicwcd.org/Pages/Water%20Development%20Projects.aspx>.





Prioritized Project No. 1:

West Desert Pipeline

Scope of Work/Overview

CICWCD will construct multiple wells throughout the valleys to pump the water into smaller transmission pipelines to pump houses.

Then larger transmission pipelines will import the water into the Cedar Valley Basin. Test wells will be drilled first to determine the capacity of the aquifer and the effect of the wells in the area. Once the test wells and capacity tests have been done, permanent production wells will be drilled and put into service.

CICWCD is working through the feasibility of having solar and wind supply power to these sites instead of construction and implementing power lines. The cost and expense may be higher in the beginning to rely on renewable energy but the operation and maintenance of the wells will be much lower.

The project will help alleviate the over drawing and mining of the aquifer in the Cedar Valley Basin. Wells that supply water to CICWCD and Cedar City can be placed on idle and water from the West Desert can supply the required water for municipal use. Any excess water from the West Desert will be placed in storage and used for recharge and recovery.

Type of System or Facility

The West Desert project includes the drilling of multiple wells, construction of well houses, construction of pump houses, construction of transmission pipelines, and construction of solar and wind power sources.

Quality of Water Anticipated

CICWCD owns 27,000 acre-feet of water rights within the two valleys: 15,000 acre-feet in Pine Valley and 12,000 acre-feet in Wah Wah Valley.

Uses

The water from this project will be used to supply the CICWCD system for municipal and irrigation uses.

Cost Estimate

The cost for the construction of the wells and pipelines from Pine Valley is estimated to be \$199,000,000. When Wah Wah Valley is added as a distributor to the pipeline it is estimated to cost \$125,000,000 to provide the full 12,000 acre-feet.





Prioritized Project No. 2: Aquifer Recharge Projects

Scope of Work/Overview

This project focuses on utilizing flows from Coal Creek to recharge and recover the aquifer and includes 3 different parts. This includes creating settling basins in Coal Creek Channel at higher elevations, construction of recharge pits and settling basins at the bottom of the mountain and near one of the many diversions, and lastly, utilizing the area near Quichapa Lake to create diversions and dikes to recharge and recover.

Type of System or Facility

The CICWCD has been working closely with irrigation companies and Cedar City to determine the most effective ways to preserve water in Coal Creek. CICWCD decided that to best utilize water in Coal Creek, widening of the coal creek channel and detention ponds located higher in the channel near Right Hand Canyon would slow flows which would reduce sediment in the water and provide cleaner irrigation water and cleaner water to percolate into soil at recharge and recovery sites. Reducing sediment would provide better water for irrigation, which would minimize the amount of water drawn from the underground aquifer and would provide more water for recharge and recovery of the aquifer levels.

Quality of Water Anticipated

CICWCD anticipates that an average of 3,000 acre-feet will be recharged annually and during high flow years more water could be made available. Flow in Coal Creek depends on the snowpack and rainfall of the year.

Uses

The primary use for the water coming from Coal Creek is for agricultural purposes. CICWCD filed on excess flow water rights in 2006 that would be used for recharge and recovery purposes. The use for the water in this project would primarily be cleaning water for irrigation purposes and for recharge and recovery purposes when the water rights for irrigation have been met.

Cost Estimate

The estimated cost to widen Coal Creek and create settling basins is \$439,000. This estimate includes excavation of the channel and settling basins/detention ponds, box culvert construction, and other miscellaneous work. The estimated cost to drain water from Quichapa Lake is \$92,900, which includes 21,000 linear feet of 4" pipe, a 5 hp pump, and other valves and fittings.





Prioritized Project No. 3: Aquifer Balance

Scope of Work/Overview

Much of the water used in the Cedar Valley Basin is pulled from the same aquifer. The aquifer balance project will help to alleviate draw demand from the aquifer in areas that have a high density of wells to areas that have fewer wells. To start, a well field will be placed northwest of Enoch between Lund Highway and Minersville Highway. It is anticipated that wells on the north end of the valley will produce approximately 3,000 acre-feet per year. This estimate is based on the amount of water that could be utilized to help recover the aquifer levels in the south end of the valley along with recharge and recovery. The number of wells placed in this area will have to be evaluated to ensure that the aquifer isn't depleted; however, it is proposed that 4 wells be drilled in this area. Once completed and in production the wells on the south end of the valley will be idled to help restore aquifer levels through natural infiltration as well as through recharge and recovery. Coordination and cooperation from Cedar City is important to the success of this project. If the wells are not idled in the south end of the valley then the basin will continue to see a drop in water levels within already depleted regions rather than recovery.

Type of System or Facility

The project will include construction of a minimum of 4 wells in the north end of the valley with the necessary pipeline to connect to existing CICWCD pipeline infrastructure, construction of a new storage tank, and construction of a connection and booster station to Cedar City's drinking water system.

Quality of Water Anticipated

The aquifer balance project will withdraw 3,000 acre-feet from the north end of the valley and reduce the withdrawals by 3,000 acre-feet from the south end of the valley.

Uses

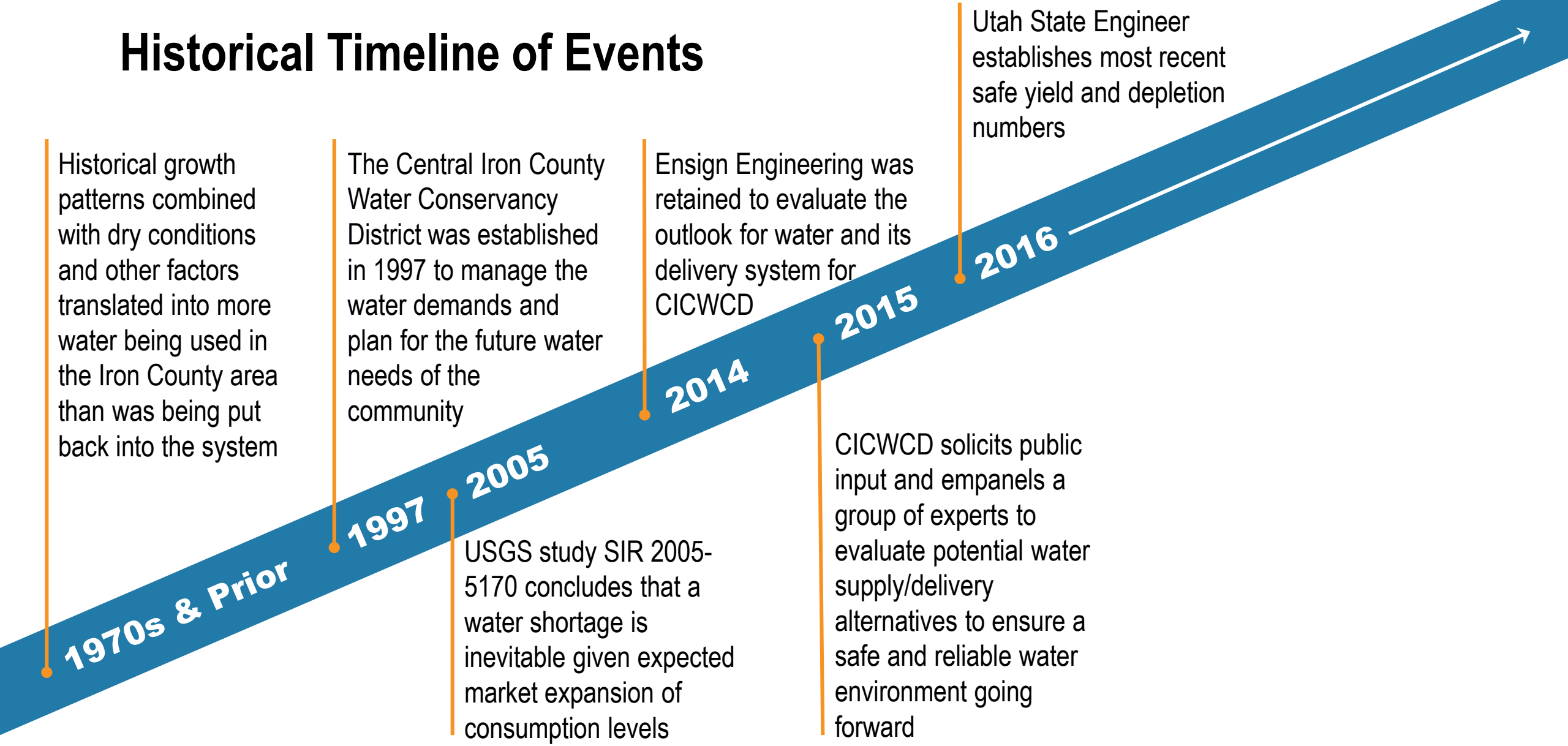
The water from the wells on the north end would be placed into the CICWCD water system to serve its customer base as well as connect to Cedar City's water system to supply them with additional water.

Cost Estimate

The wells for the aquifer balance project are proposed to be drilled along Lunch Highway at the north end of the valley and are estimated to cost \$3,410,000. This cost is estimated for drilling 4 wells, the construction of 4 well houses, the plumbing and electrical for each well, and an 18" transmission line from the wells to the connection to the Cedar City water system. A new tank on the BLM property will be 5 million gallons and will cost an estimated \$5,000,000. The pump houses connecting CICWCD to Cedar City will cost an estimated \$1,000,000.



Historical Timeline of Events



Historical growth patterns combined with dry conditions and other factors translated into more water being used in the Iron County area than was being put back into the system

The Central Iron County Water Conservancy District was established in 1997 to manage the water demands and plan for the future water needs of the community

USGS study SIR 2005-5170 concludes that a water shortage is inevitable given expected market expansion of consumption levels

Ensign Engineering was retained to evaluate the outlook for water and its delivery system for CICWCD

CICWCD solicits public input and empanels a group of experts to evaluate potential water supply/delivery alternatives to ensure a safe and reliable water environment going forward

Utah State Engineer establishes most recent safe yield and depletion numbers



Cedar Valley Public Meeting, December 8th 2016

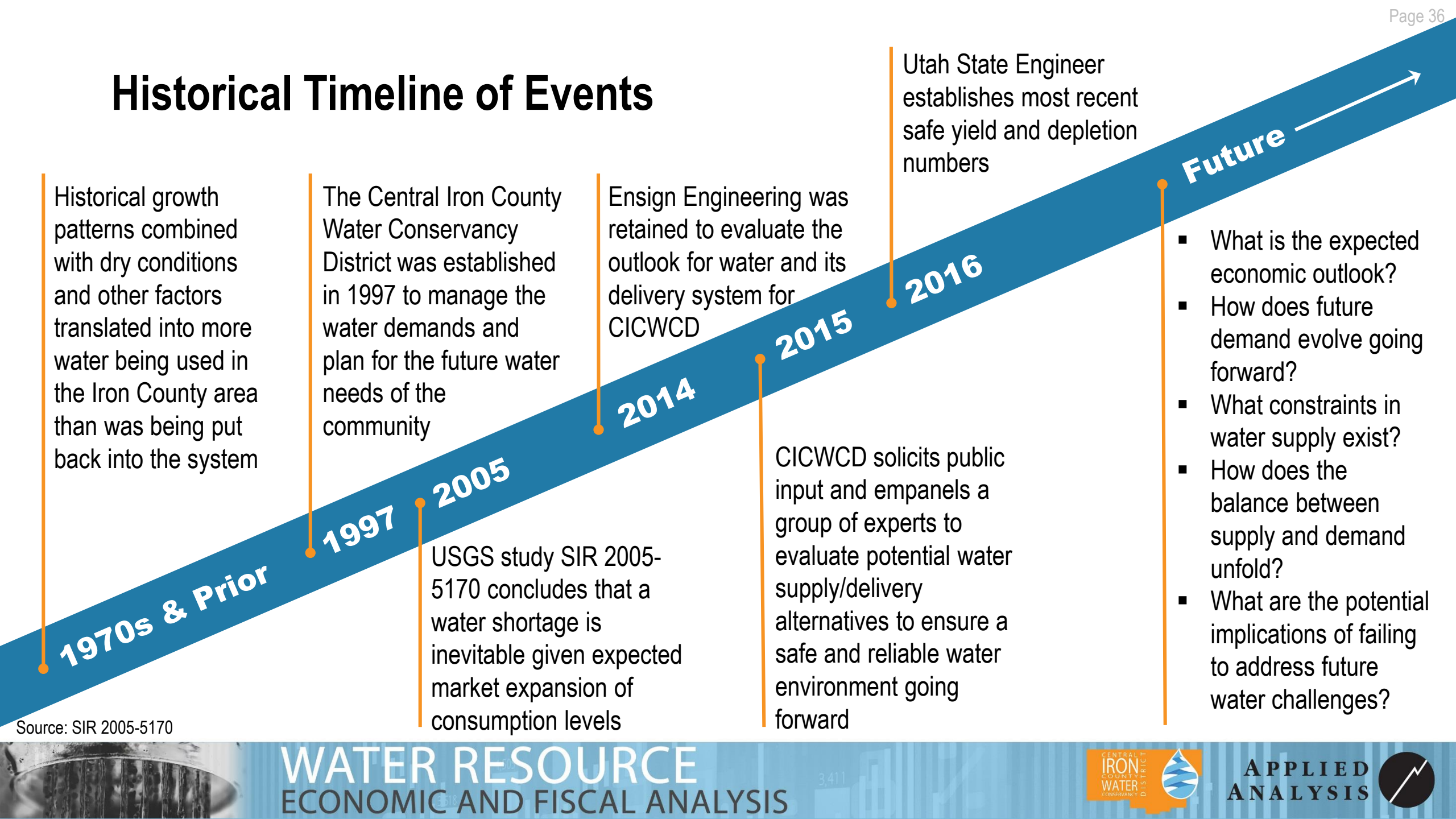


During this meeting, the Utah State Engineer concludes:

- The established safe yield is 21,000 acre-feet per year
- The current depletion is 28,000 acre-feet per year
- The potential (available) depletion is 50,000 acre-feet per year

Source: Utah Division of Water Rights

Historical Timeline of Events



Historical growth patterns combined with dry conditions and other factors translated into more water being used in the Iron County area than was being put back into the system

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- What is the expected economic outlook?
- How does future demand evolve going forward?
- What constraints in water supply exist?
- How does the balance between supply and demand unfold?
- What are the potential implications of failing to address future water challenges?

Source: SIR 2005-5170



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- Fiscal Considerations



Iron County

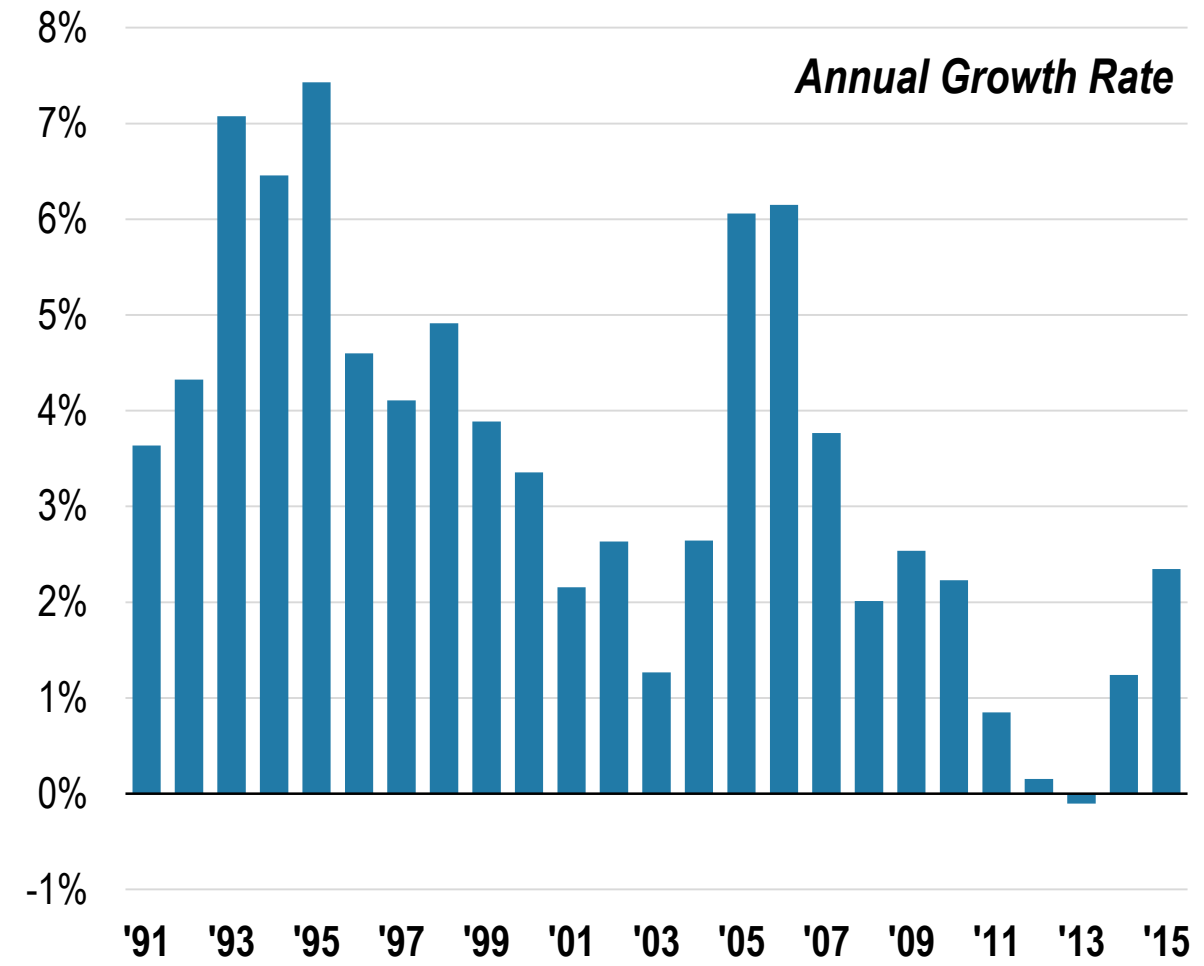
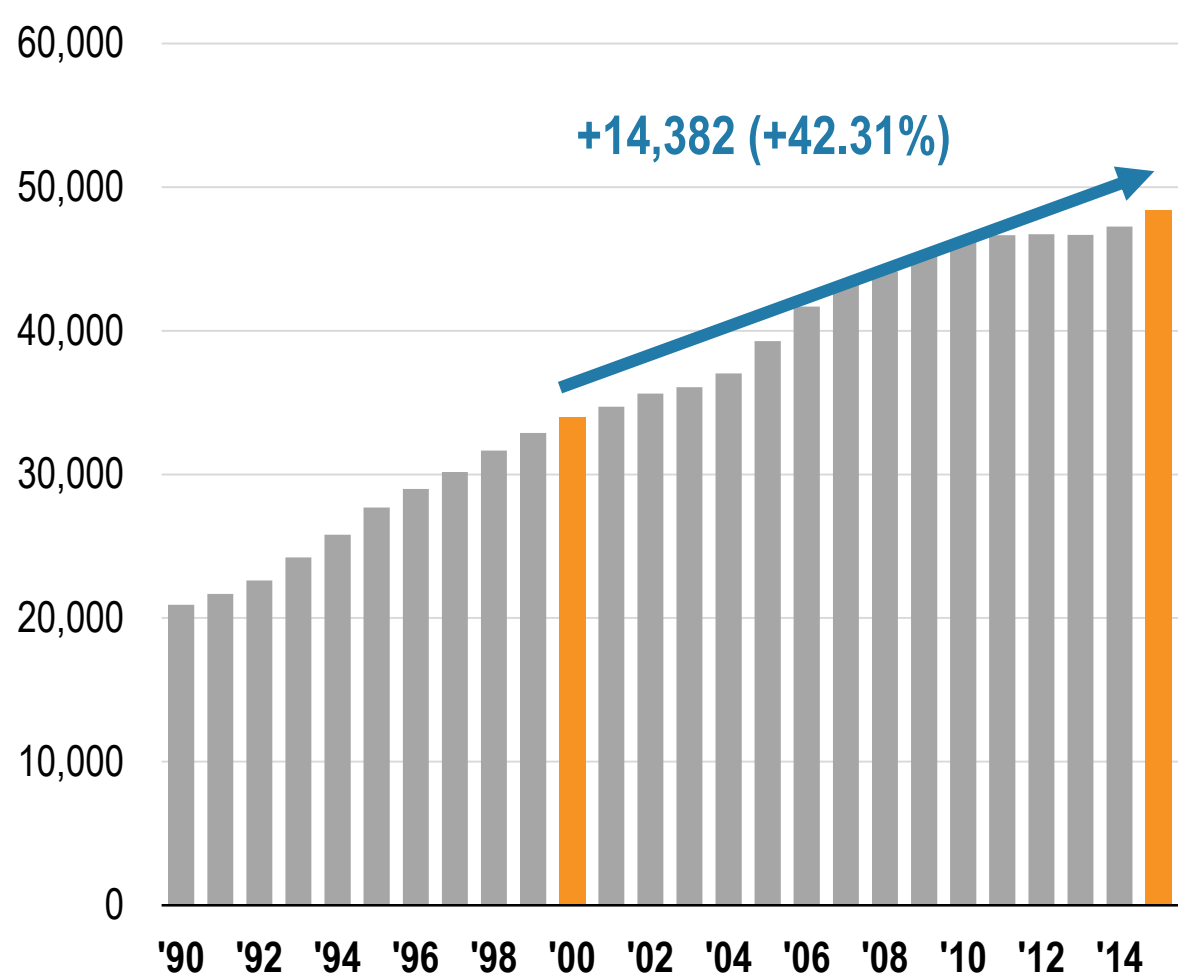
Economic Overview

	Peak		Present		% Δ
Population	2015	48,368	2015	48,368	At Peak
Labor Force Employment	Nov-06	21,396	Nov-16	20,972	-2.0%
Unemployment Rate	Nov-06	2.10%	Nov-16	3.60%	1.6%
Personal Income (Billions)	2015	\$1.31	2015	\$1.31	At Peak
Per Capita Personal Income	2015	\$27,037	2015	\$27,037	At Peak
Average Weekly Wage	Q4 15	\$645	Q2 16	\$622	-3.6%
Establishment Count	Q4 07	1,562	Q2 16	1,484	-5.0%

	Prior Year		Present		% Δ
Population	2014	47,259	2015	48,368	2.4%
Labor Force Employment	Nov-15	19,786	Nov-16	20,972	6.0%
Unemployment Rate	Nov-15	3.70%	Nov-16	3.60%	-0.1%
Personal Income (Billions)	2014	\$1.23	2015	\$1.31	6.0%
Per Capita Personal Income	2014	\$26,098	2015	\$27,037	3.6%
Average Weekly Wage	Q2 15	\$596	Q2 16	\$622	4.2%
Establishment Count	Q2 15	1,412	Q2 16	1,435	1.6%

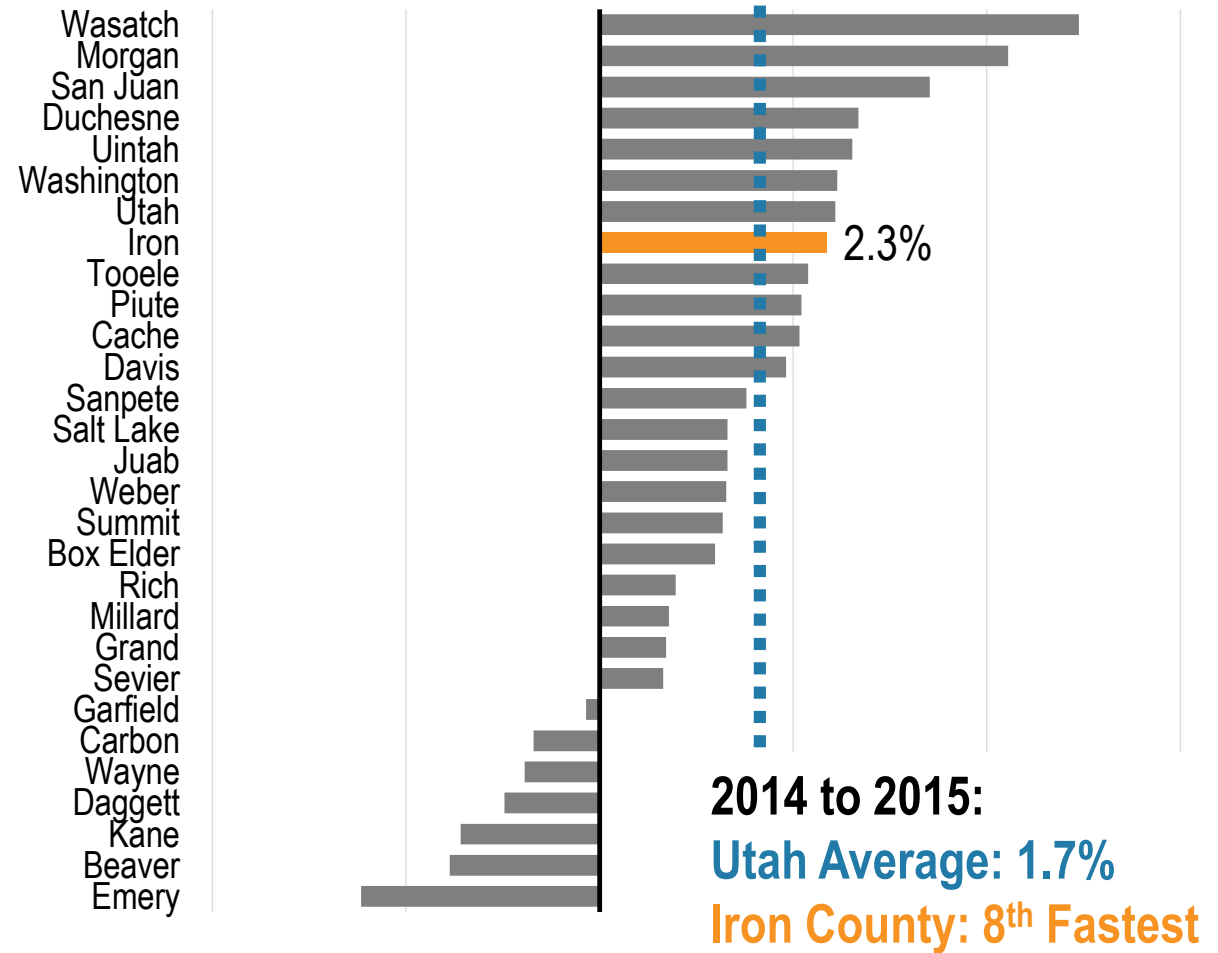
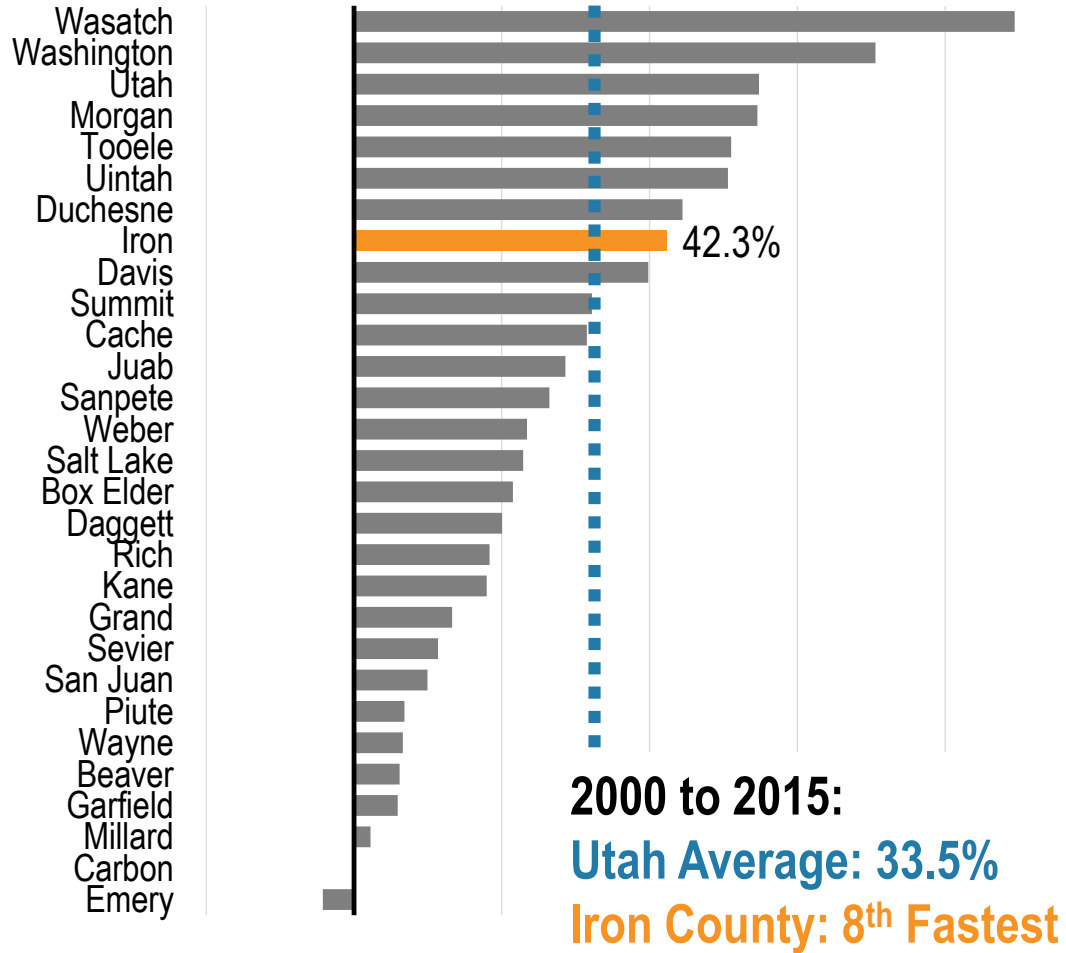
Source: US Census, Bureau of Labor Statistics, Bureau of Economic Analysis

Iron County Historical Population



Source: US Census Bureau

Iron County Population Growth Rankings

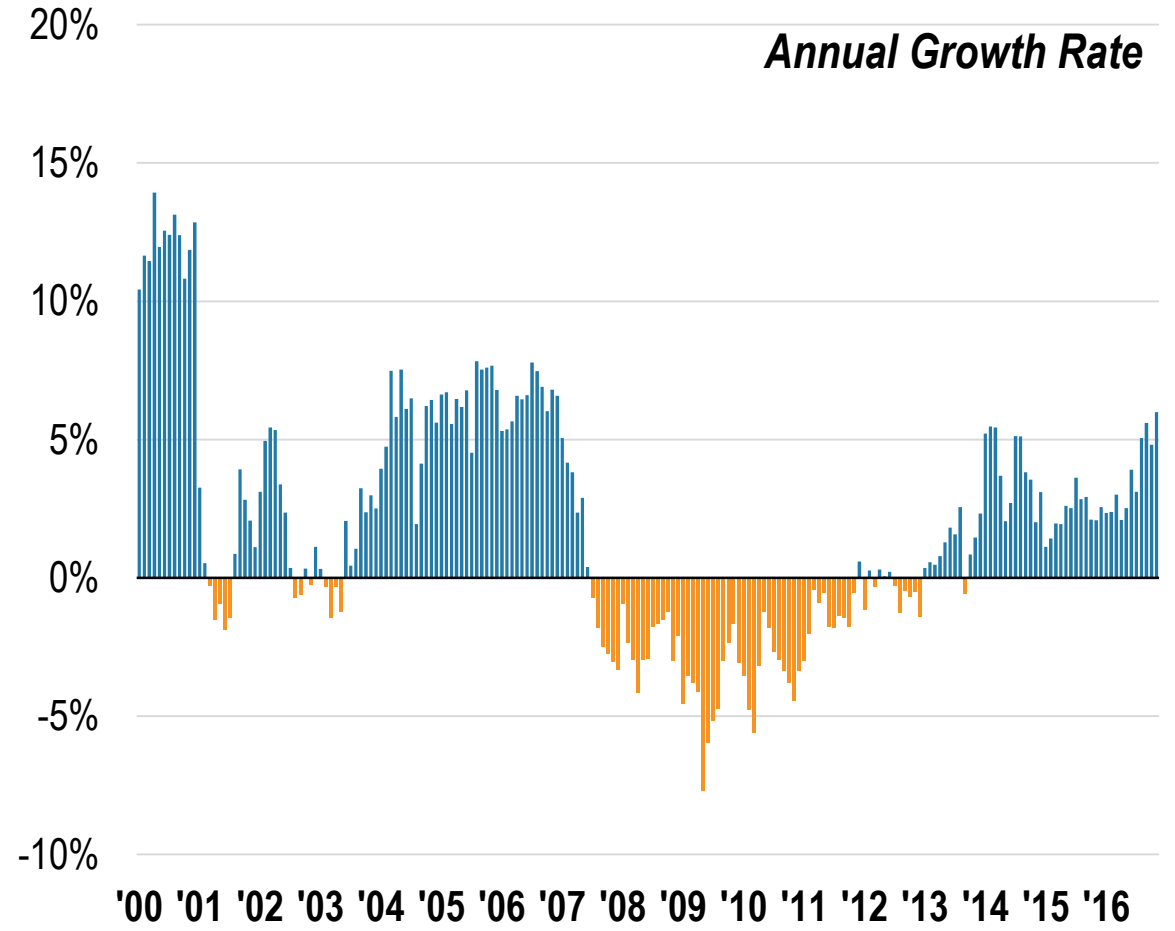
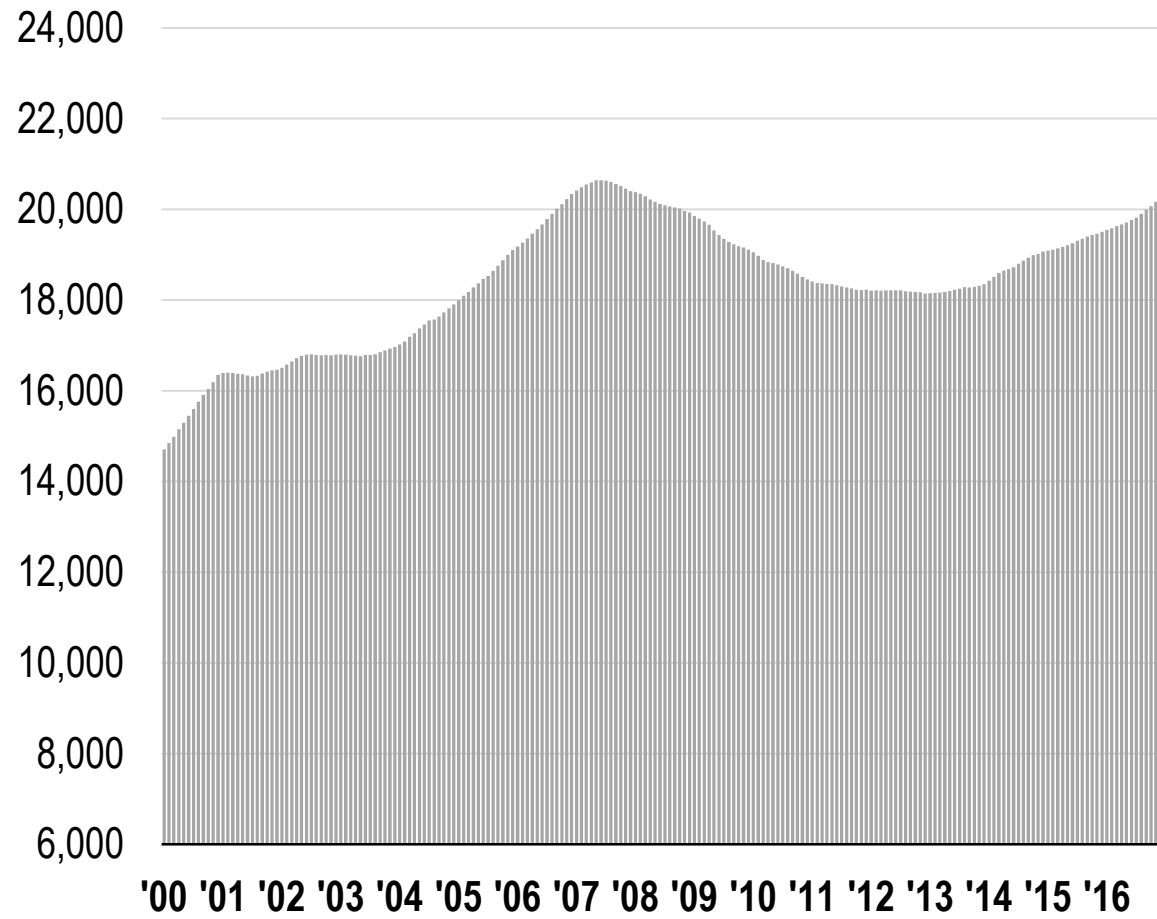


Source: US Census Bureau



Iron County

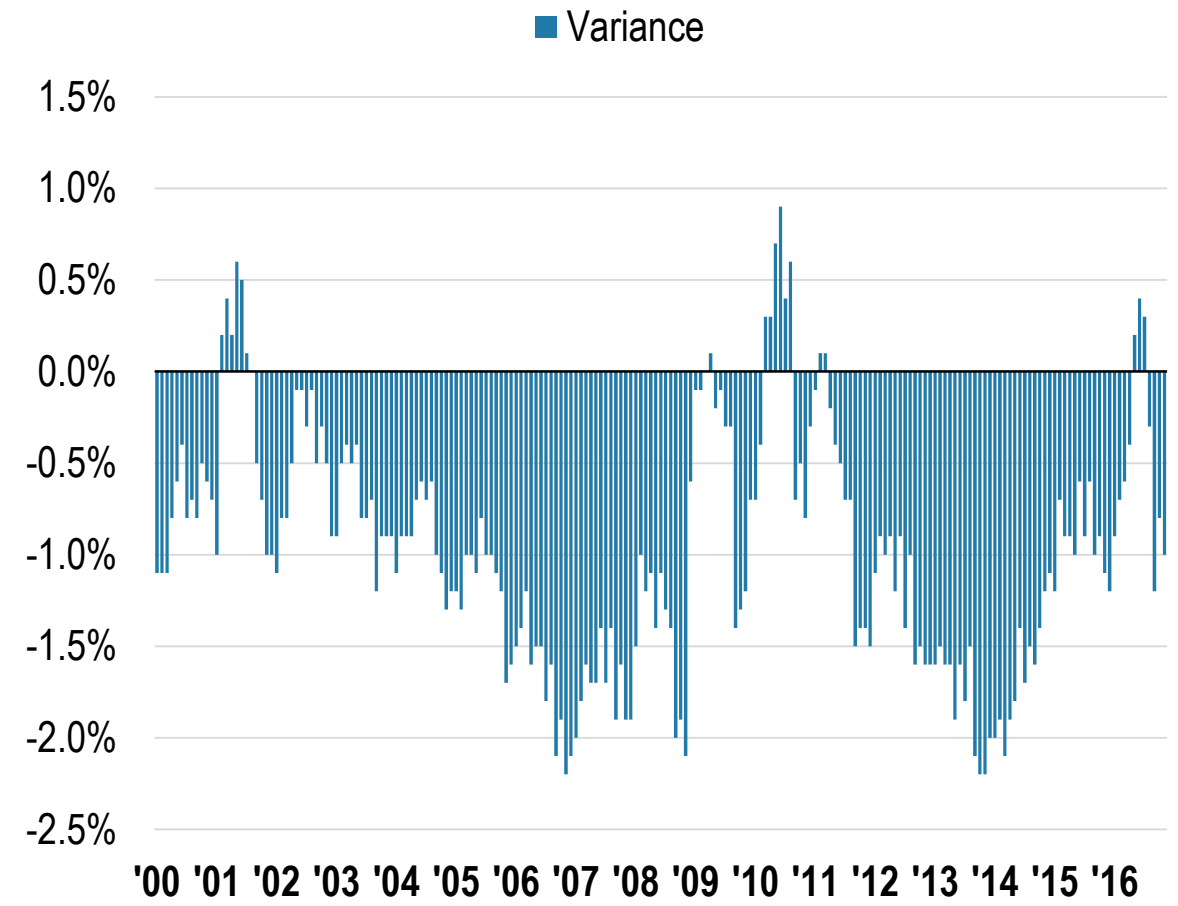
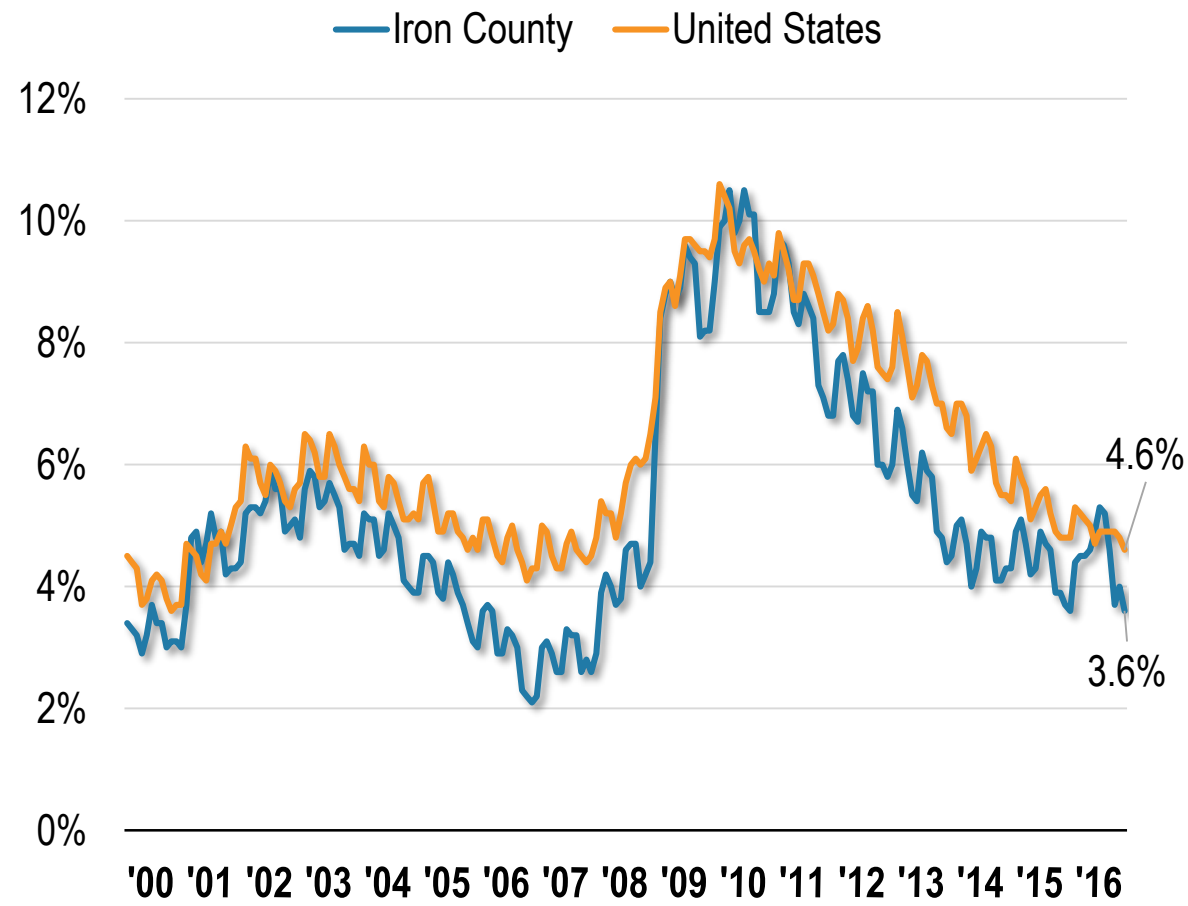
Historical Labor Force Employment



Source: Bureau of Labor Statistics, Current Population Survey

Iron County

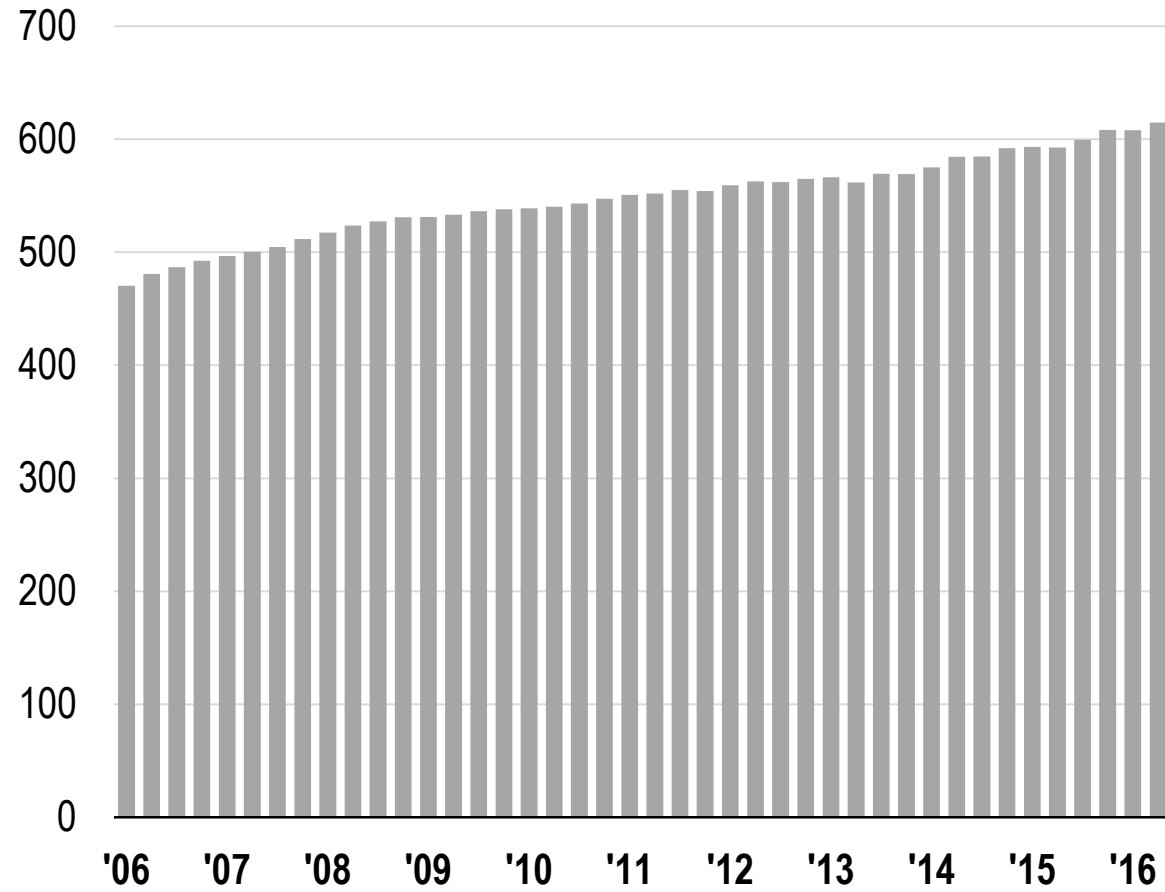
Historical Unadjusted Unemployment Rate vs United States



Source: Bureau of Labor Statistics

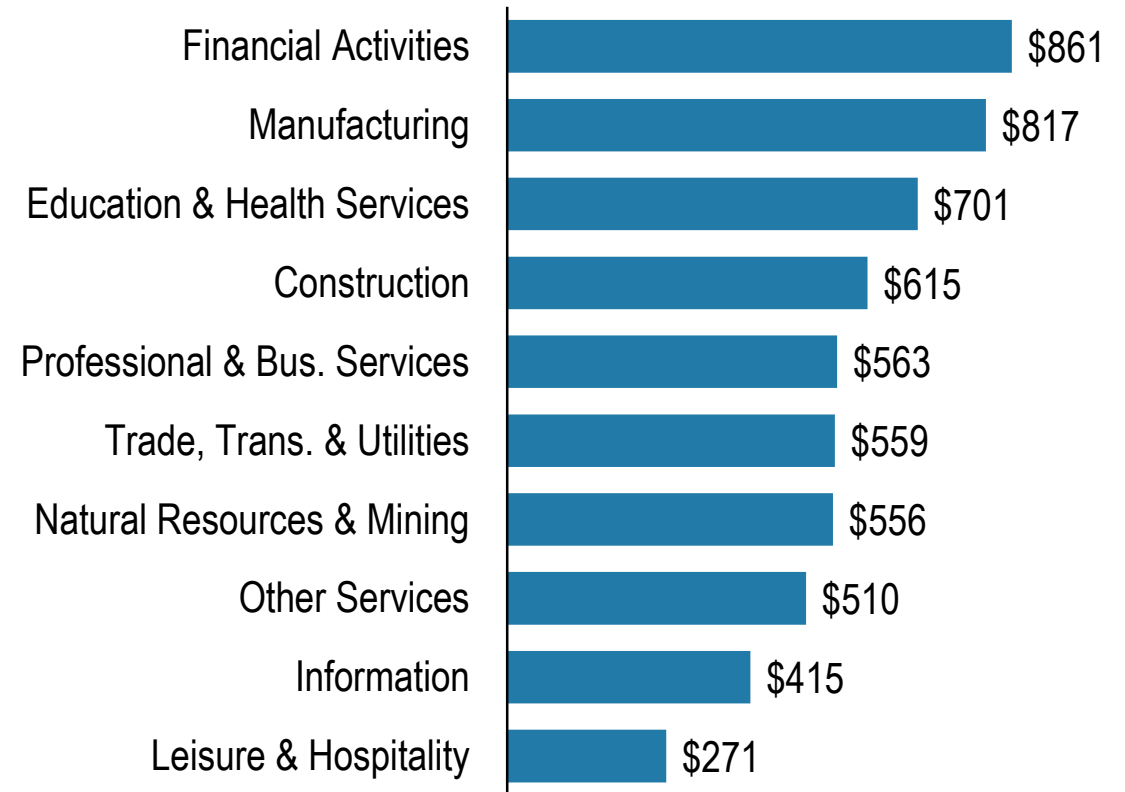
Iron County

Historical Average Weekly Wages



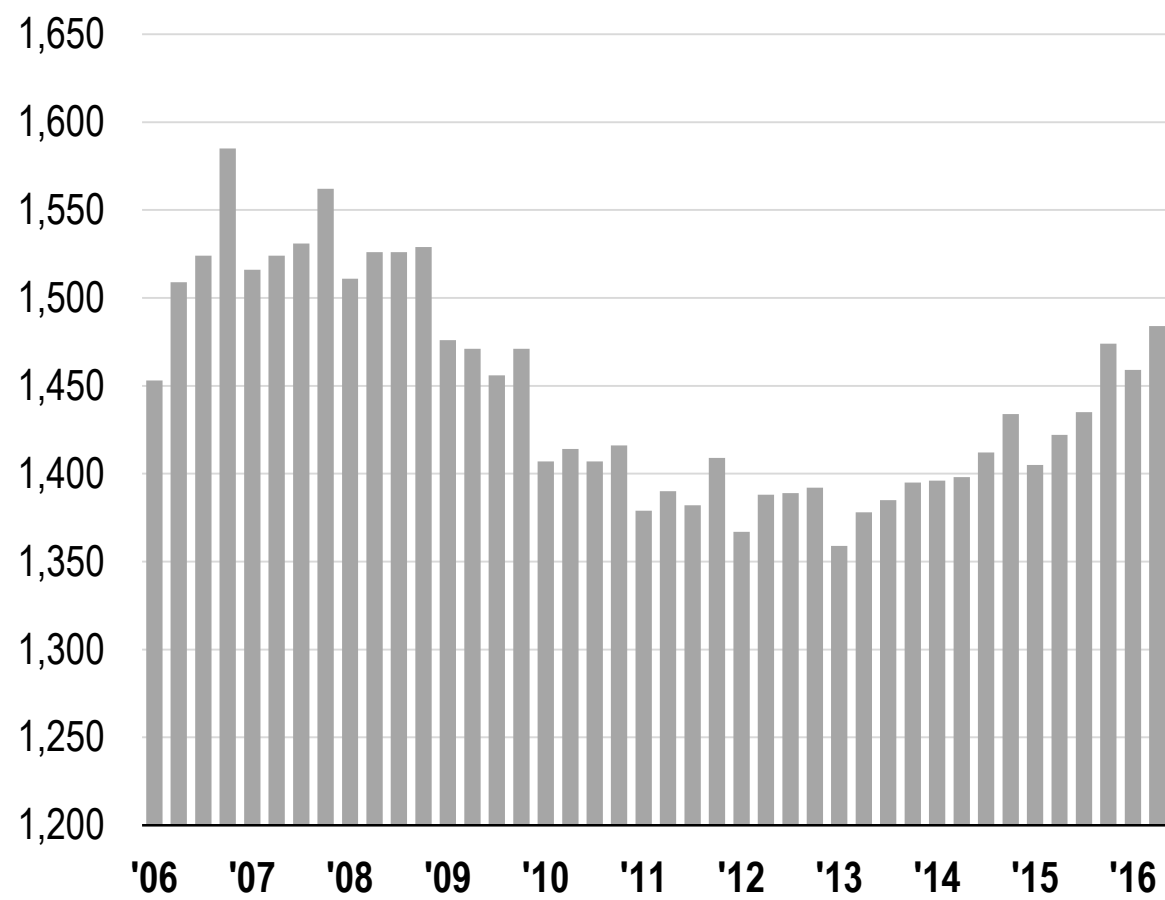
Source: Bureau of Labor Statistics. Note, "Average Weekly Wage by Sector" is for Q2 2016 (latest available data)

Average Weekly Wage by Sector



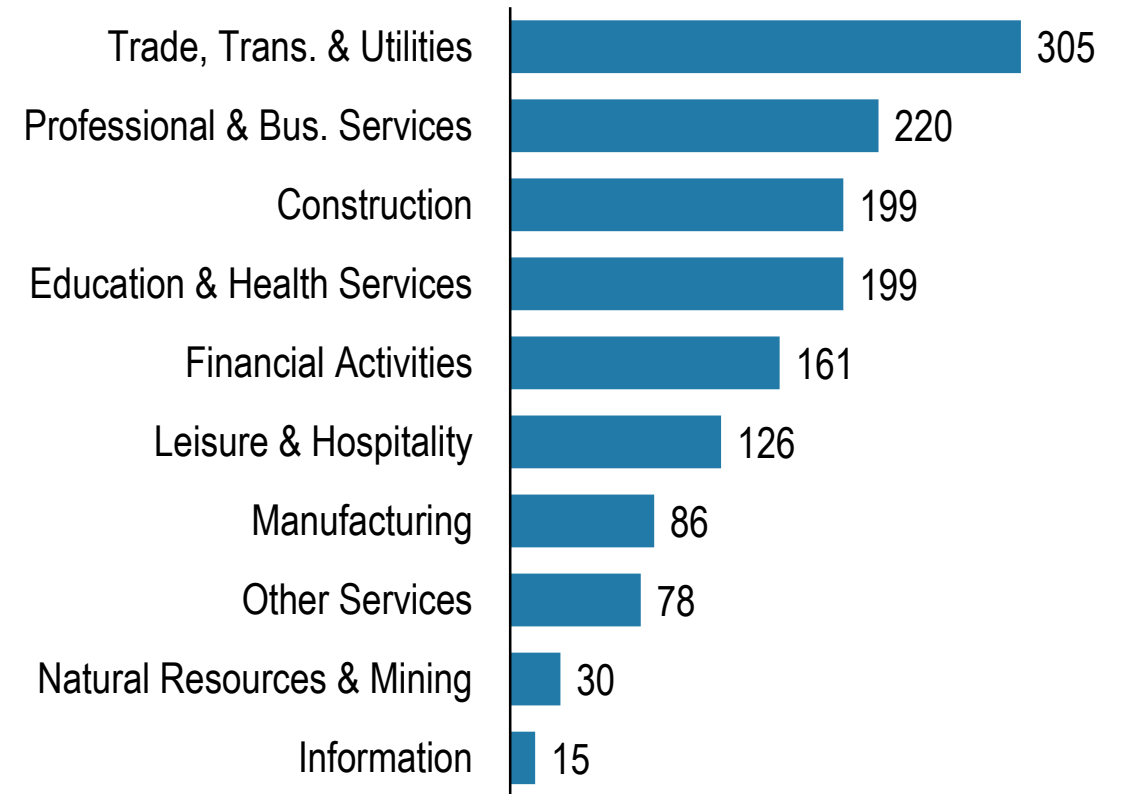
Iron County

Historical Establishments



Source: Bureau of Labor Statistics. Note, "Establishments by Sector" is for Q2 2016 (latest available data)

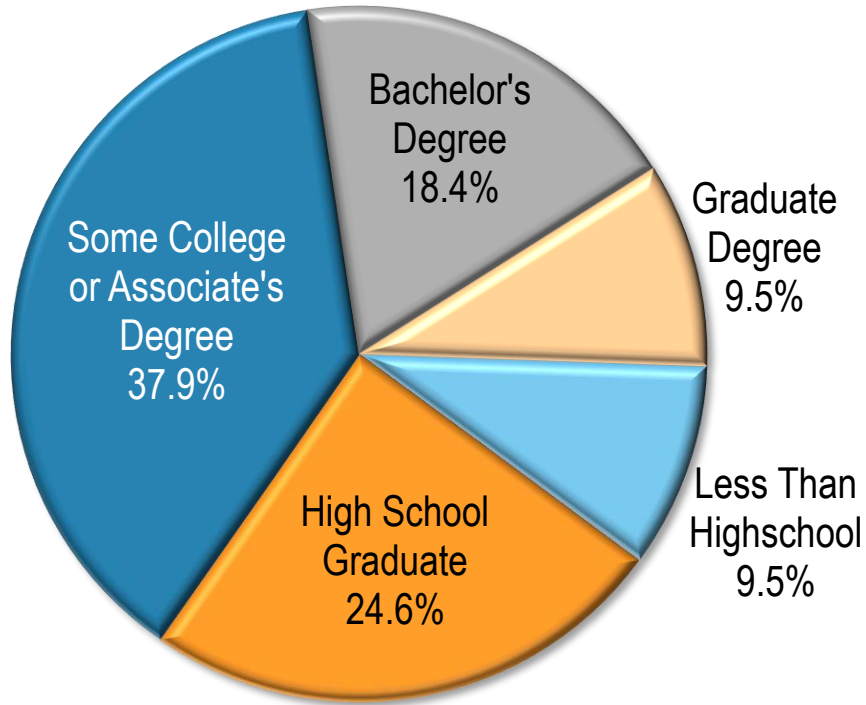
Establishments by Sector



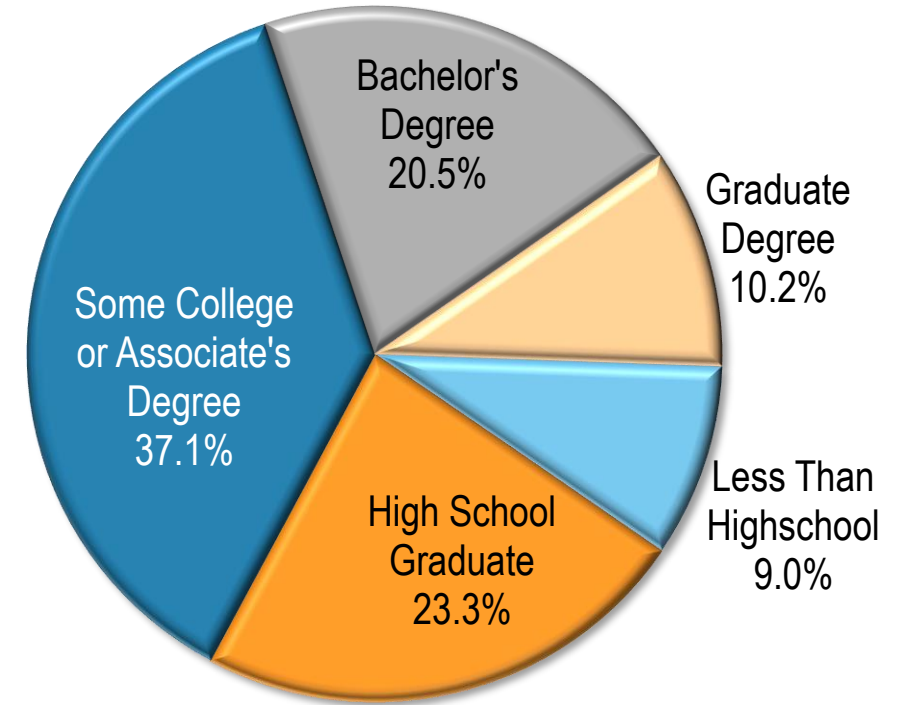
Iron County

Educational Attainment for Population 25 Years and Over | 2015

Iron County



Utah

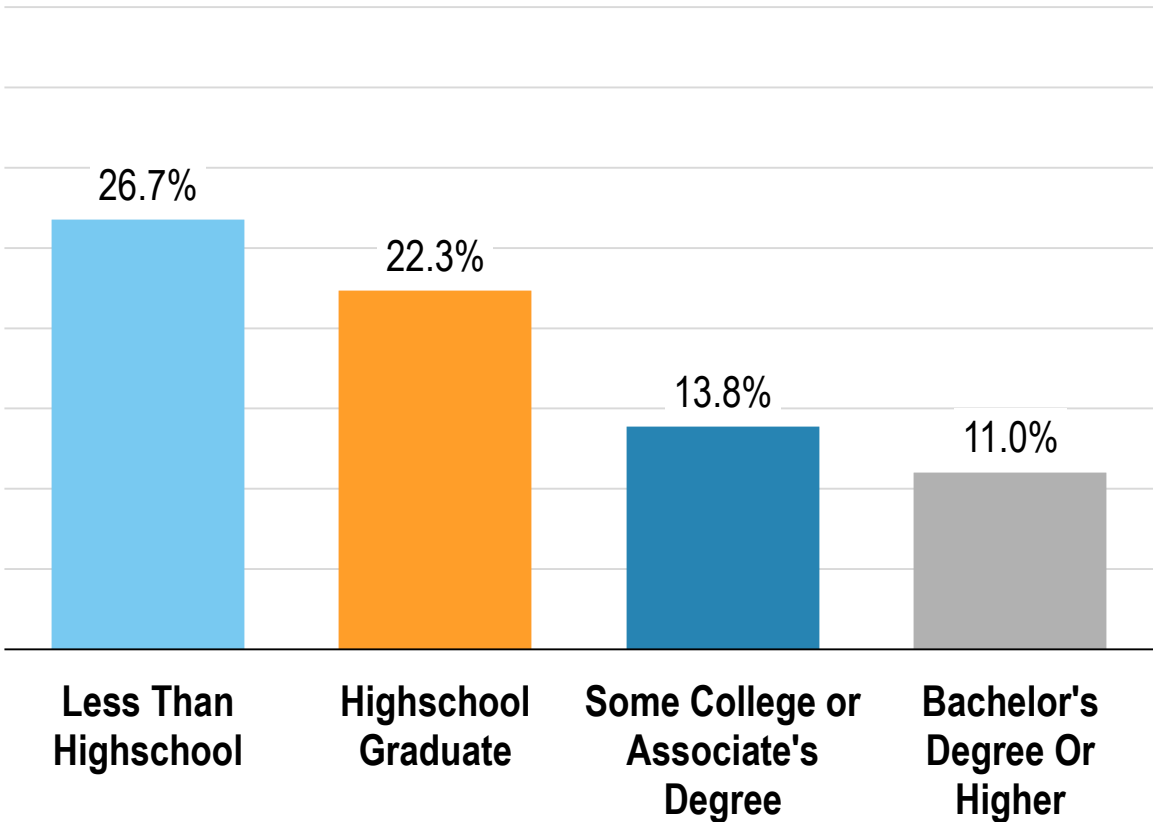


Source: US Census Bureau, American Community Survey

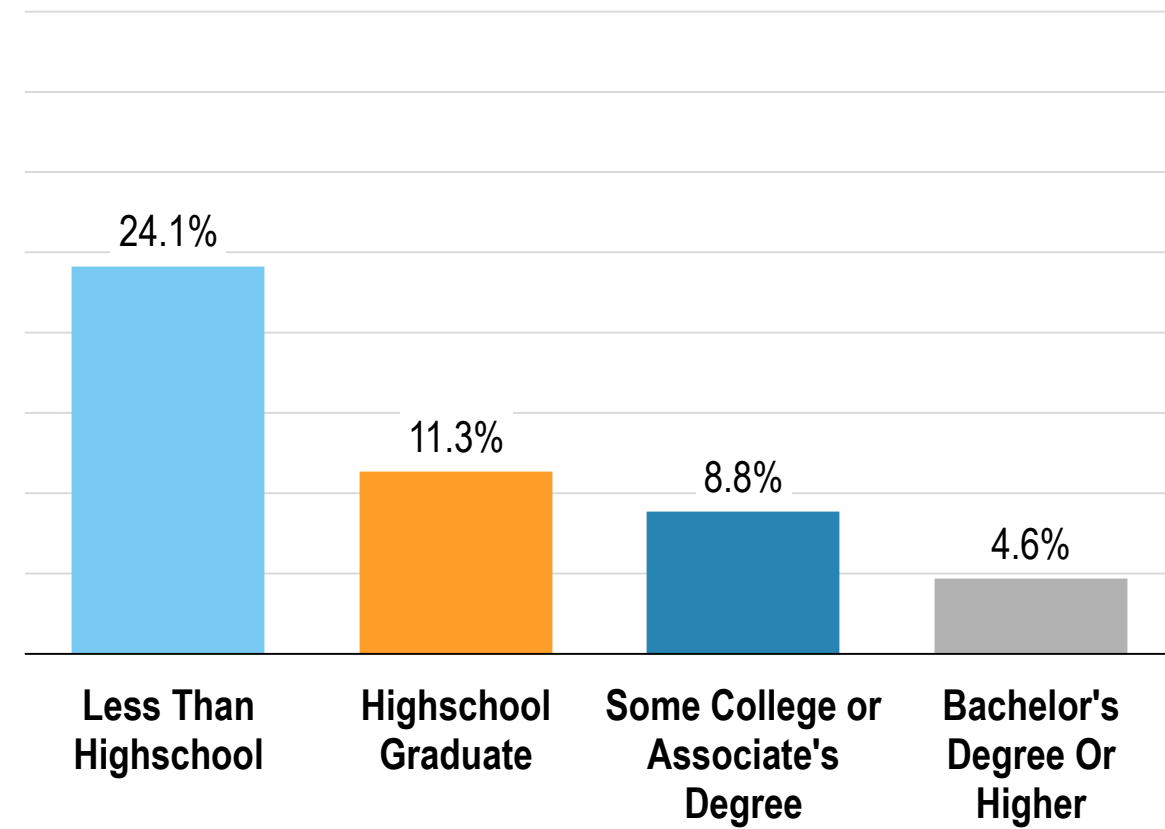
Iron County

Poverty Rate by Educational Attainment | 2015

Iron County



Utah



Source: US Census Bureau, American Community Survey

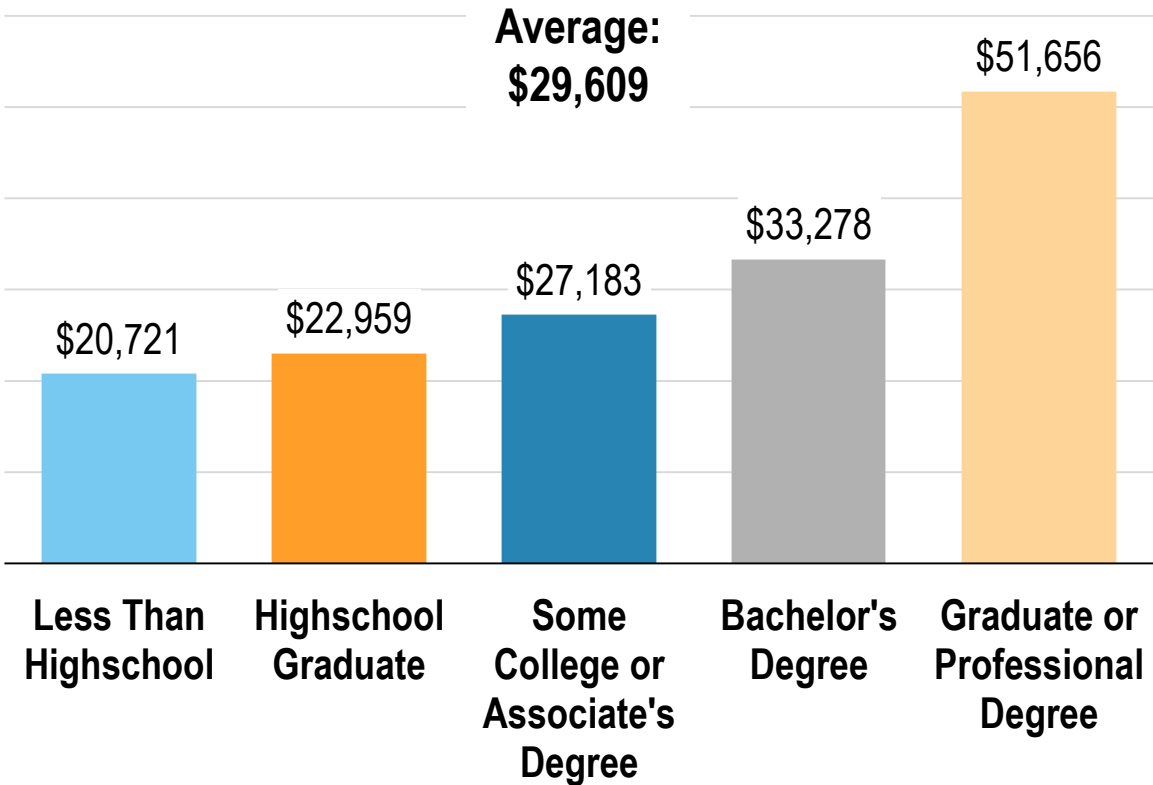


Iron County

Median Earnings in the Past 12 Months by Educational Attainment

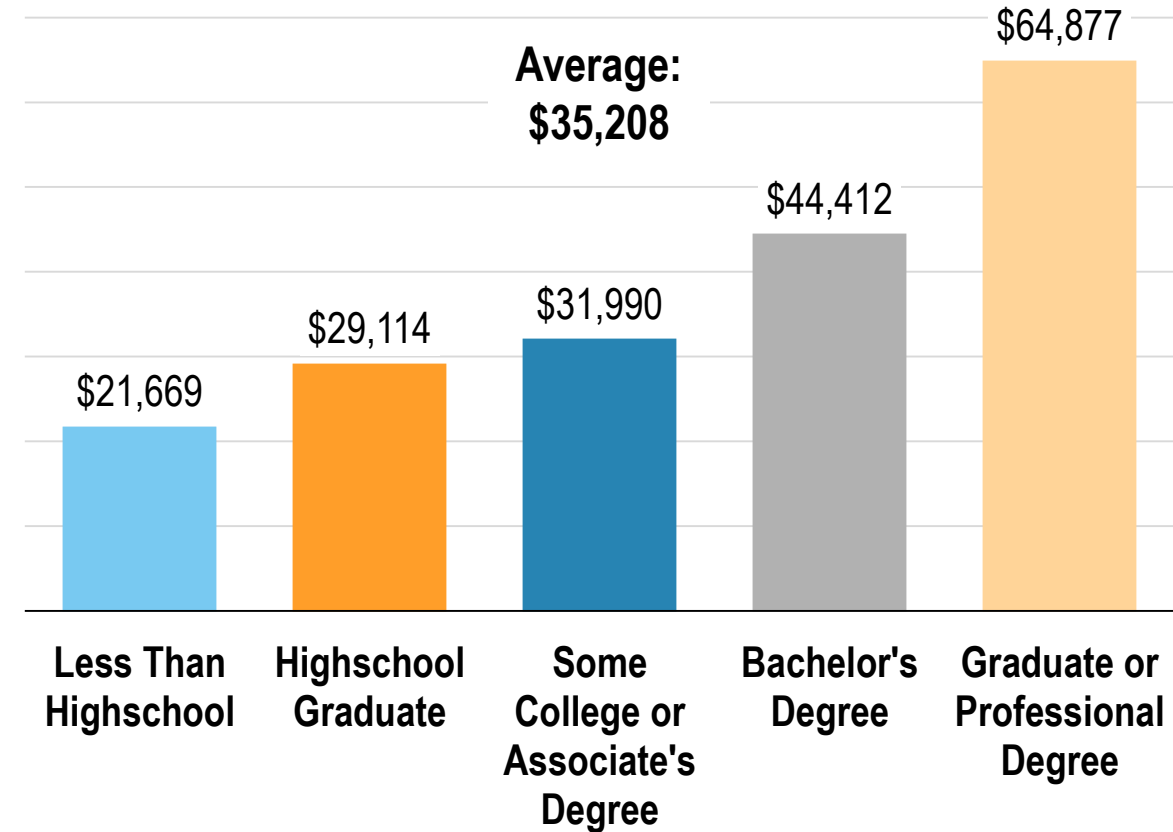
Iron County

Average:
\$29,609



Utah

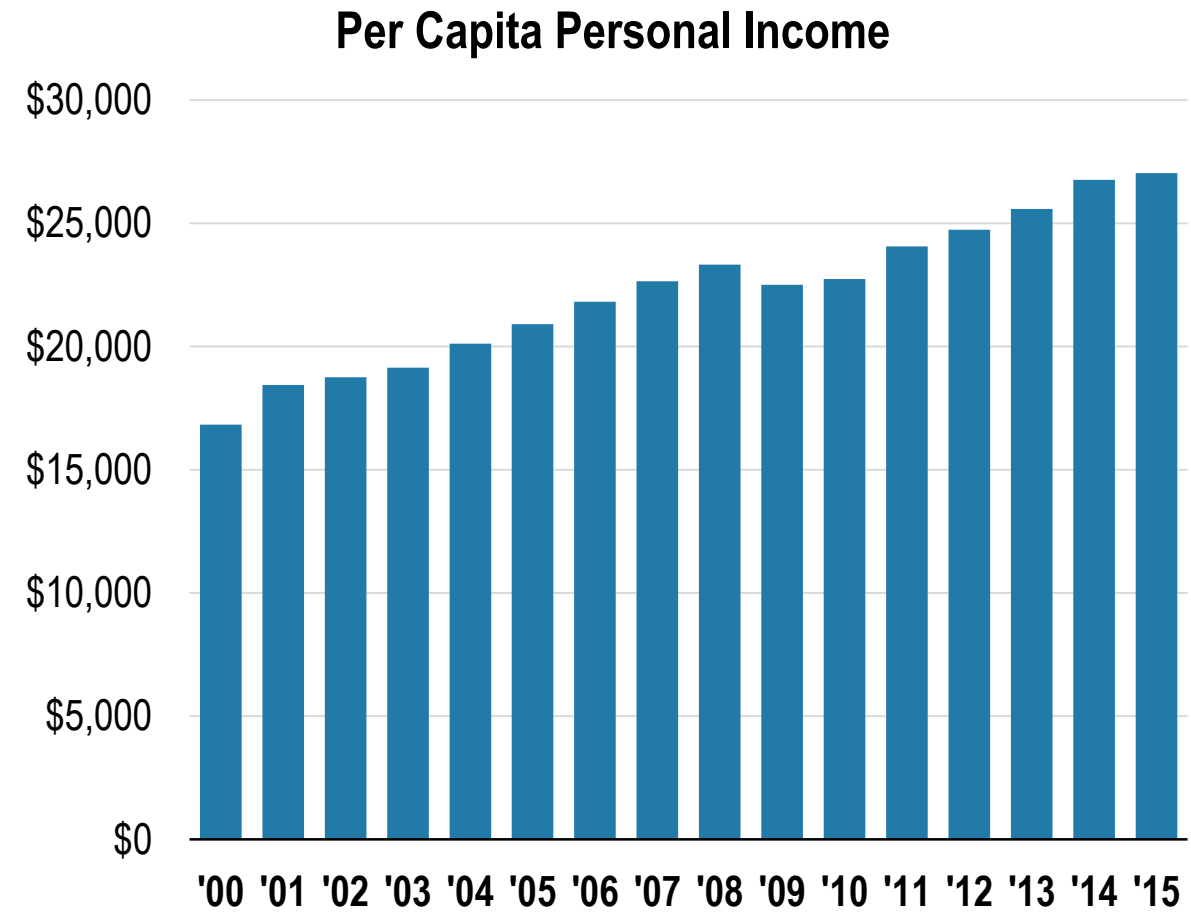
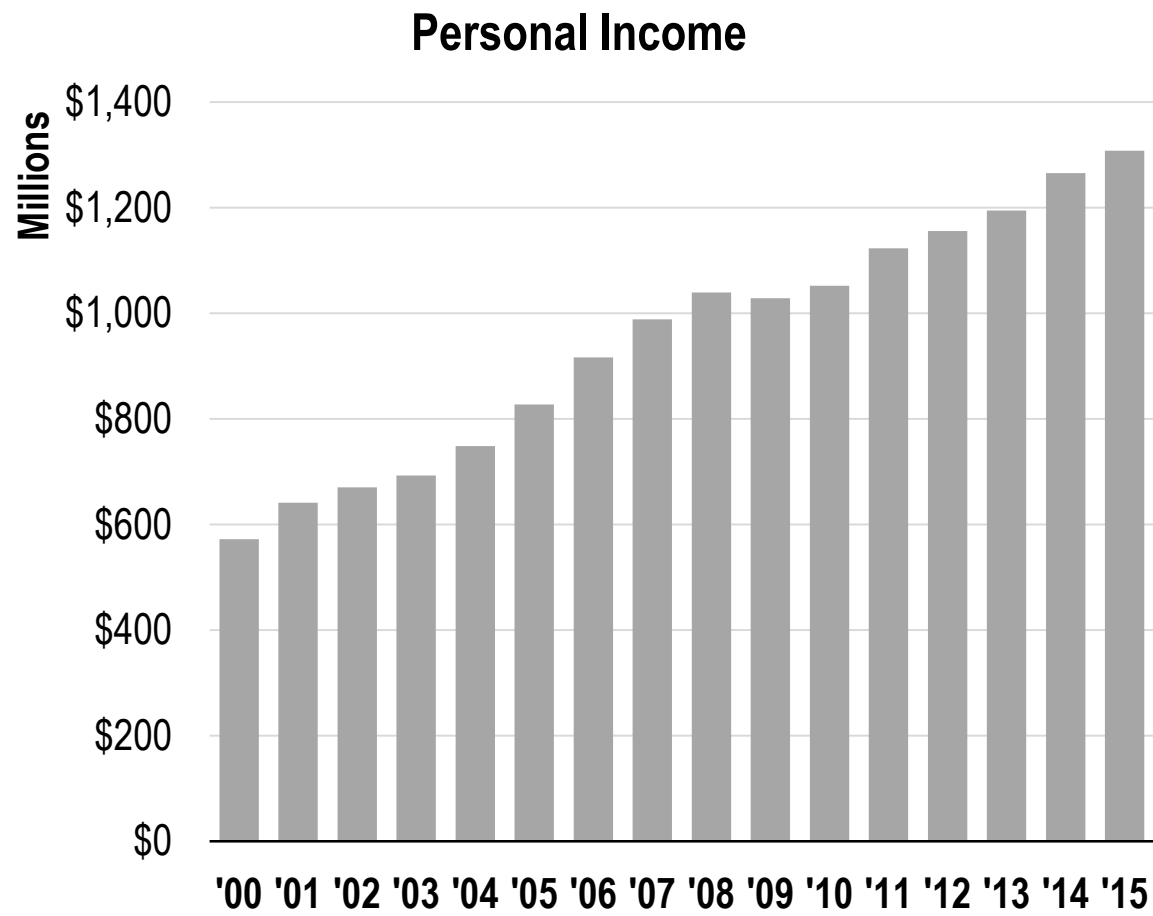
Average:
\$35,208



Source: US Census Bureau, American Community Survey

Cedar City Micro. Statistical Area

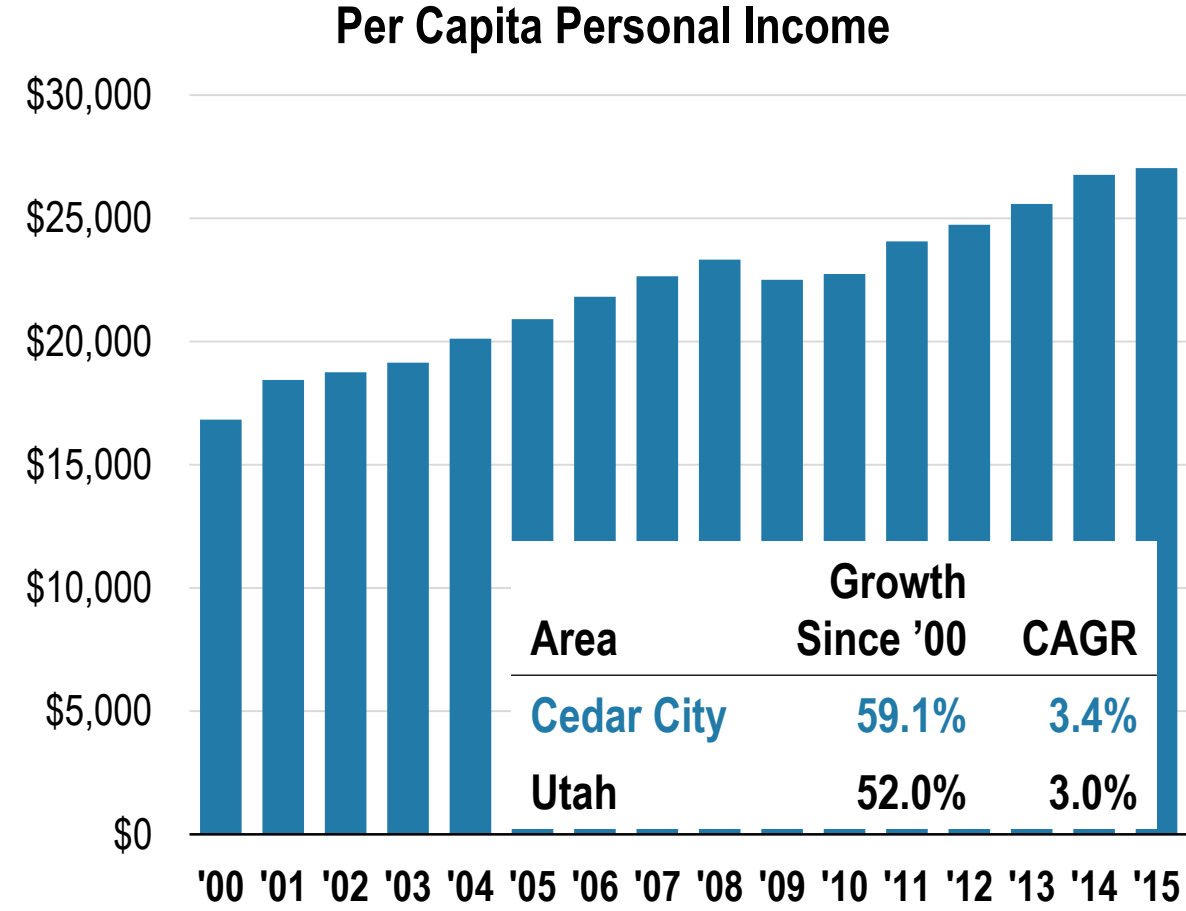
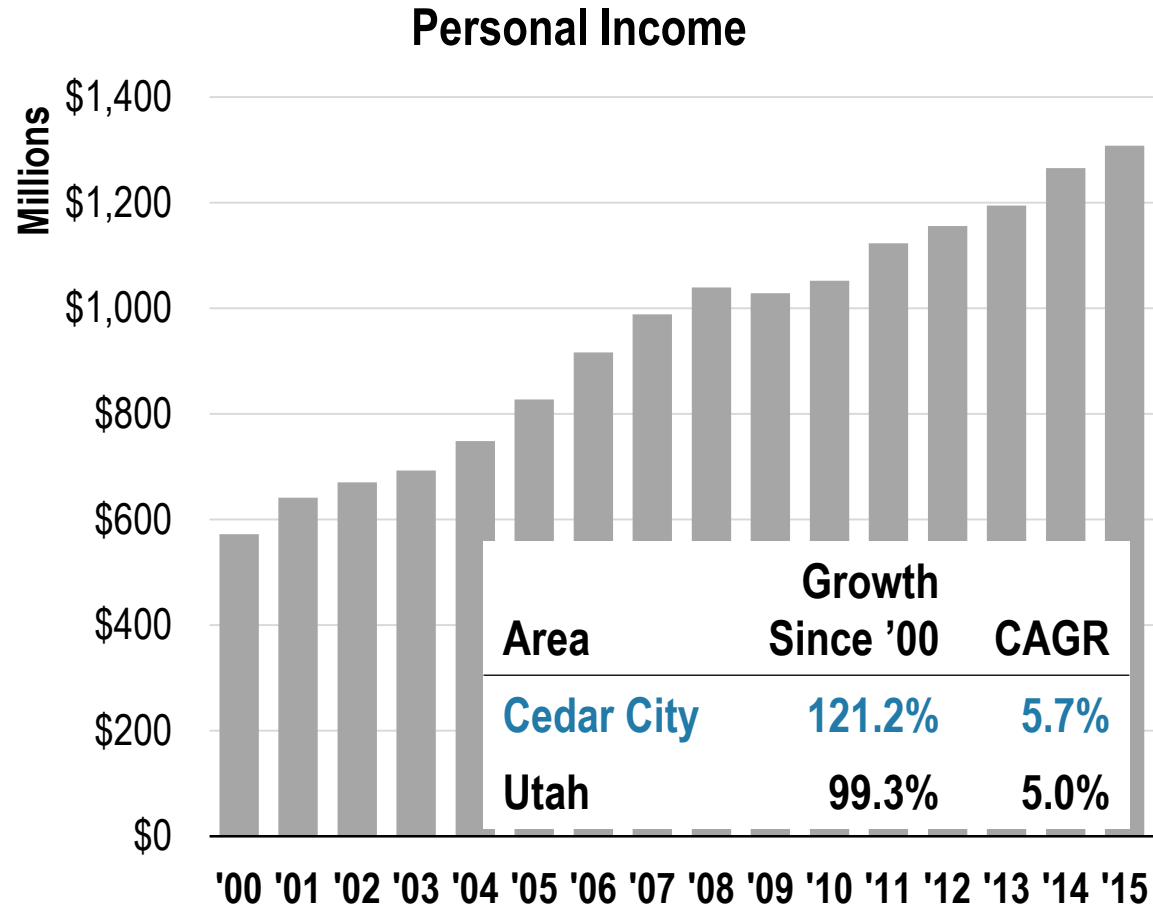
Historical Personal Income



Source: US Bureau of Economic Analysis

Cedar City Micro. Statistical Area

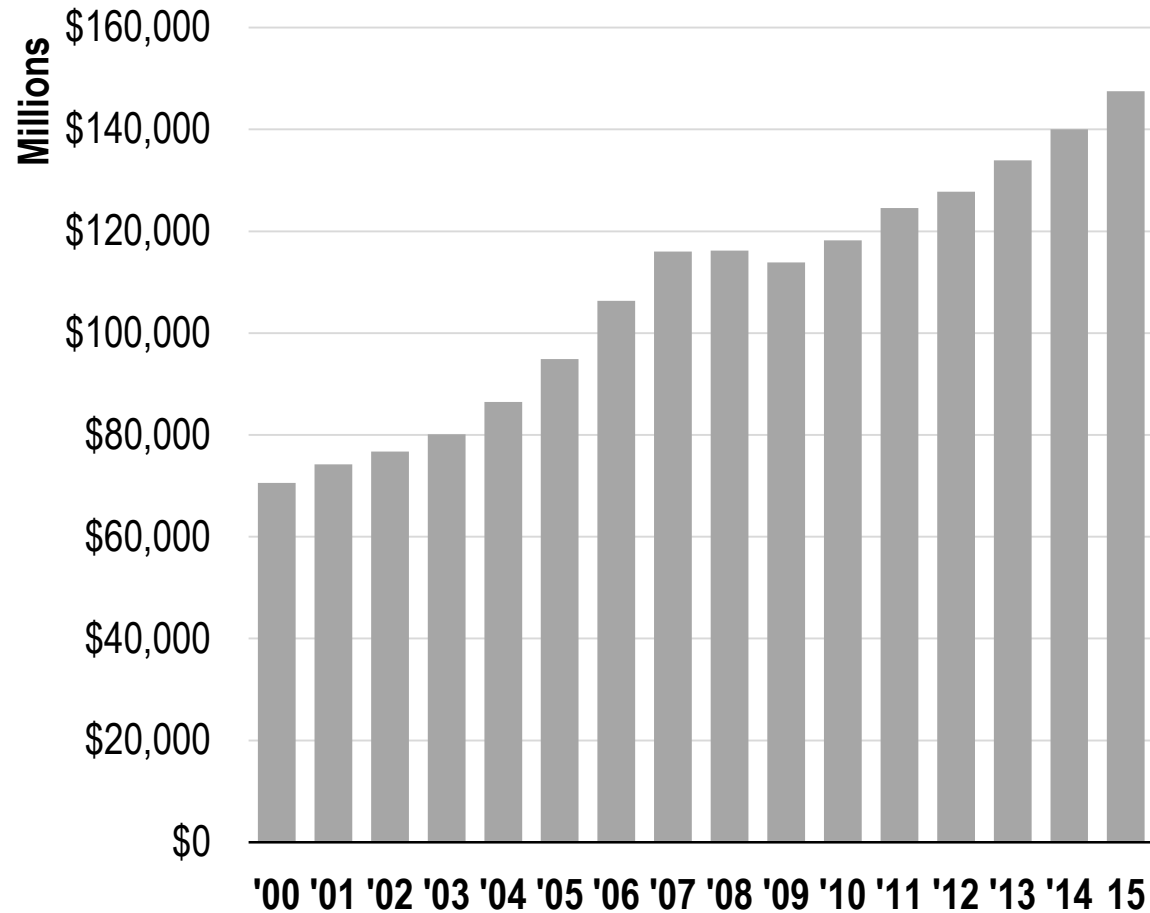
Historical Personal Income



Source: US Bureau of Economic Analysis

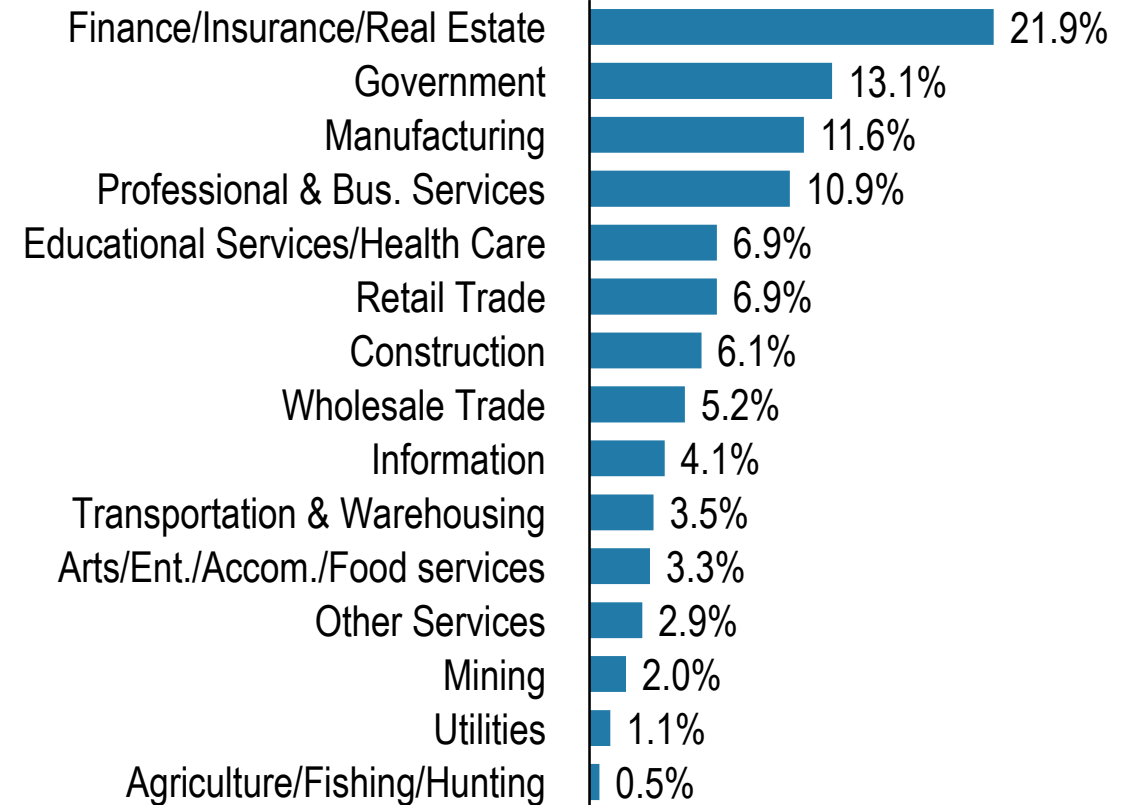
Utah

Historical Gross Domestic Product and By Industry



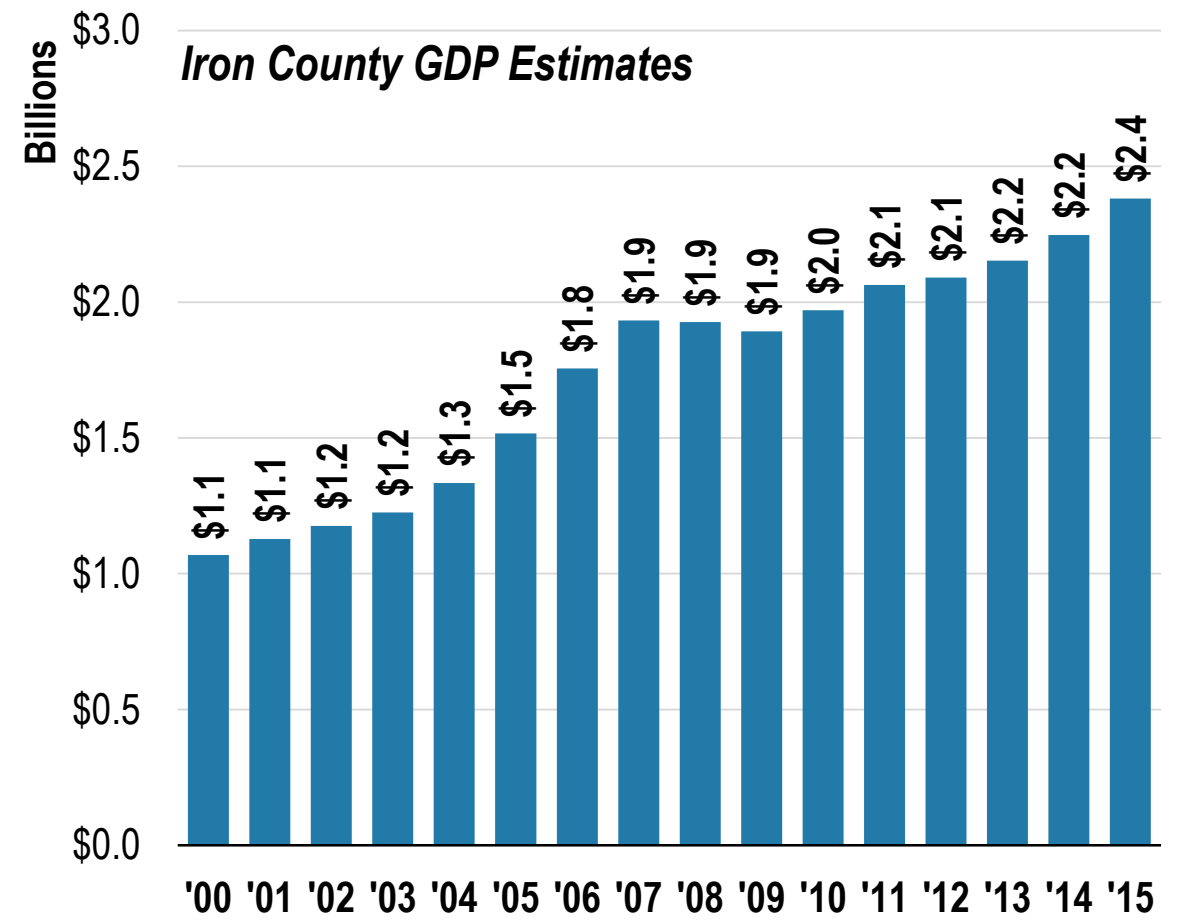
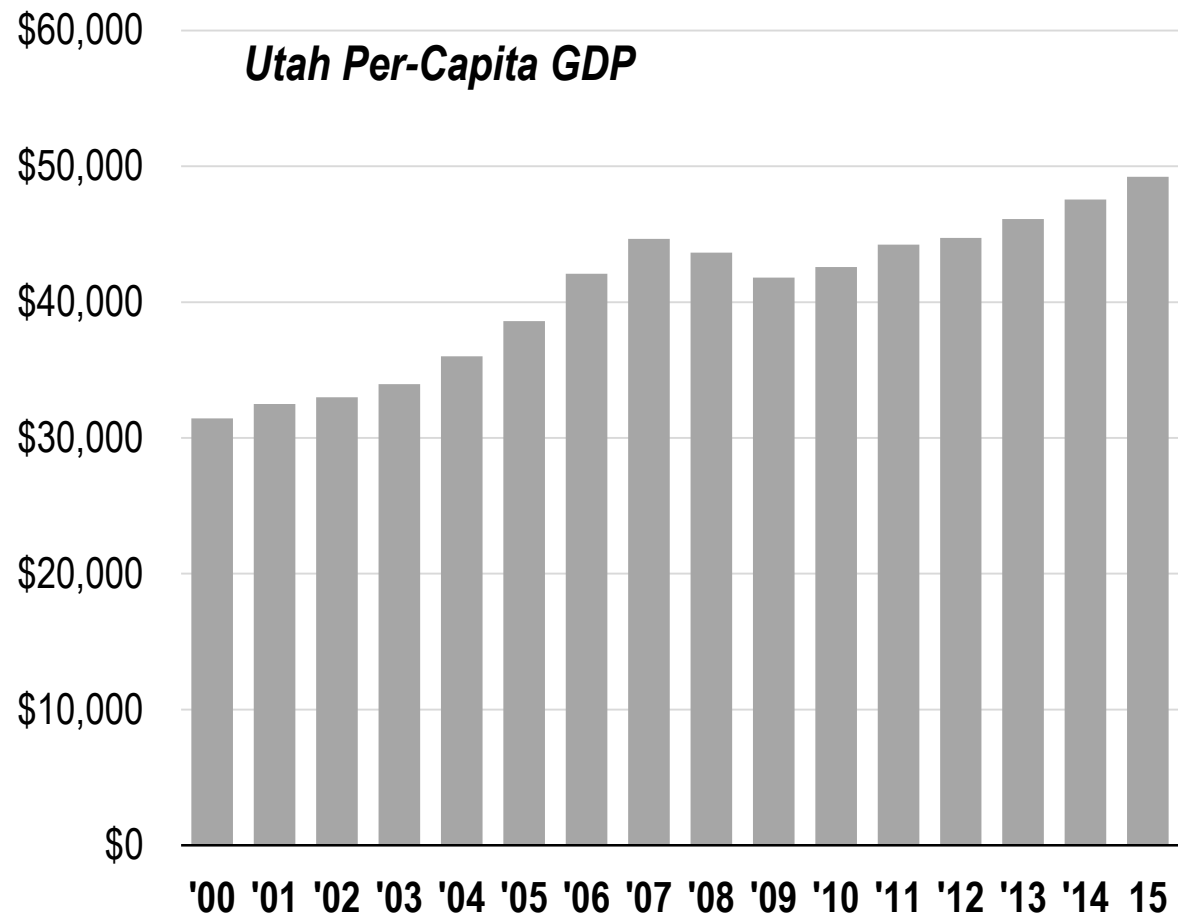
Source: US Bureau of Economic Analysis

Share of GDP by Industry



Gross Domestic Product

Per Capita in Utah and Estimated for Iron County



Source: US Bureau of Economic Analysis (Iron County estimates assume consistent per-capita GDP)



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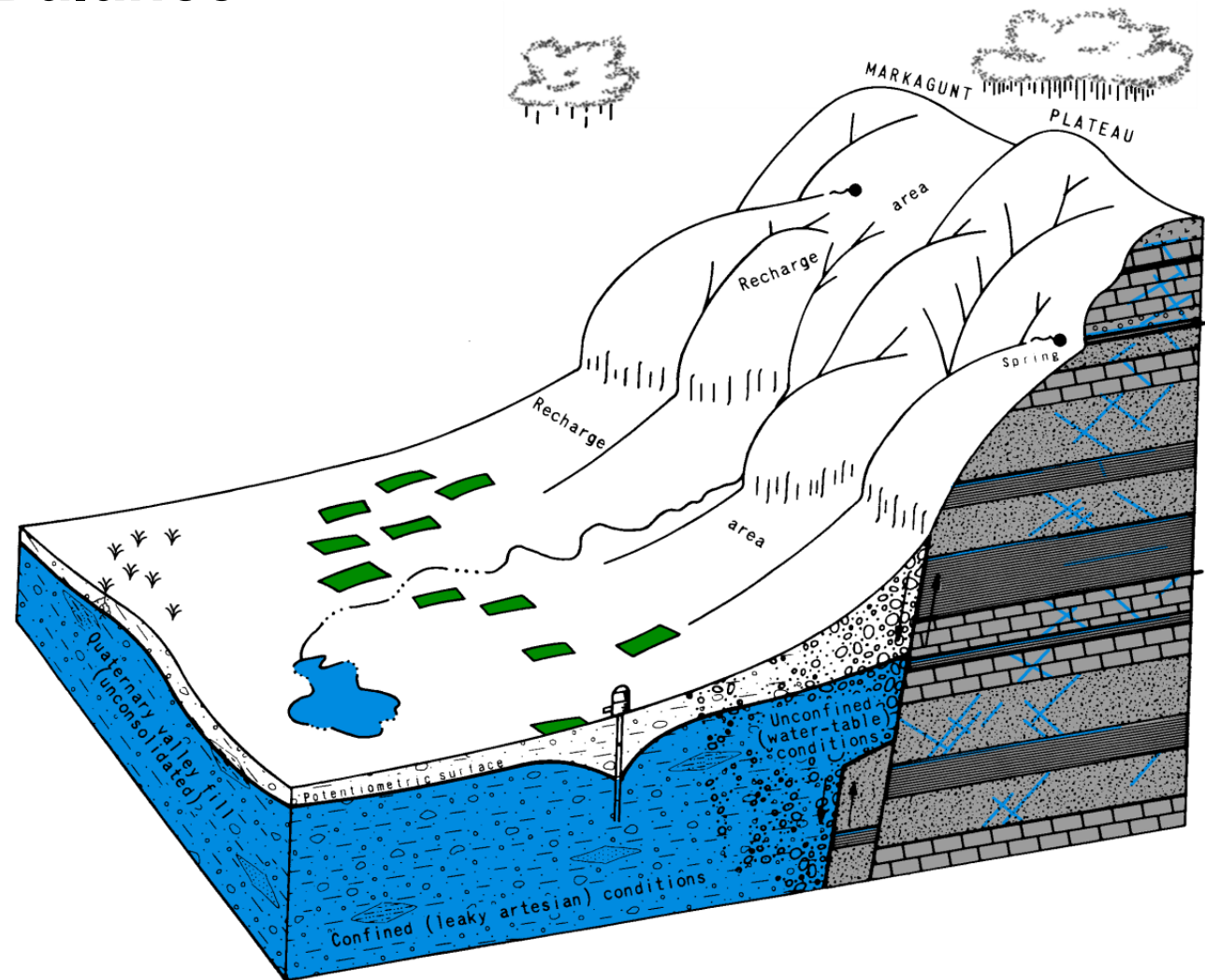
Groundwater Supply-Demand Balance

■ Discharge (or Depletion or Use)

- Well pumping
- Subsurface outflow
- Evapotranspiration (evaporation and plant transpiration)
- Valley springs

■ Recharge

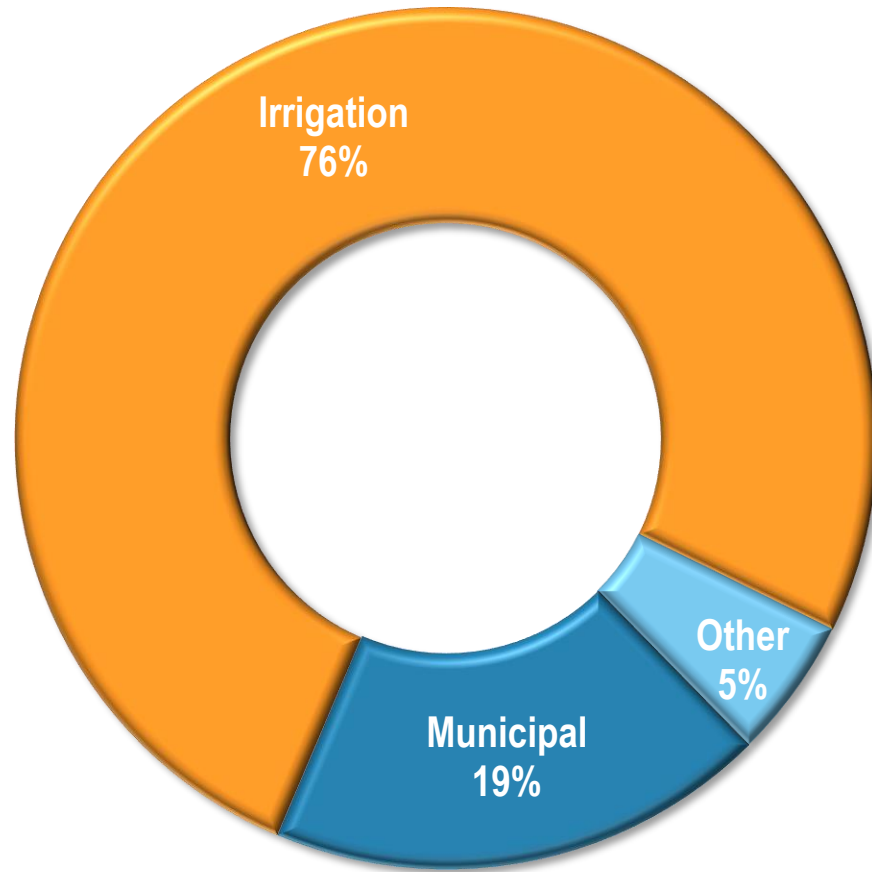
- Precipitation
- Seepage from irrigation
- Seepage from streams and canals
- Subsurface inflow



Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).



Current Sources of Discharge/Depletion (approximate)

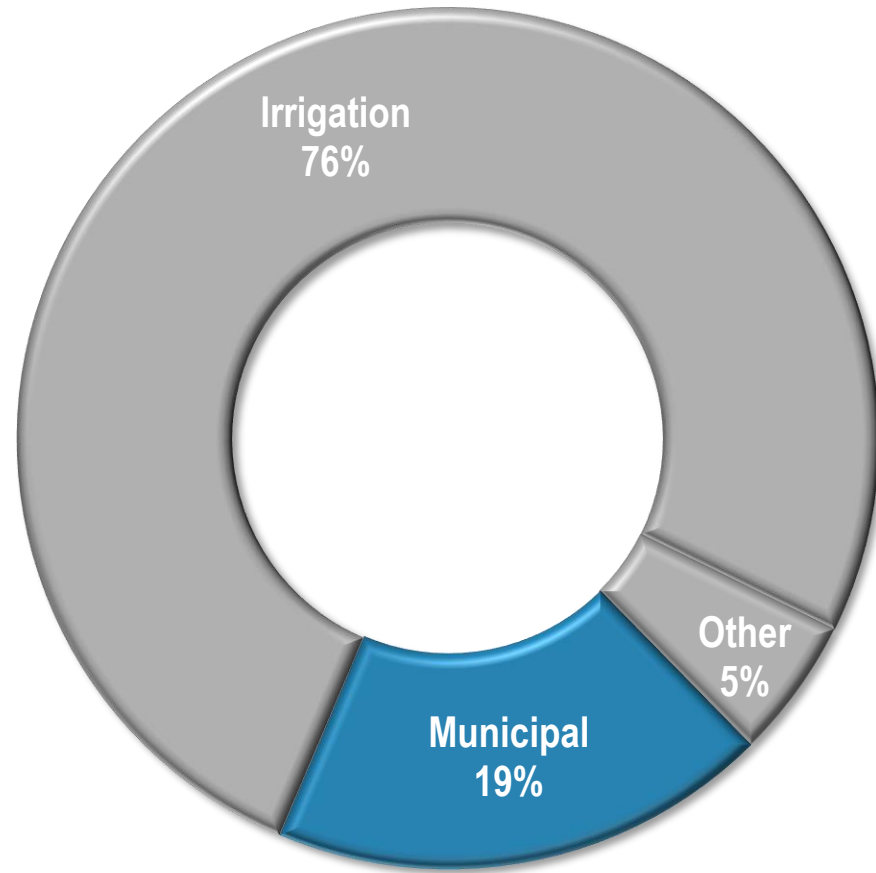


“The majority (± 95 percent) of water depletion is sourced to irrigation (agriculture) and municipal (non-agricultural) uses”

Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).



Current Sources of Discharge/Depletion (approximate)



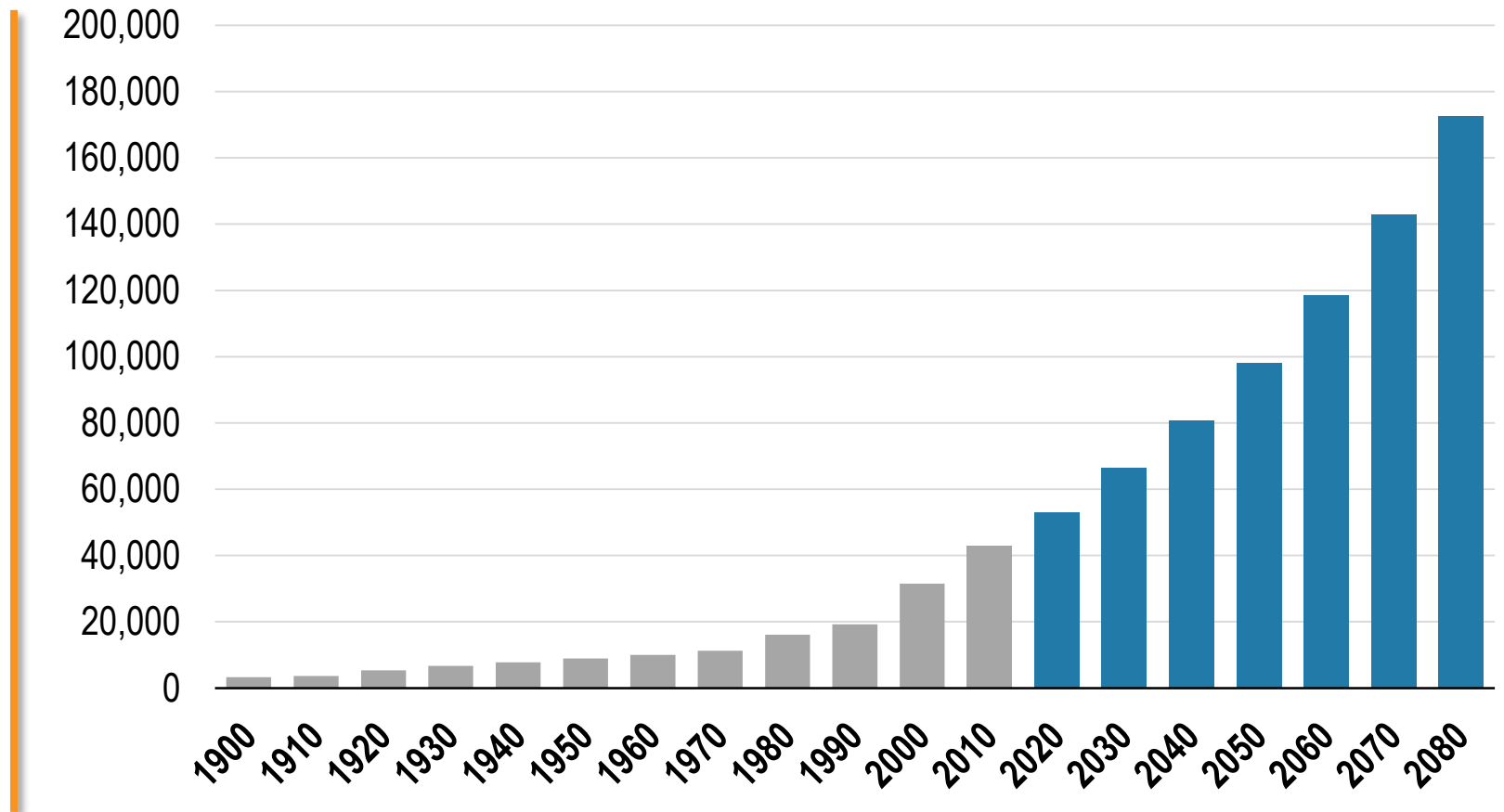
The following provides a demand projection for municipal water

Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).

Non-Agriculture Use

CICWCD Population Expectations

“Projected population growth remains a key driver of potential water demand going forward”



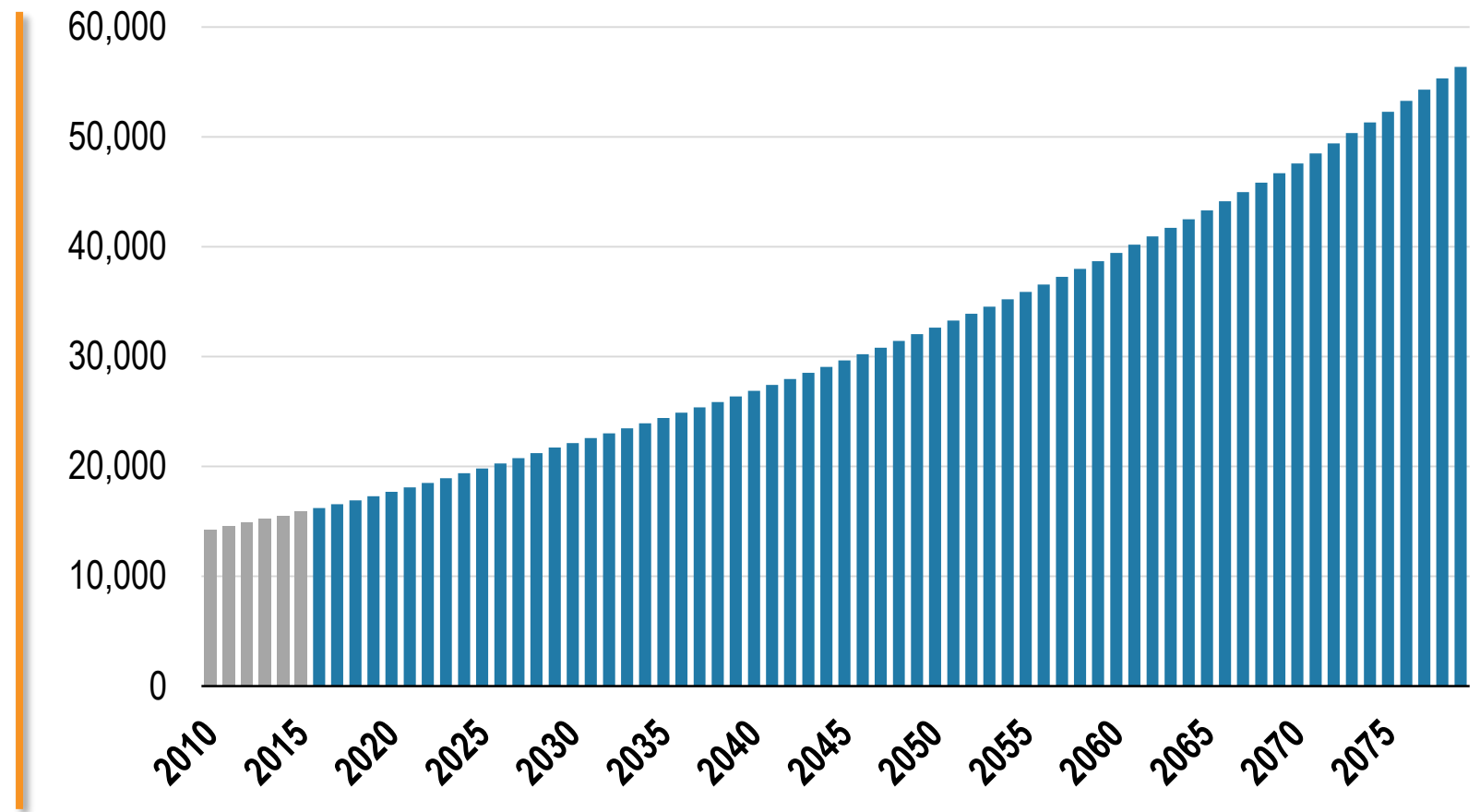
Source: US Census, GOMB, Applied Analysis (CICWCD population based on approximately 92.7 percent of Iron County population), Ensign Engineering.



Non-Agriculture Use

CICWCD Household Growth Expectations

“The number of households are expected to generally track with population growth and reach in excess of 56,000 by 2080, which is more than 3 times current levels”

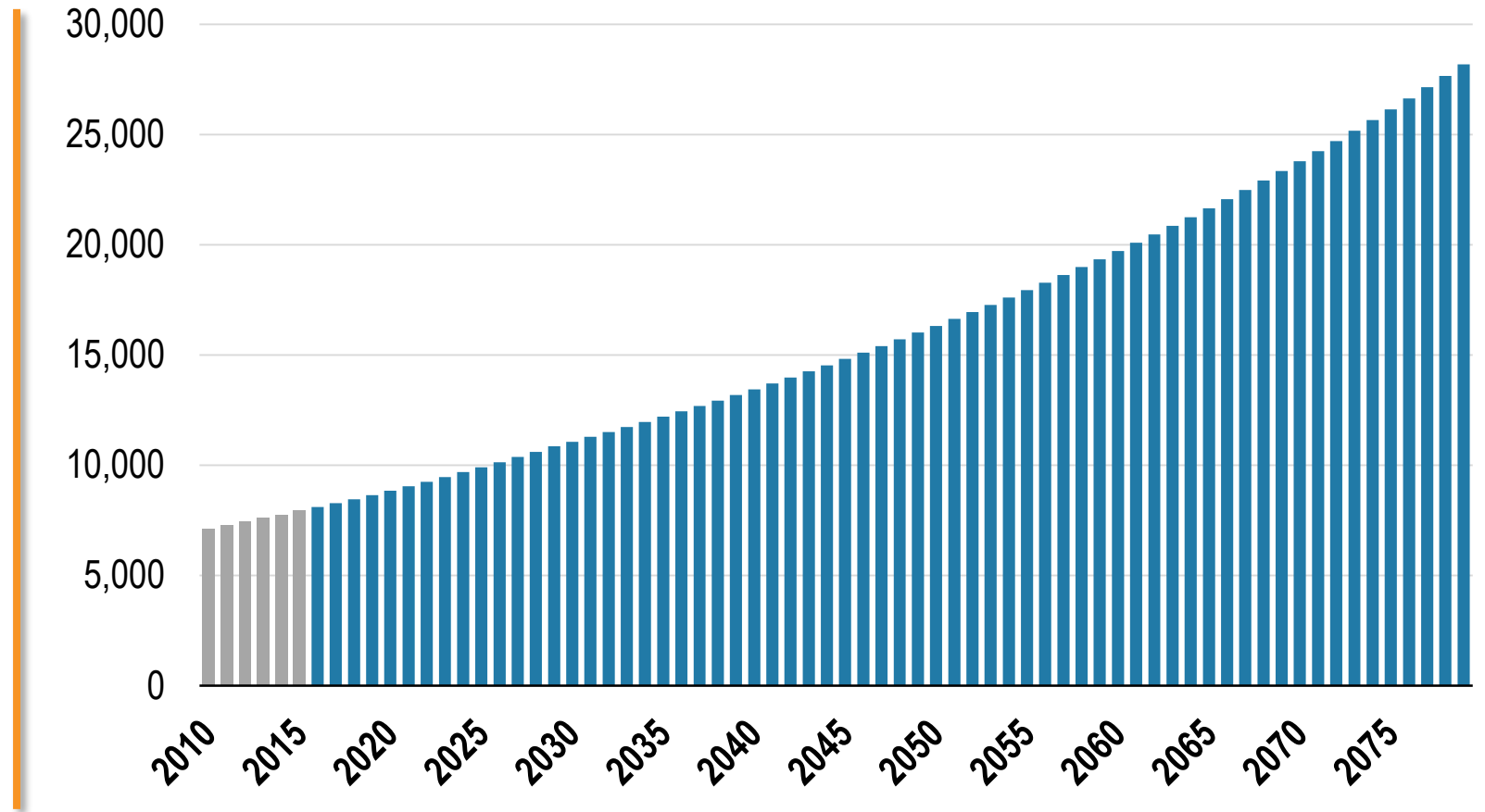


Source: US Census, GOMB, Applied Analysis (CICWCD population based on approximately 92.7 percent of Iron County population), Ensign Engineering.

Non-Agriculture Use

CICWCD Water Demand Estimates (Acre Feet)

“Assuming no additional conservation measures, non-agriculture use is expected to reach toward 30,000 acre feet by 2080”



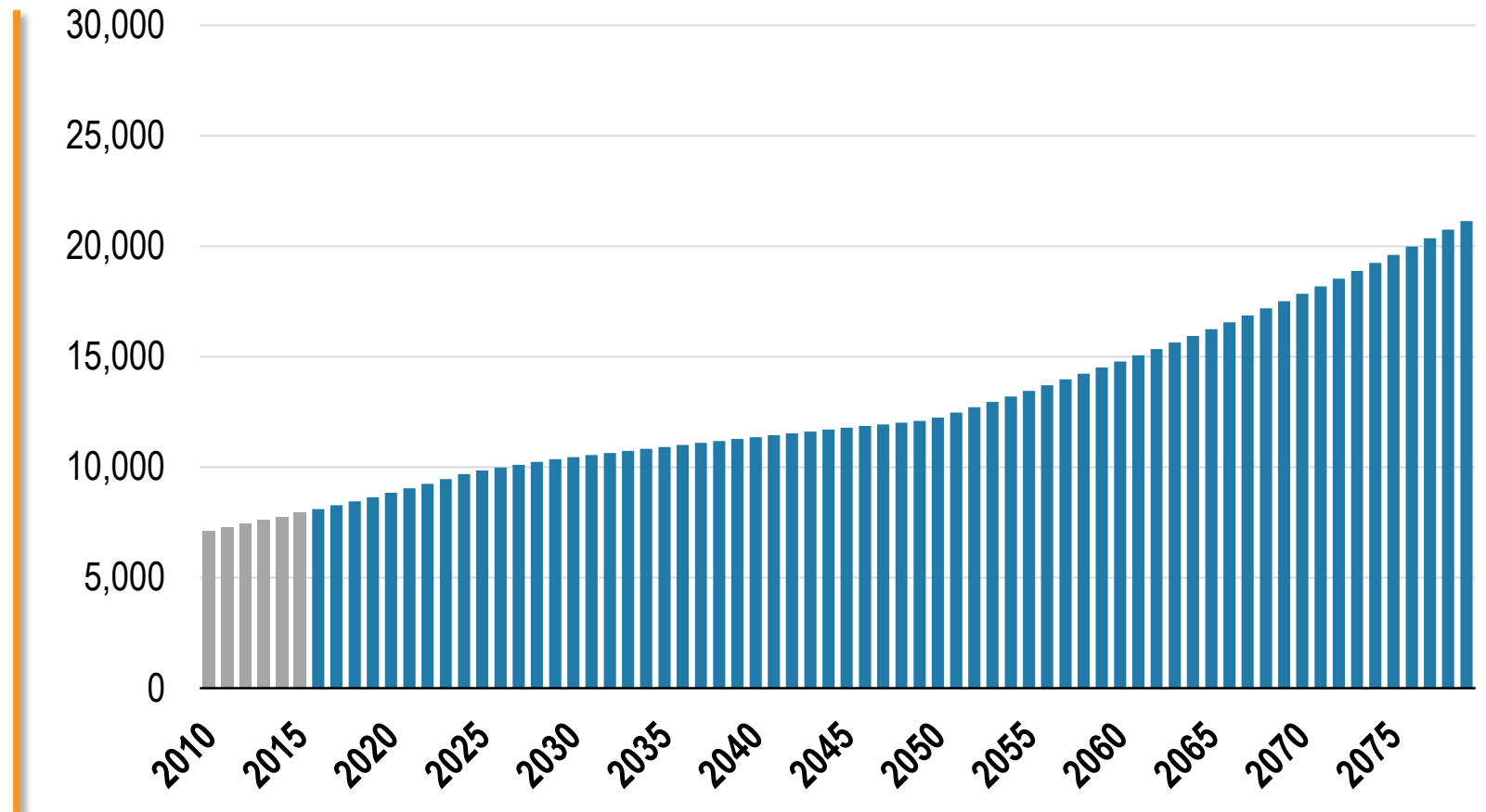
Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot)



Non-Agriculture Use

CICWCD Water Demand Estimates (Acre Feet), With An Additional 25% Conservation

“With additional conservation measures (another 25 percent reduction from 2025 to 2050), water demand is expected to reach in excess of 20,000 acre feet by 2080”

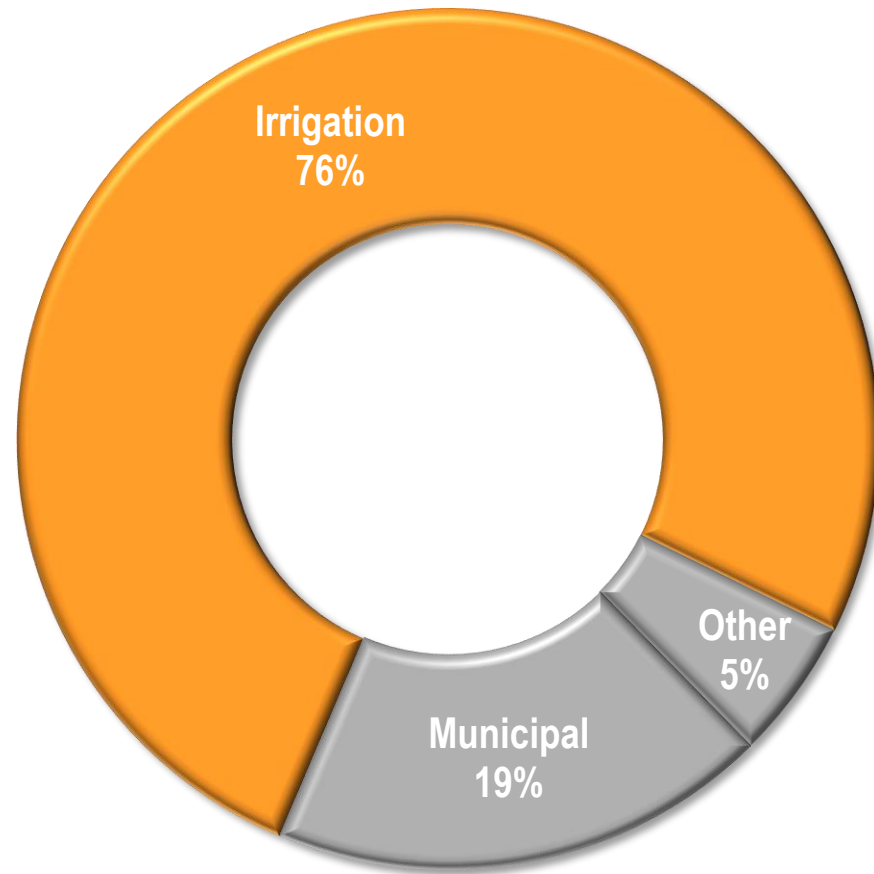


Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)

Note: Additional conservation measures reflect a 25-percent reduction in municipal water, in addition to the state mandate



Current Sources of Discharge/Depletion (approximate)



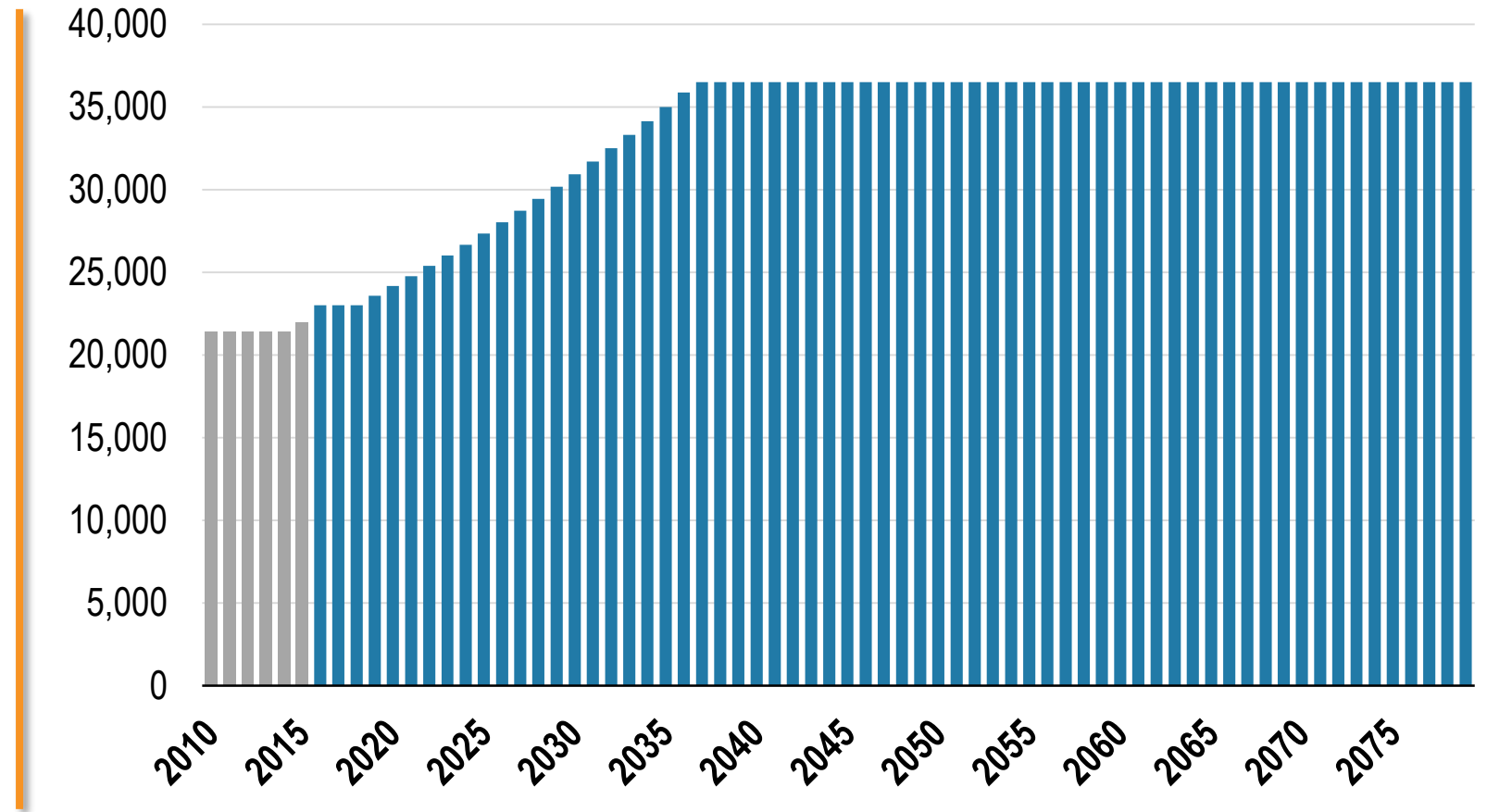
The following provides a range of demand projection scenarios for agricultural purposes, which currently account for approximately three-fourths of all uses

Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).

Agriculture Use

Water Demand Estimates (Acre Feet), Full Water Right Utilization (No Conversion)

“Assuming water rights owners’ water use continues to increase to full water right utilization, demand reaches 36,500 by approximately 2038”



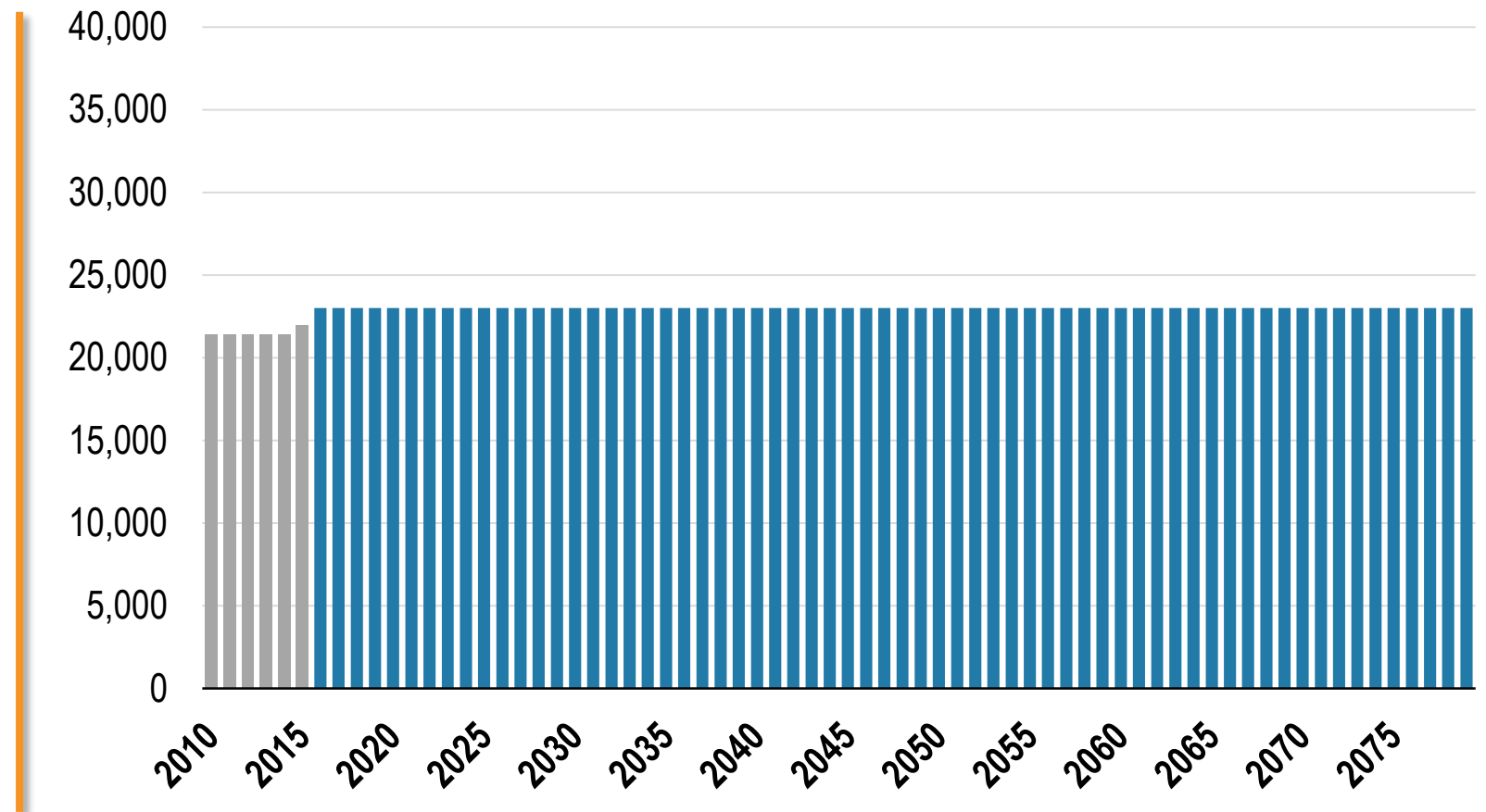
Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Agriculture Use

Water Demand Estimates (Acre Feet), No Conversion to Non-Ag Uses

“Assuming no conversion of water rights owners’ water use and overall use holds stable, approximately 23,000 acre feet of water will be demanded ”



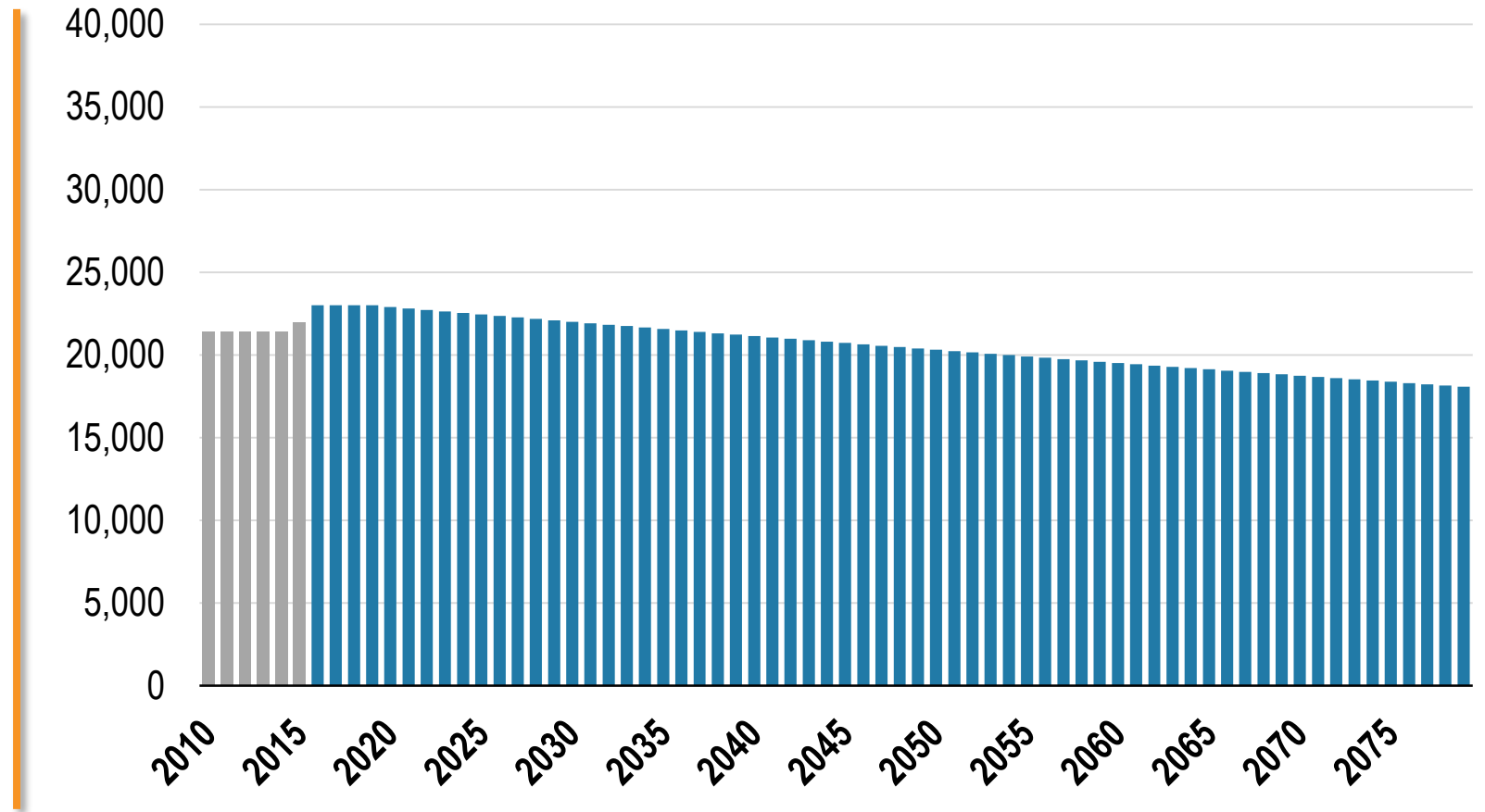
Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Agriculture Use

Water Demand Estimates (Acre Feet), Conversion to Non-Ag Uses

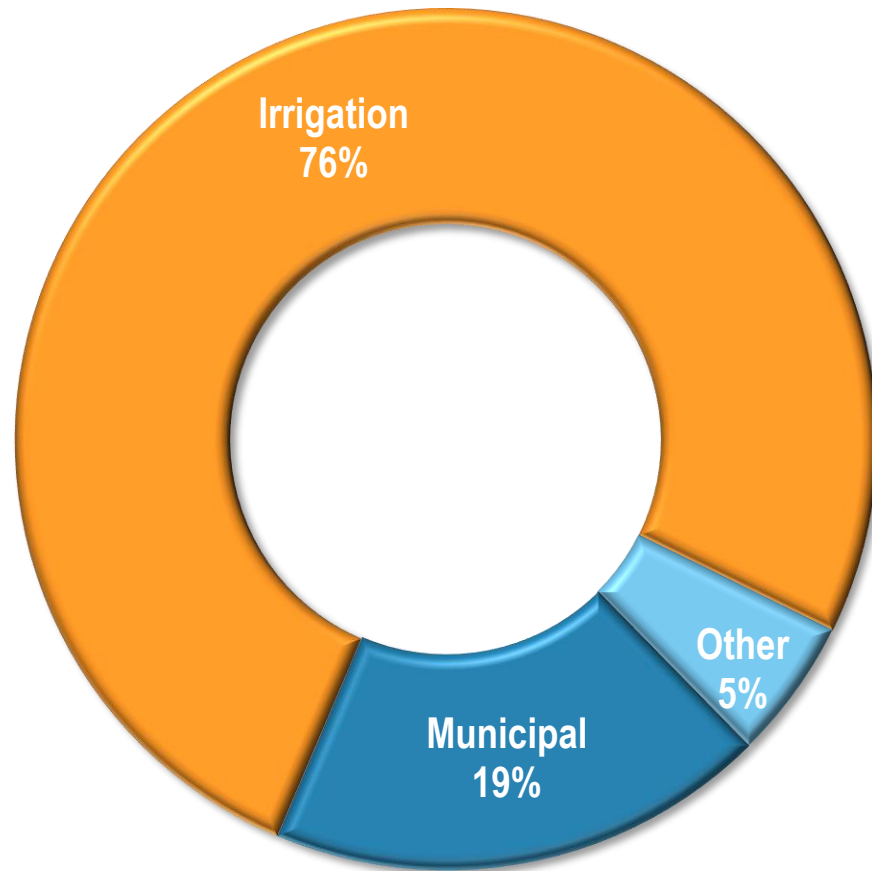
“Assuming conversion of agricultural uses at a rate of 0.4 percent annually, demand remains would be expected to decline at a modest rate overall through the study period”



Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Current Sources of Discharge/Depletion (approximate)



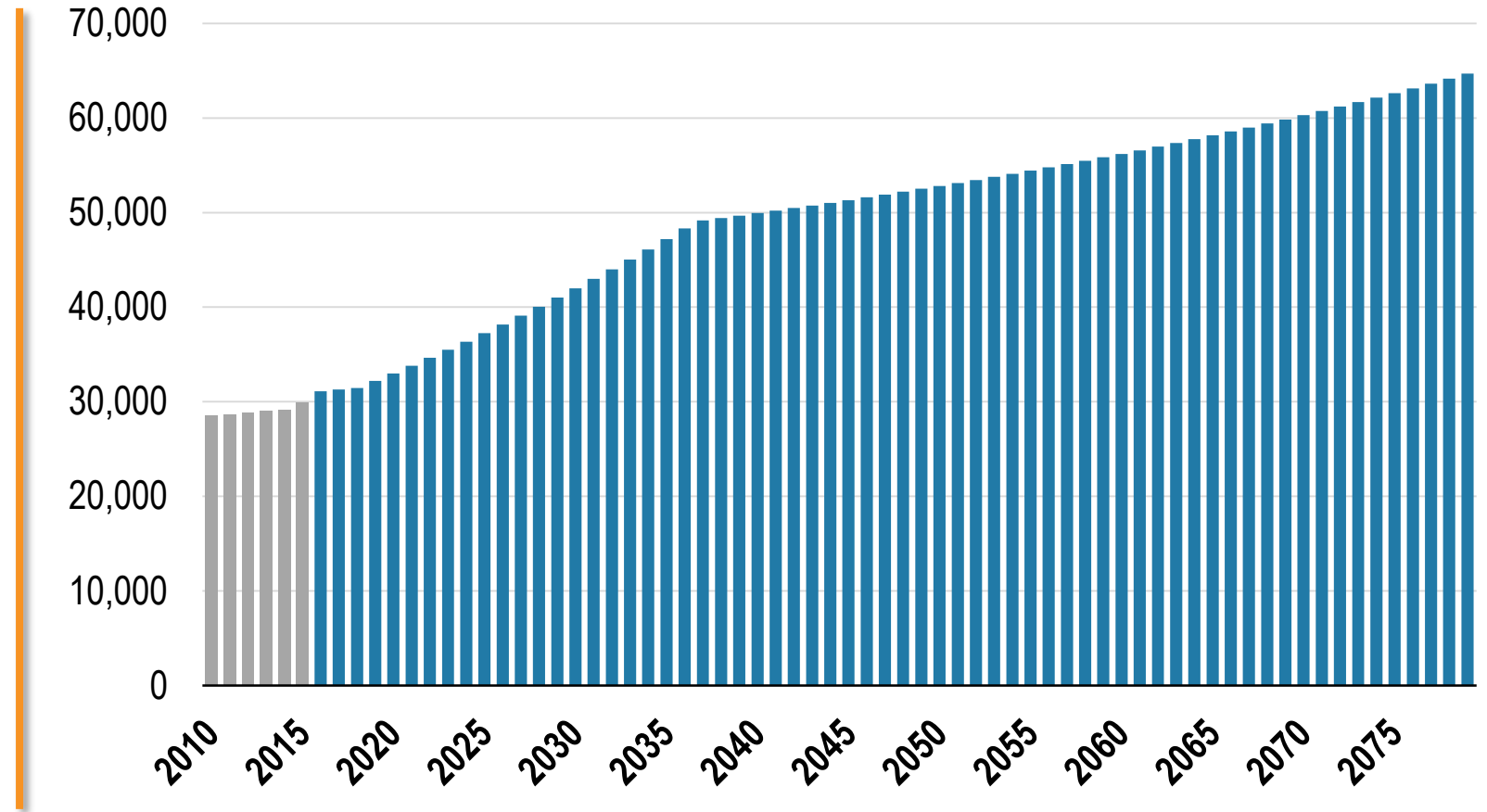
“The majority (± 95 percent) of water depletion is sourced to irrigation (agriculture) and municipal (non-agricultural) uses”

Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).

Combined Use (Ag and Non-Ag in Acre Feet)

No Additional Municipal Conservation, Full Water Right Utilization (No Conversion)

“With no additional conservation efforts and full water right utilization, total water demand equates to nearly 65,000 acre feet by the end of the study period”



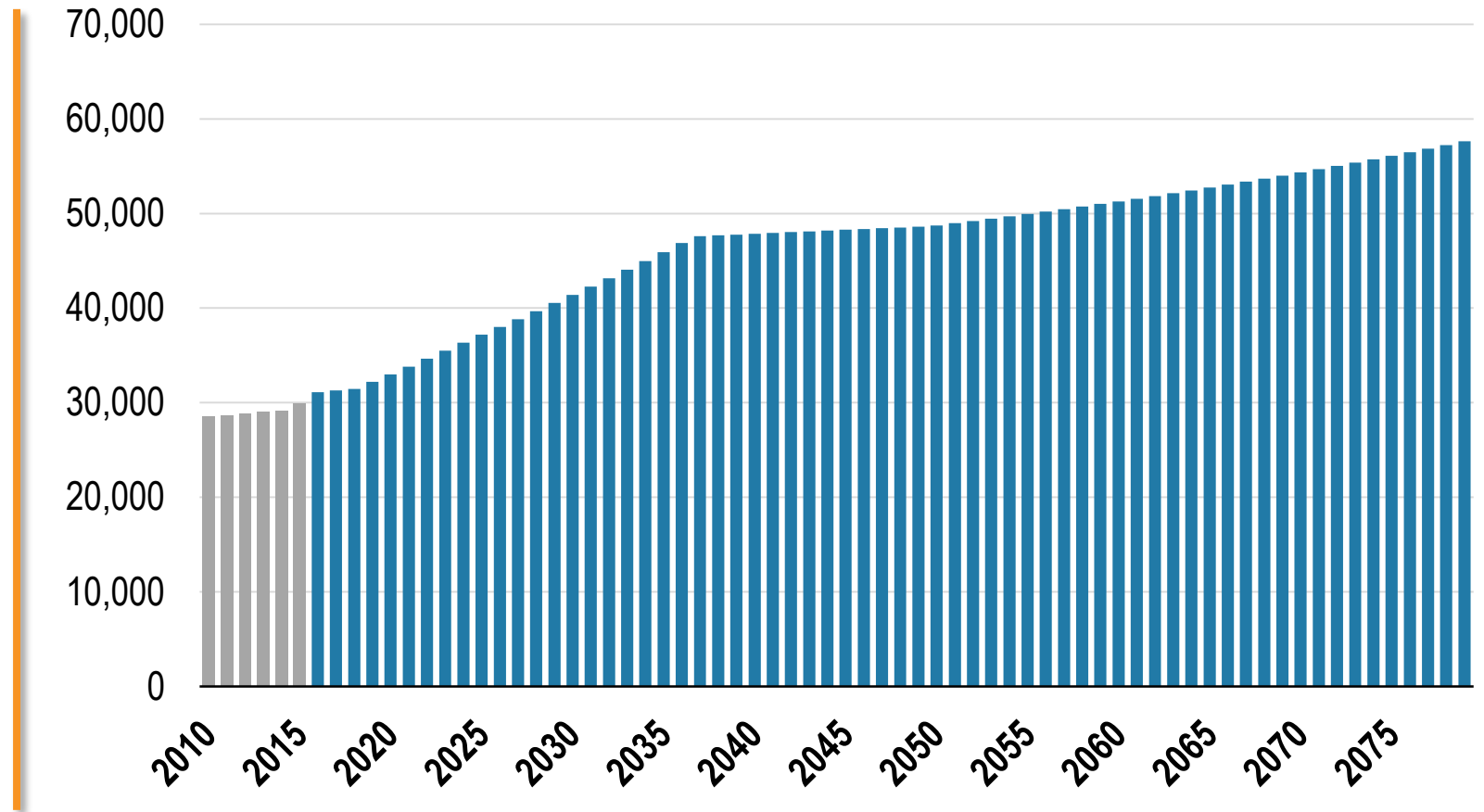
Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot)



Combined Use (Ag and Non-Ag in Acre Feet)

Additional 25% Municipal Conservation, Full Water Right Utilization (No Conversion)

“With another 25 percent conservation effort from 2025 to 2050 and full water right utilization, total water demand equates to nearly 60,000 acre feet by the end of the study period”

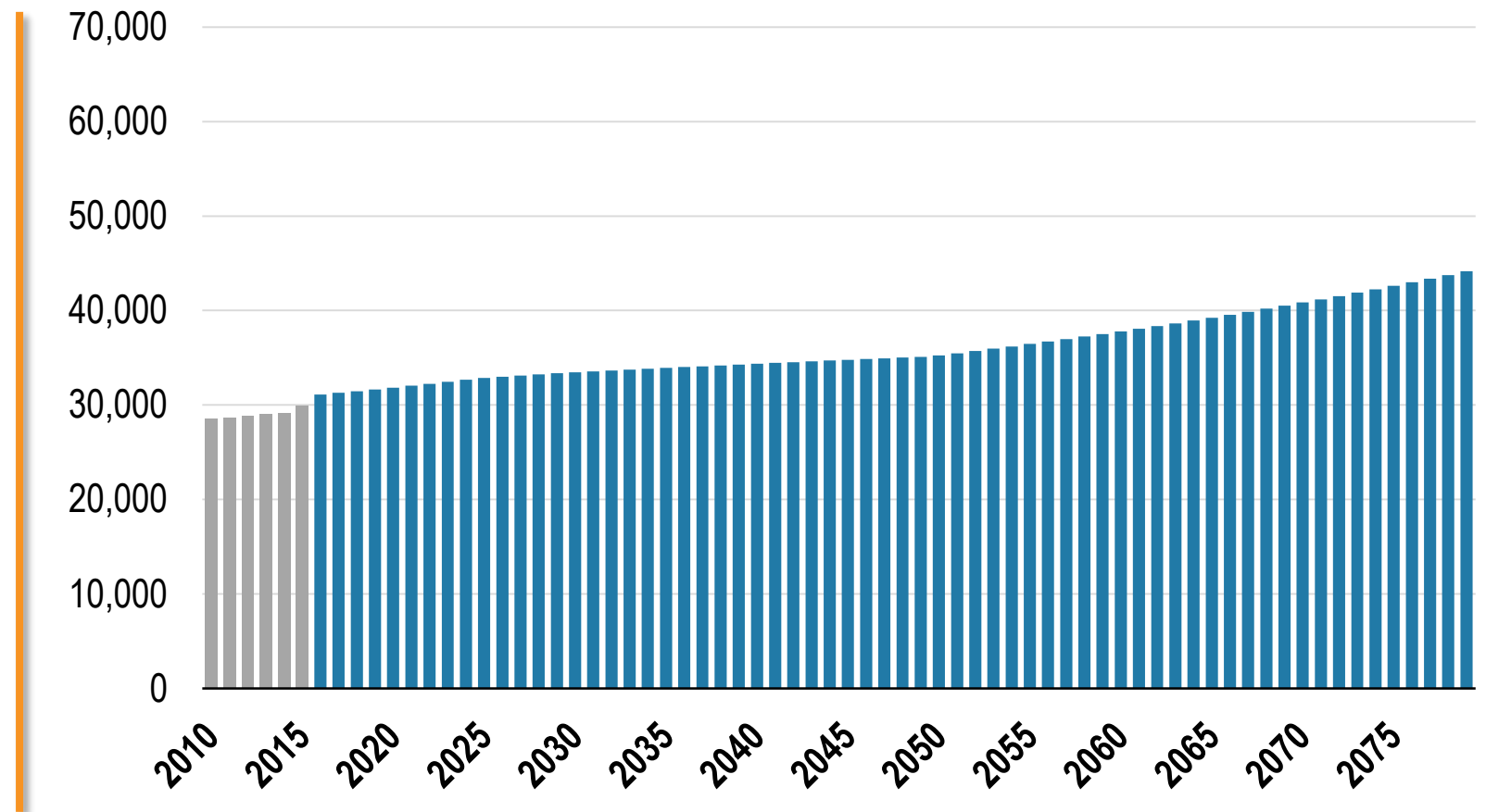


Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)

Combined Use (Ag and Non-Ag in Acre Feet)

Additional 25% Municipal Conservation, Status Quo Ag Use (No Conversion)

“With another 25 percent conservation effort from 2025 to 2050 and stable (status quo) agriculture use, total water demand equates to nearly 45,000 acre feet by the end of the study period”

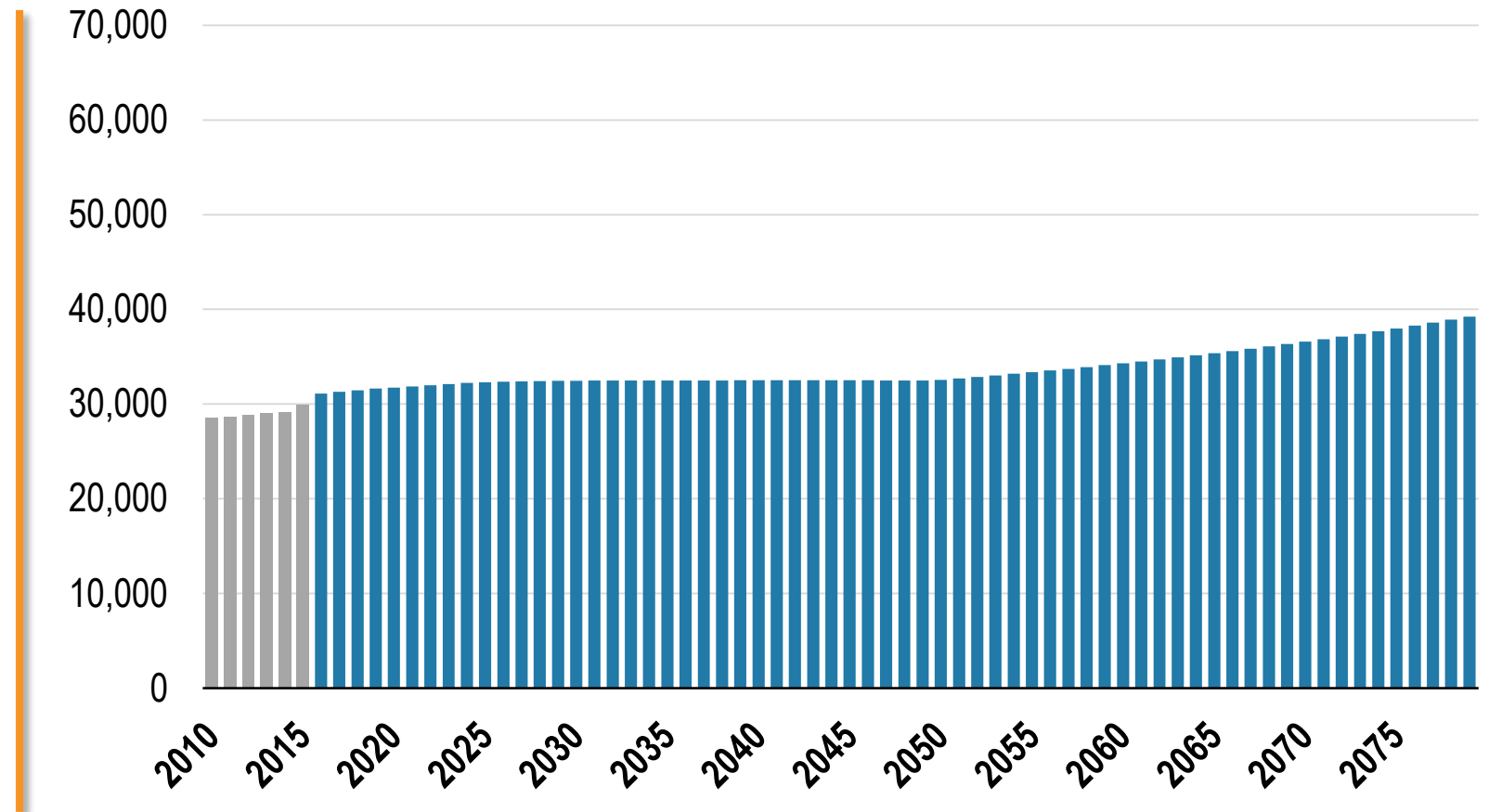


Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)

Combined Use (Ag and Non-Ag in Acre Feet)

Additional 25% Municipal Conservation, Agriculture Conversion

“With another 25 percent conservation effort from 2025 to 2050 and the conversion of agriculture use, total water demand equates to nearly 40,000 acre feet by the end of the study period”



Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)



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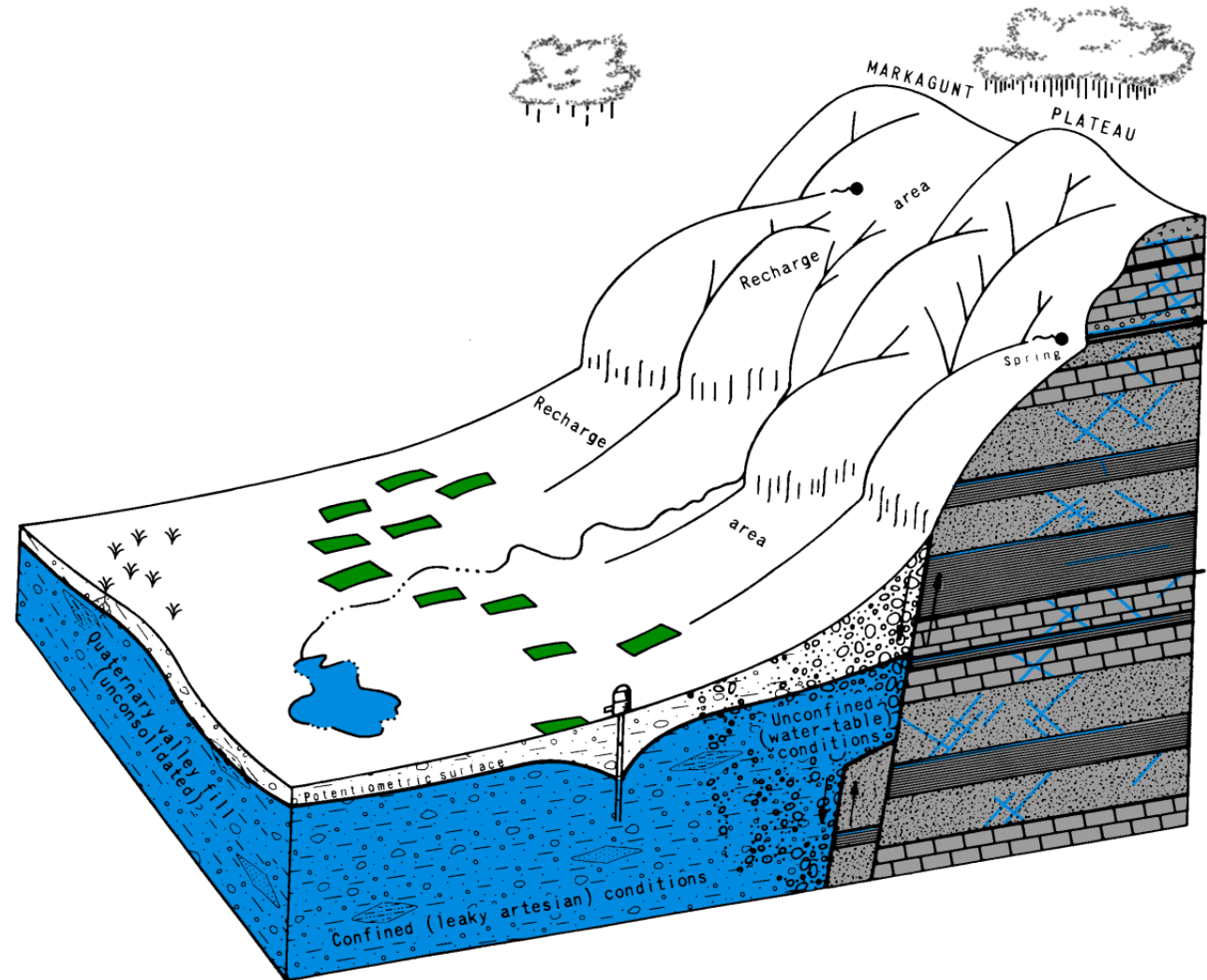
Groundwater Supply-Demand Balance

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- Evapotranspiration (evaporation and plant transpiration)
- Valley springs

■ Recharge

- Precipitation
- Seepage from irrigation
- Seepage from streams and canals
- Subsurface inflow



Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).

Estimating the Annual Amount of Supply/Recharge

- Quantifying the amount of recharge in the region is a difficult exercise. Based on a number of scientific analyses and studies, the Utah Division of Water Rights (“UDWR”) noted four estimates:

– Flow Budget	32,000 Acre Feet
– Groundwater Model	24,000 Acre Feet
– Chloride Mass Model	21,000 Acre Feet
– Storage Change (15-year Analysis)	20,000 Acre Feet
- UDWR concluded the amount of recharge is estimated between 20,000 and 24,000 acre feet annually.
- The Utah State Engineer estimates the sustainable safe yield is approximately 21,000 acre feet.
- Currently, approximately 50,000 acre feet of water rights have been authorized.

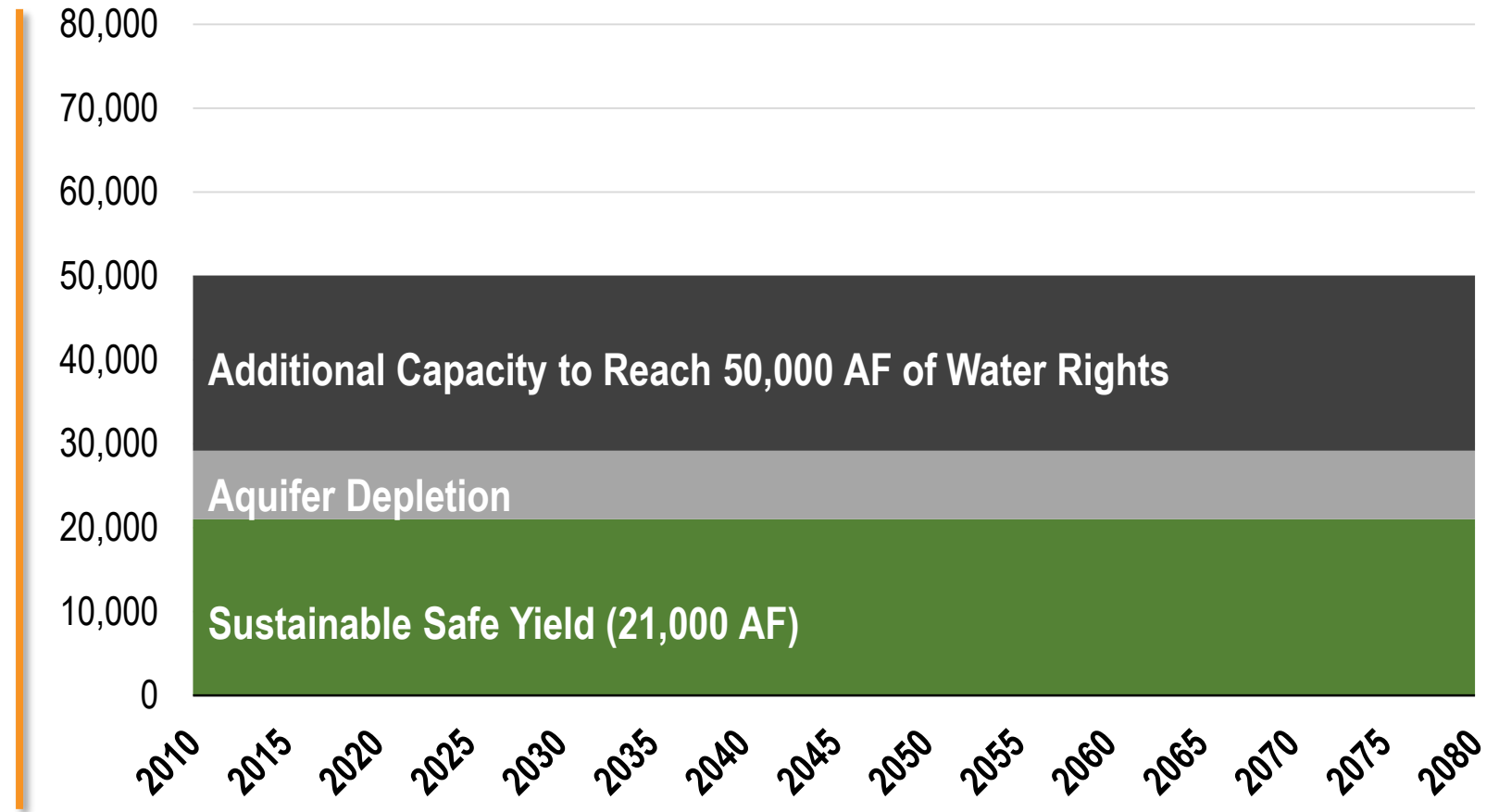


Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (December 8, 2016); Ensign Engineering.

Water Supply (In Acre Feet)

“With a sustainable safe yield of 21,000 acre feet and use of approximately 29,000 annually, the aquifer is being depleted by over 8,000 acre feet per year”

- Additional Capacity to Full Water Rights (50,000)
- Aquifer Depletion
- Sustainable Safe Yield (21,000)



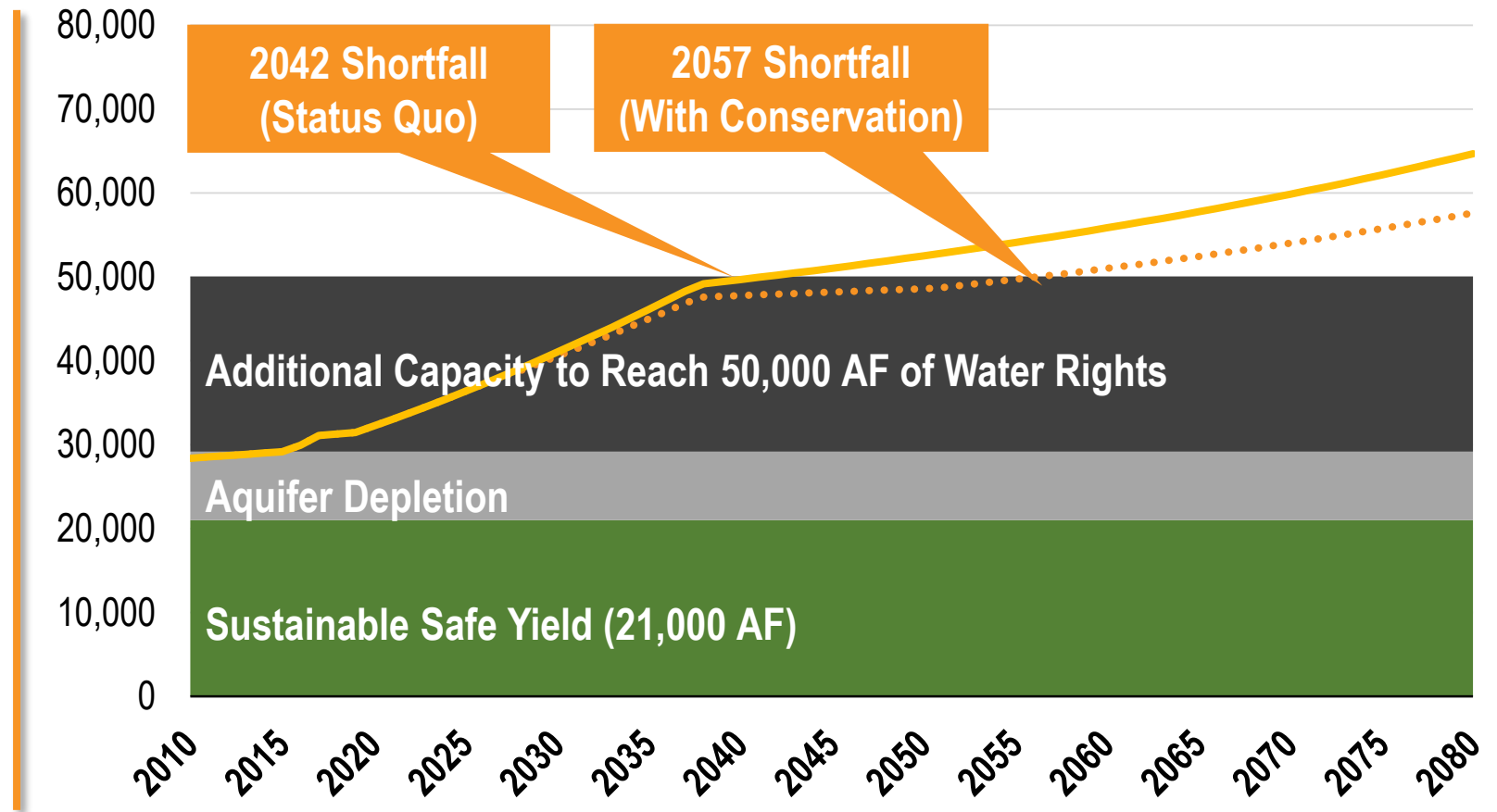
Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)



Water Supply (In Acre Feet)

“Assuming availability of full water rights of 50,000 acre feet, projected demand indicates a shortfall relative to supply by 2042 or 2057 under two scenarios”

- Additional Capacity to Full Water Rights (50,000)
- Aquifer Depletion
- Sustainable Safe Yield (21,000)
- Anticipated Demand (With Add'l Conservation)
- Anticipated Demand (W/O Add'l Conservation)

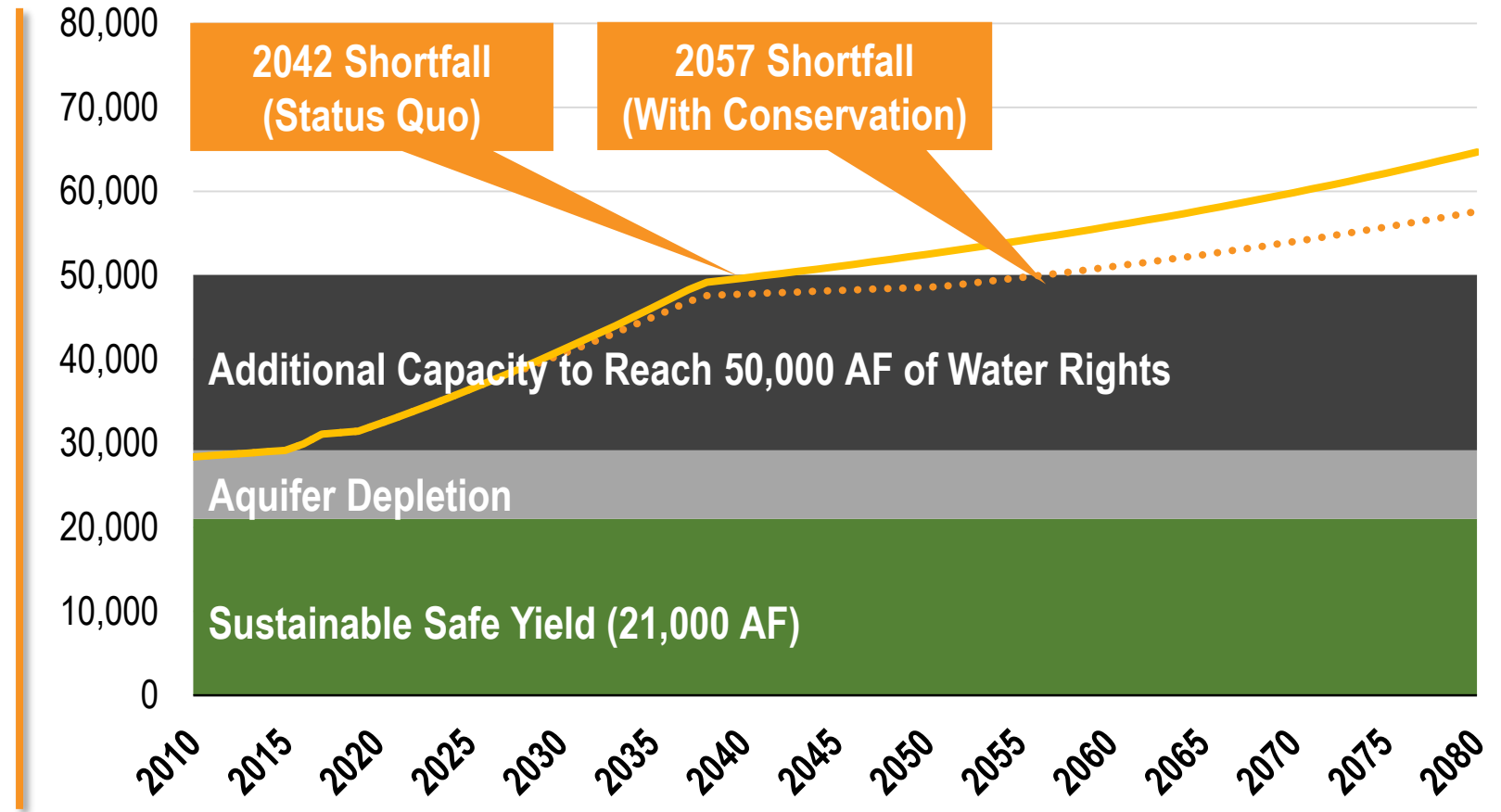


Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)

Water Supply (In Acre Feet)

“Even under more conservative demand assumptions, the aquifer is expected to continue to be depleted as water use exceeds sustainable safe yield”

- Additional Capacity to Full Water Rights (50,000)
- Aquifer Depletion
- Sustainable Safe Yield (21,000)
- Anticipated Demand (With Add'l Conservation)
- Anticipated Demand (W/O Add'l Conservation)



Source: US Census, GOMB, Applied Analysis, Ensign Engineering (assumes two households acre foot and 25-percent conservation from 2025 to 2050)



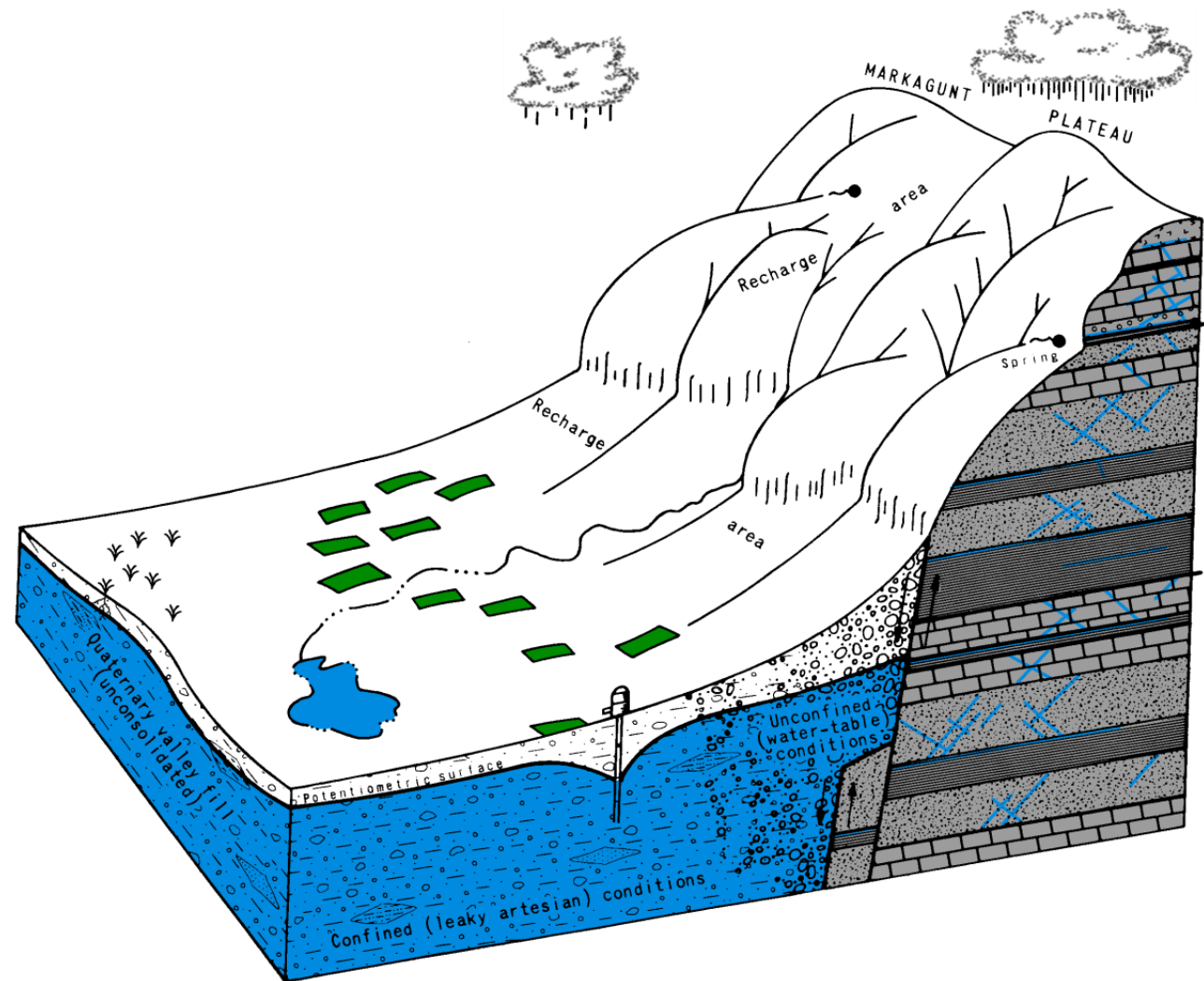
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Groundwater Supply-Demand Balance

Putting It Into Perspective

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 - Subsurface outflow
 - Evapotranspiration (evaporation and plant transpiration)
 - Valley springs
- **Recharge**
 - Precipitation
 - Seepage from irrigation
 - Seepage from streams and canals
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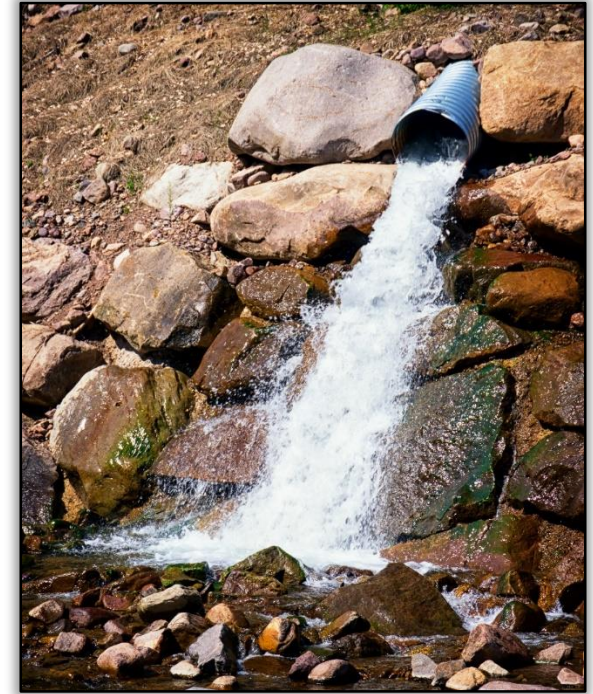
Source: Cedar Valley Water Users public meeting concerning the process for development a groundwater management plan for Cedar Valley in Iron County (January 7, 2016).



Groundwater Supply-Demand Balance

Putting It Into Perspective

- **Discharge (or Depletion or Use)**
 - Well pumping
 - Subsurface outflow
 - Evapotranspiration (evaporation and plant transpiration)
 - Valley springs
- **Recharge**
 - Precipitation
 - Seepage from irrigation
 - Seepage from streams and canals
 - Subsurface inflow



Discharge

±29,000

Acre Feet Annually

Recharge (Safe Yield)

±21,000

Acre Feet Annually

Net Loss

±8,000

Acre Feet Annually

Groundwater Supply-Demand Balance

Putting It Into Perspective

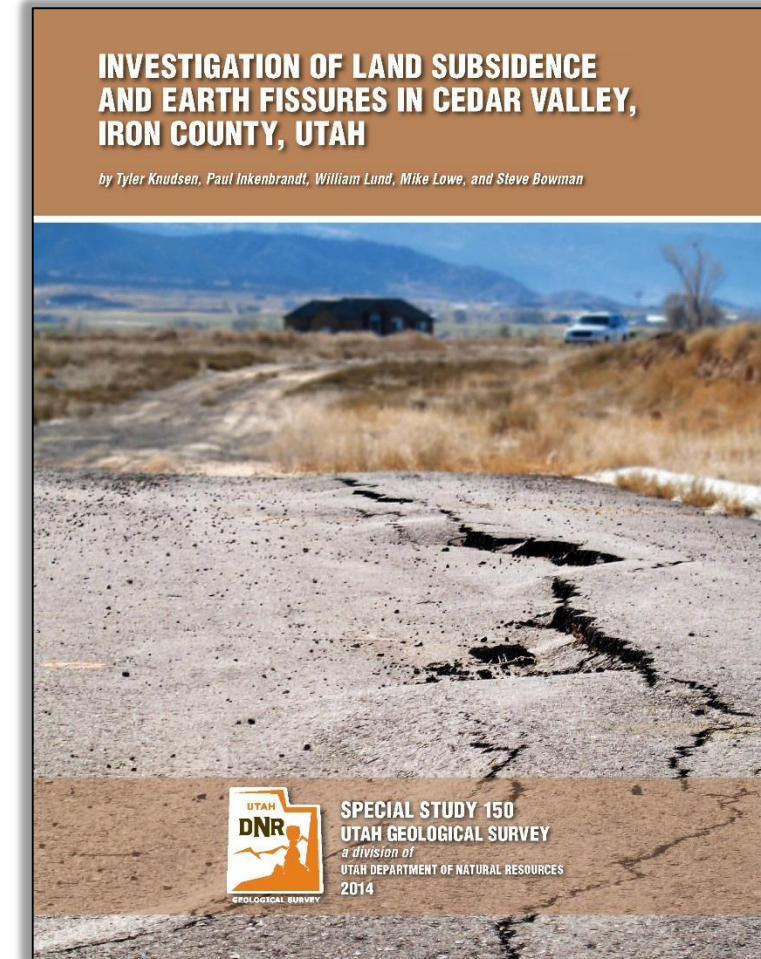
“The reality of the situation is that more water is being used than is being captured, and that cannot continue into perpetuity. While water may continue to pour from residents’ faucets, other potential issues are concerning, including subsidence and fissures.”



Groundwater Supply-Demand Balance

Putting It Into Perspective

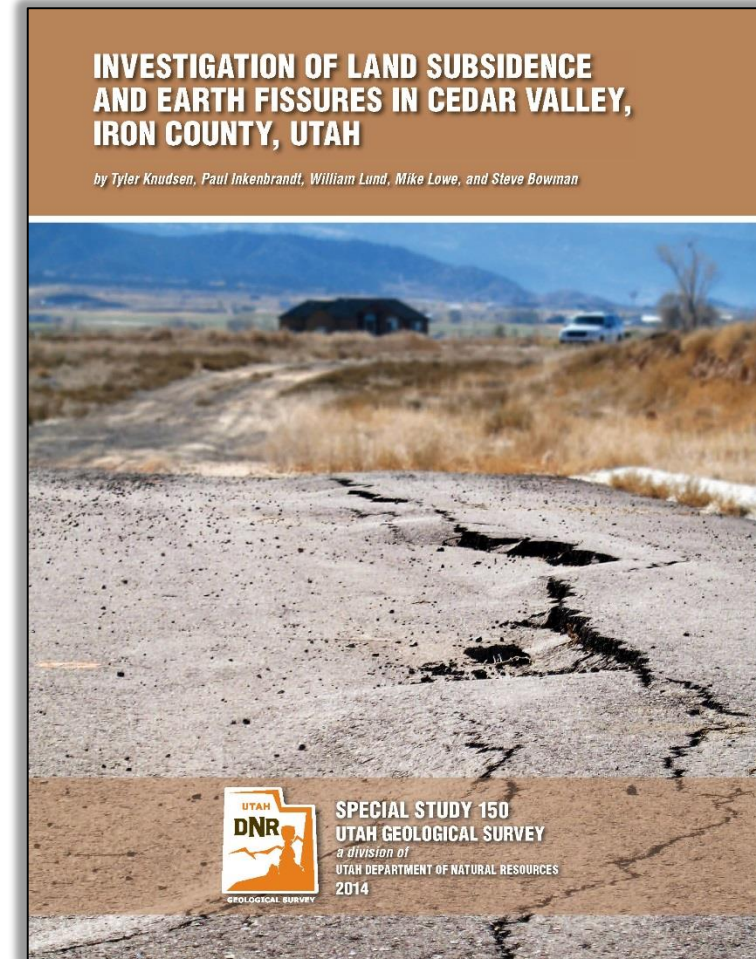
- In 2009, a 2.5-mile fault line was identified in Enoch, sourced to subsidence.
- A total of 8.3 miles of earth fissures have formed the southwest and northeaster portions of Cedar Valley.
- The Utah Geological Survey (“UGS”) concluded the following:



Groundwater Supply-Demand Balance

Putting It Into Perspective: UGS Conclusions

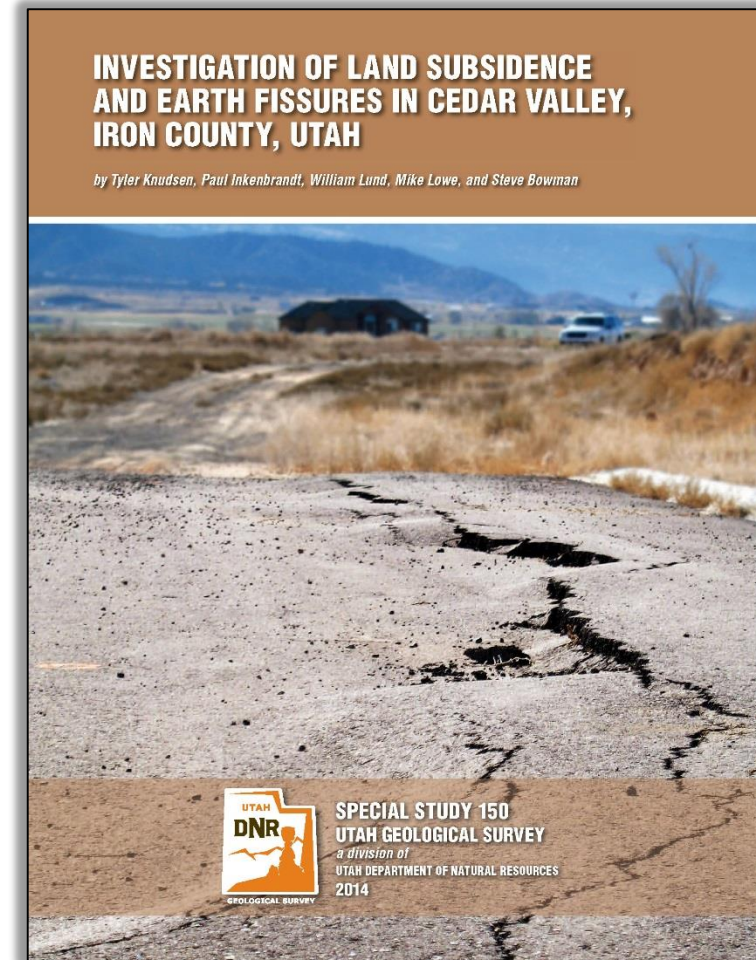
1. Long-term groundwater pumping in excess of recharge (groundwater mining) is the cause of the land subsidence and earth fissures in Cedar Valley.
2. The maximum amount of land subsidence and earth fissure formation in Cedar Valley coincide with areas of significant groundwater-level decline and the presence of compressible fine-grained sediment in the subsurface.
3. If groundwater levels in Cedar Valley continue to decline at a rate of approximately 2 feet per year, average basin-wide subsidence will likely continue at a rate of 0.02 to 1.2 inches per year.
4. Continued subsidence will likely cause new fissures to form in the future.
5. The inventory of earth fissures in Cedar Valley is likely incomplete because fissures lacking offset or not enlarged by erosion typically exist as hairline cracks that are rarely visible on aerial photographs and are difficult to identify in the field.



Groundwater Supply-Demand Balance

Putting It Into Perspective: UGS Conclusions

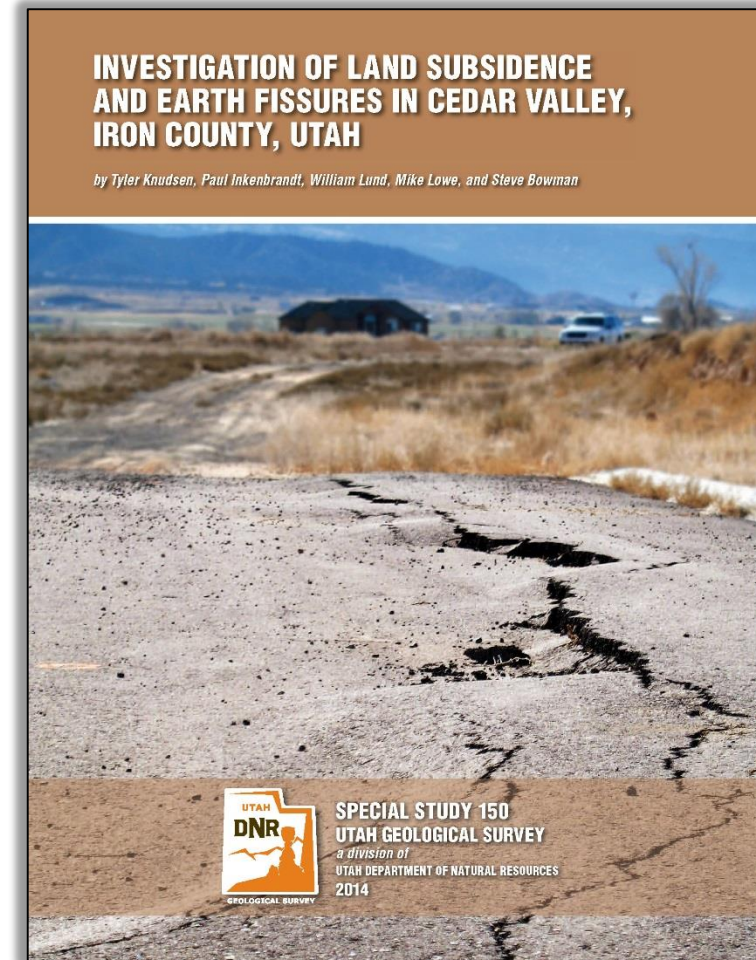
6. Currently unrecognized or new earth fissures may damage existing and future infrastructure in Cedar Valley.
7. Continued southward growth of either the Enochgraben-west or -east fissures may eventually impact fully developed neighborhoods in Enoch City.
8. Earth fissures could provide a direct path for contaminated surface water to reach the Cedar Valley aquifer, a principal source of potable water in Cedar Valley.
9. Managing basin-fill aquifers as a renewable resource and managing the hazards presented by land subsidence and earth-fissure formation require that subsiding areas and rates of subsidence within those areas (likely variable) be defined (technologies such as InSAR, LiDAR, and high-precision GPS/GNSS surveying are well suited to this task).
10. Site-specific hazard investigations are required for new development, and in some instances for existing development, in areas known or suspected to be subsiding.



Groundwater Supply-Demand Balance

Putting It Into Perspective: UGS Recommendations

1. Increase overall water resources by importing water from other basins
2. Increase groundwater recharge to aquifers through conjunctive management of groundwater and surface-water resources
3. Disperse high-discharge wells to reduce localized land subsidence
4. Reduce overall groundwater withdrawals from the basin



Groundwater Supply-Demand Balance

Putting It Into Perspective

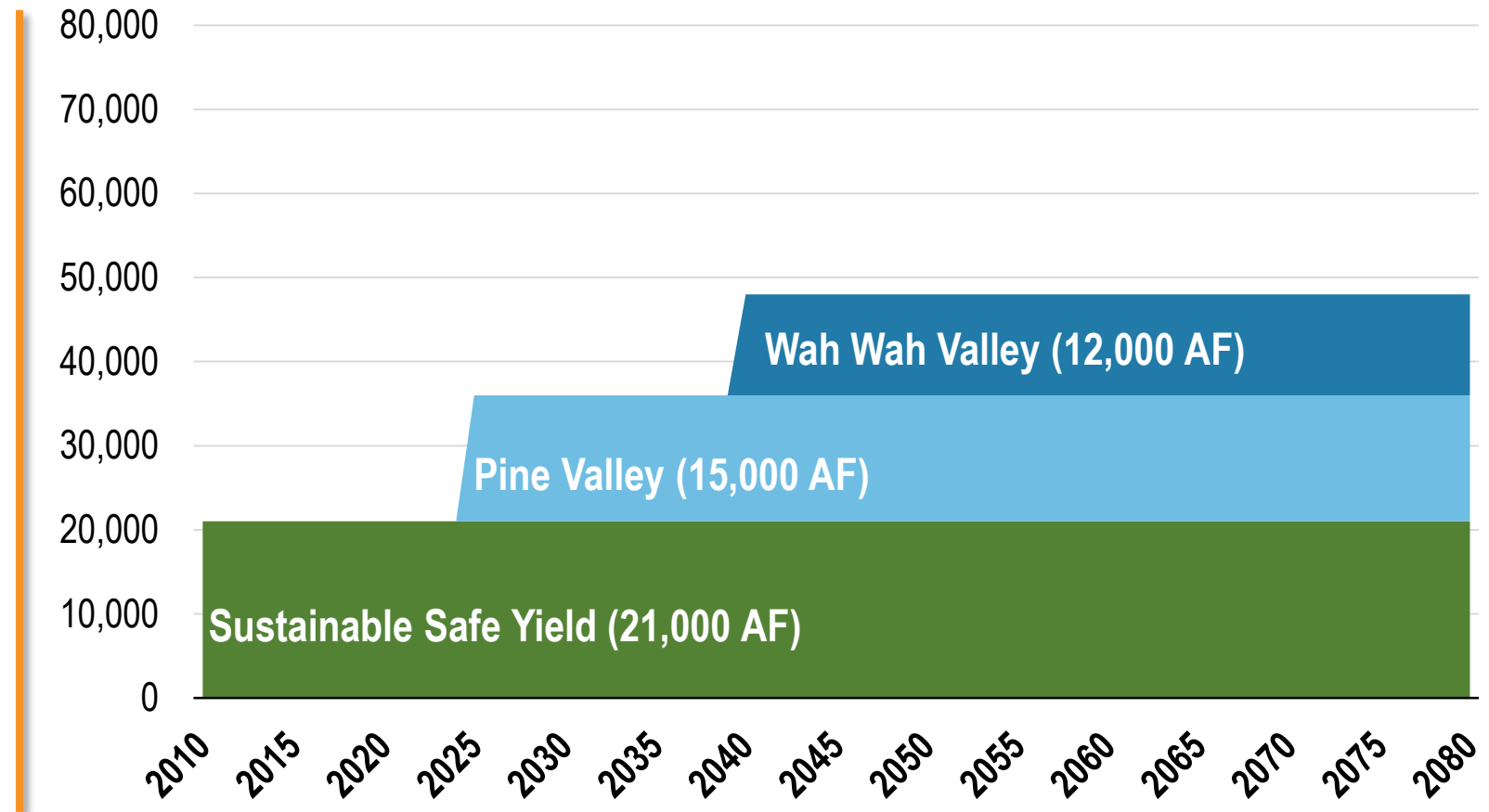
What are the potential supply implications of moving forward with the Pine Valley and Wah Wah Valley water projects recommended by the review panel



Water Supply (In Acre Feet)

“Pine and Wah Wah Valleys could theoretically come online in 2025 and 2040, respectively, to add capacity up to approximately 48,000 acre feet when considering safe yield of 21,000 acre feet”

- New Supply - Wah Wah Valley
- New Supply - Pine Valley
- Sustainable Safe Yield (21,000)

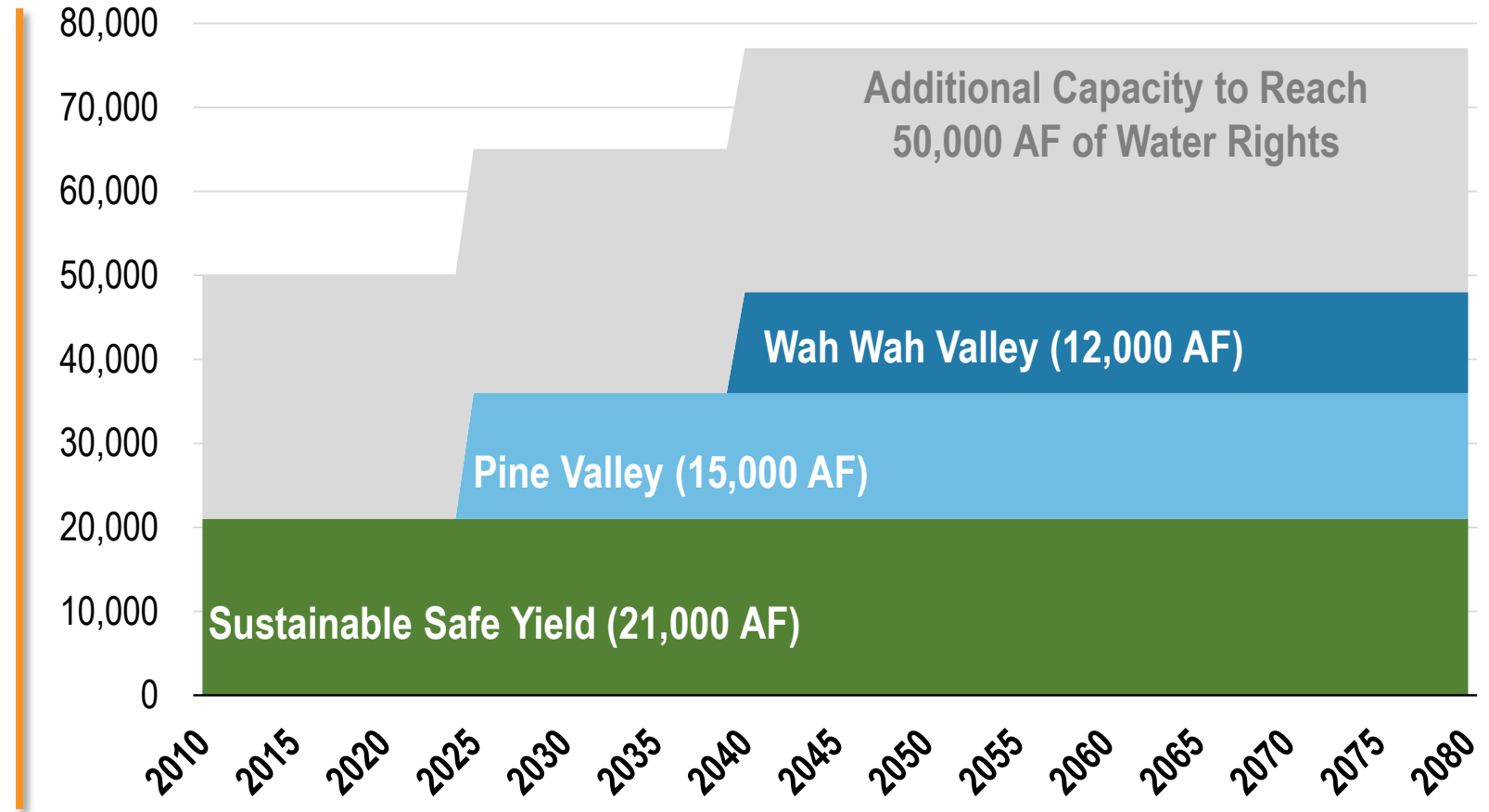


Source: US Census, GOMB, Applied Analysis, Ensign Engineering

Water Supply (In Acre Feet)

“When considering the maximum potential of water rights and the additional sources, total capacity approaches 85,000 acre feet”

- Additional Capacity to Full Water Rights (50,000)
- New Supply - Wah Wah Valley
- New Supply - Pine Valley
- Sustainable Safe Yield (21,000)

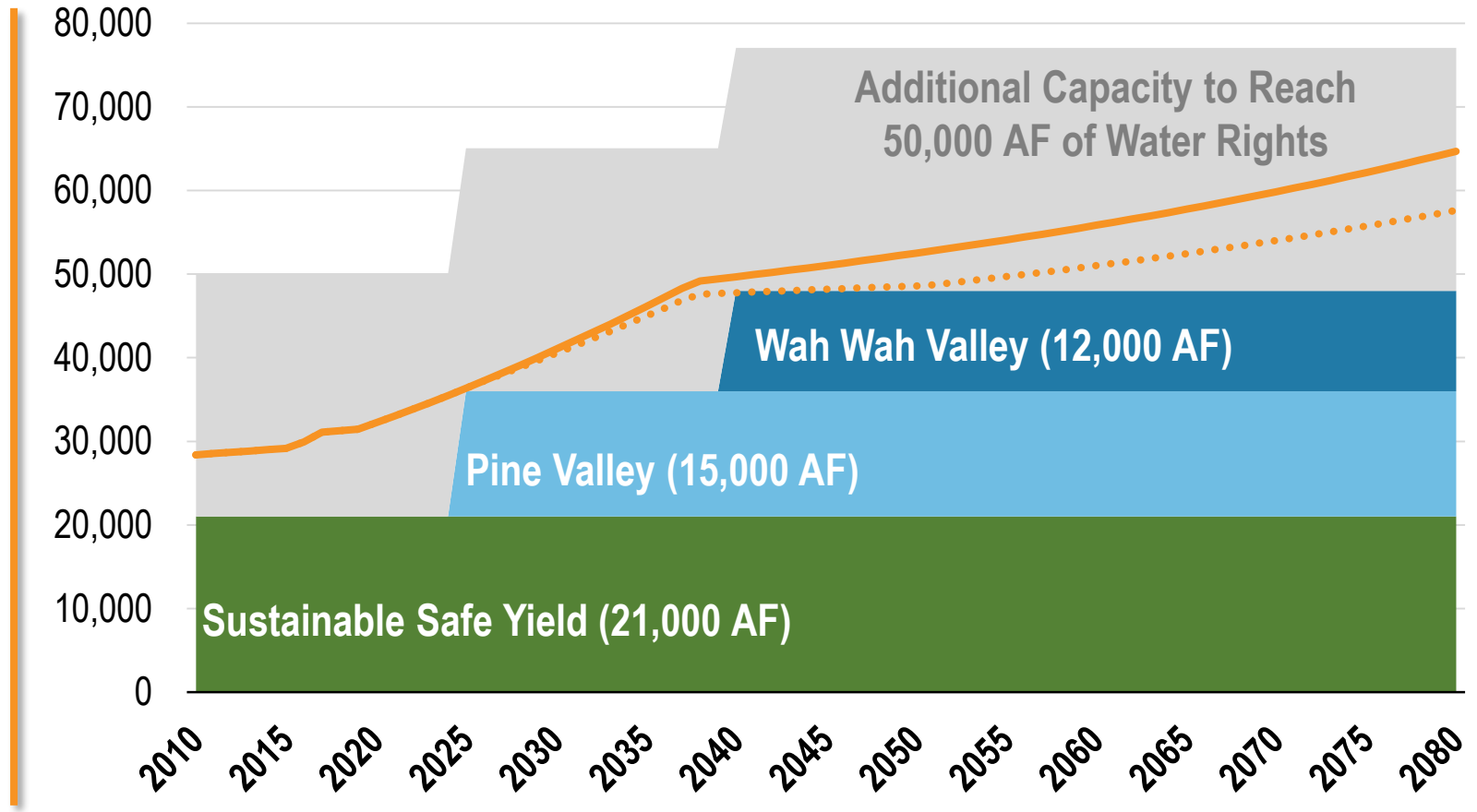


Source: US Census, GOMB, Applied Analysis, Ensign Engineering

Water Supply (In Acre Feet)

“While new supply (Pine and Wah Wah Valleys) add capacity in 2025 and 2040, respectively, the gains are insufficient to meet demand without further depleting the aquifer”

- Additional Capacity to Full Water Rights (50,000)
- New Supply - Wah Wah Valley
- New Supply - Pine Valley
- Sustainable Safe Yield (21,000)
- Anticipated Demand (W/O Add'l Conservation)
- Anticipated Demand (With Add'l Conservation)



Source: US Census, GOMB, Applied Analysis, Ensign Engineering

Groundwater Supply-Demand Balance

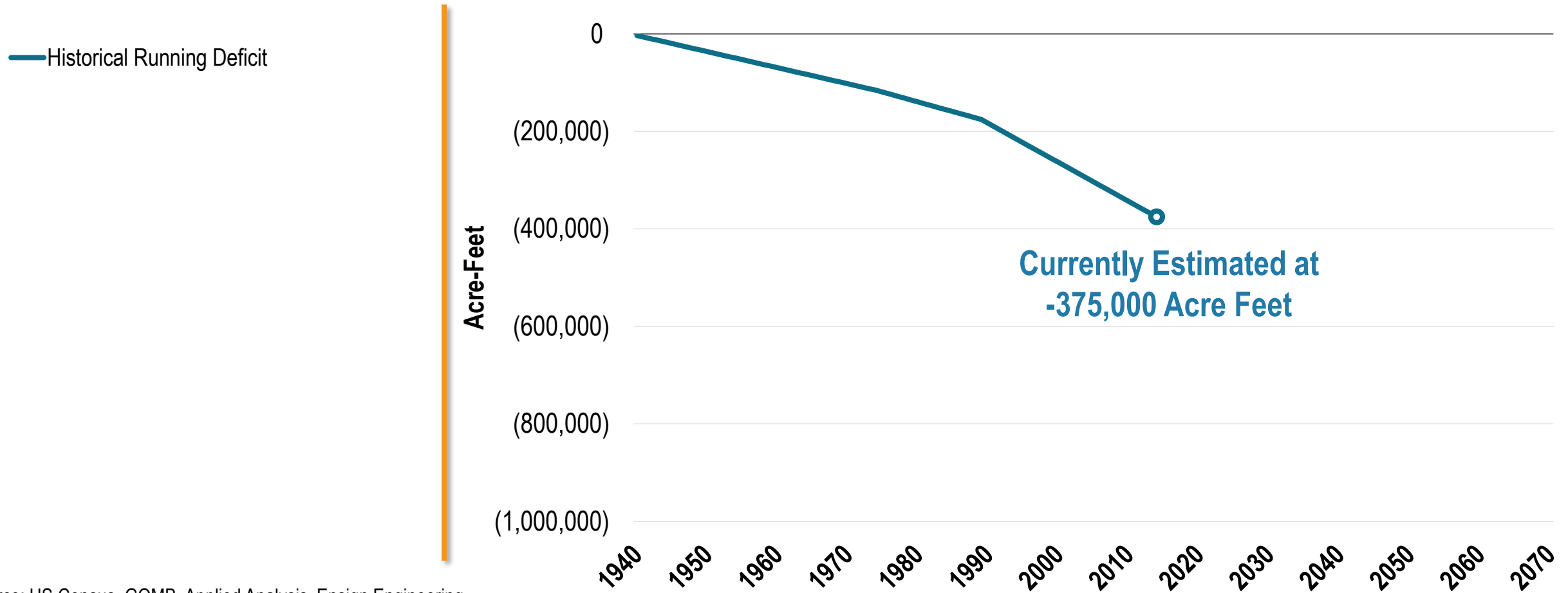
Putting It Into Perspective

What are the historical and projected impacts on the aquifer's running deficit when measured in acre feet



Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)

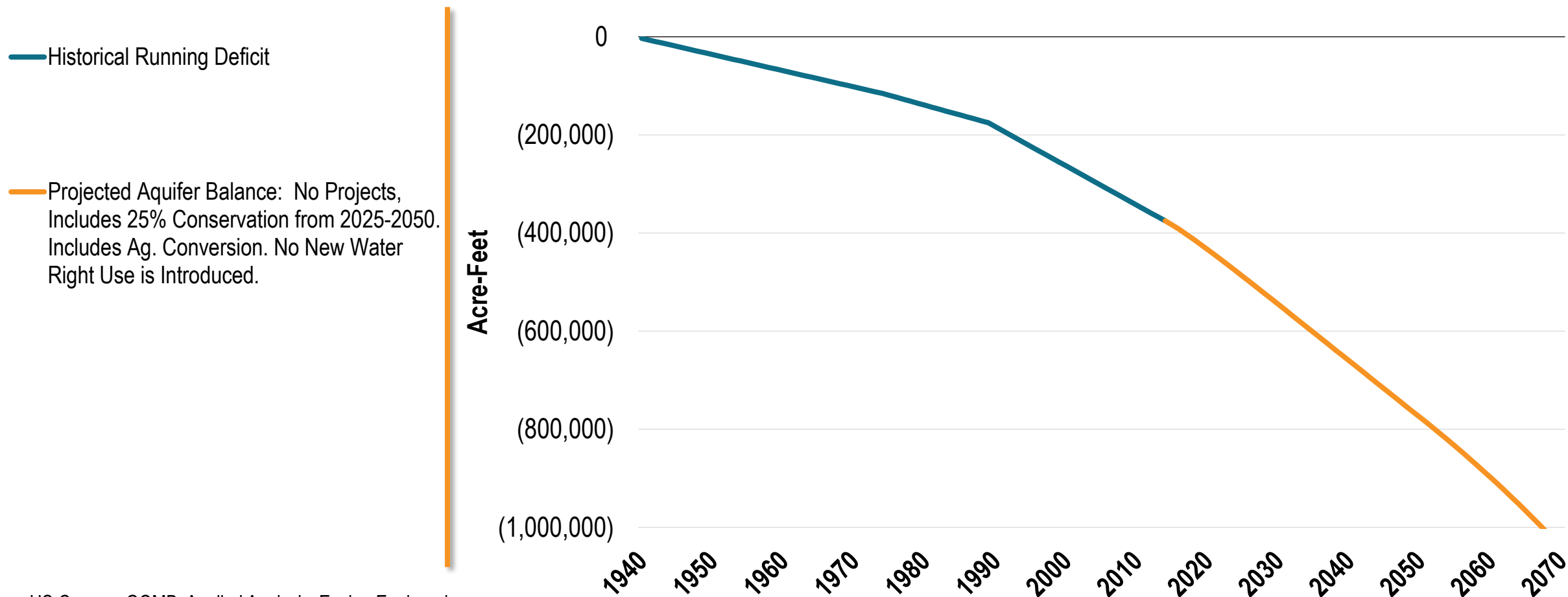


Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

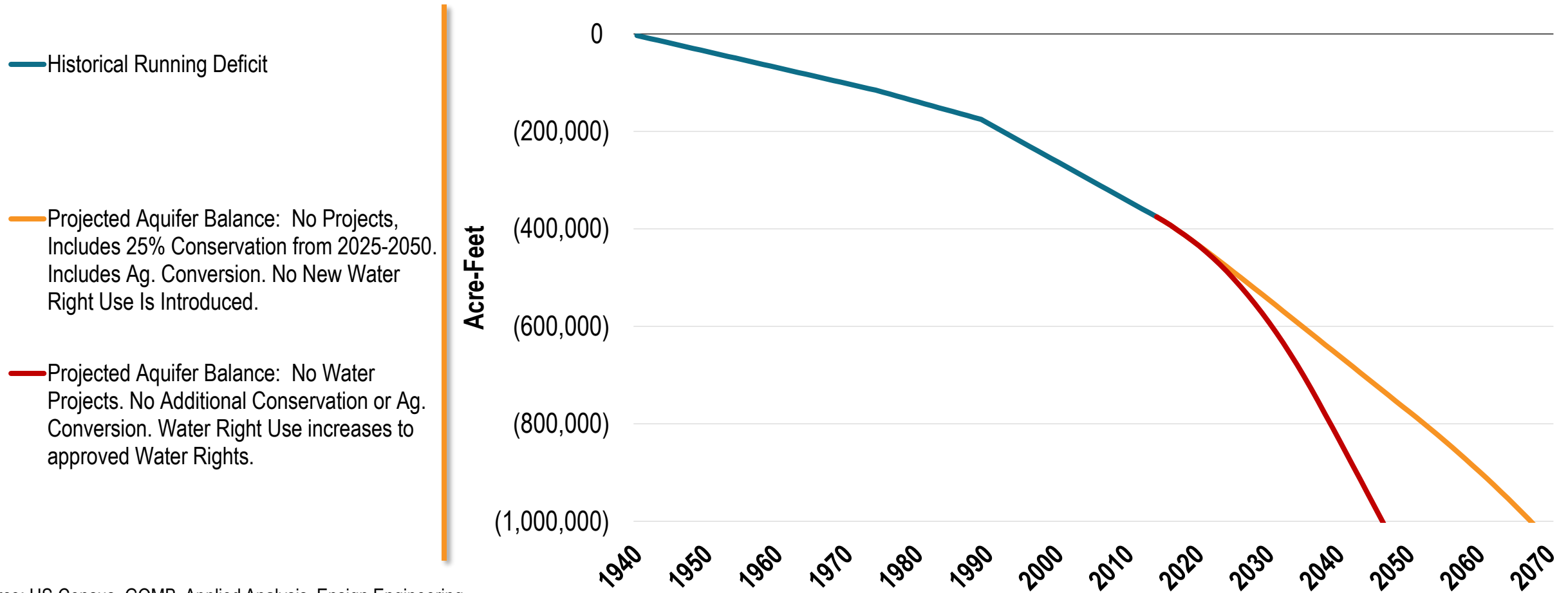
Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)



Source: US Census, GOMB, Applied Analysis, Ensign Engineering

Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)

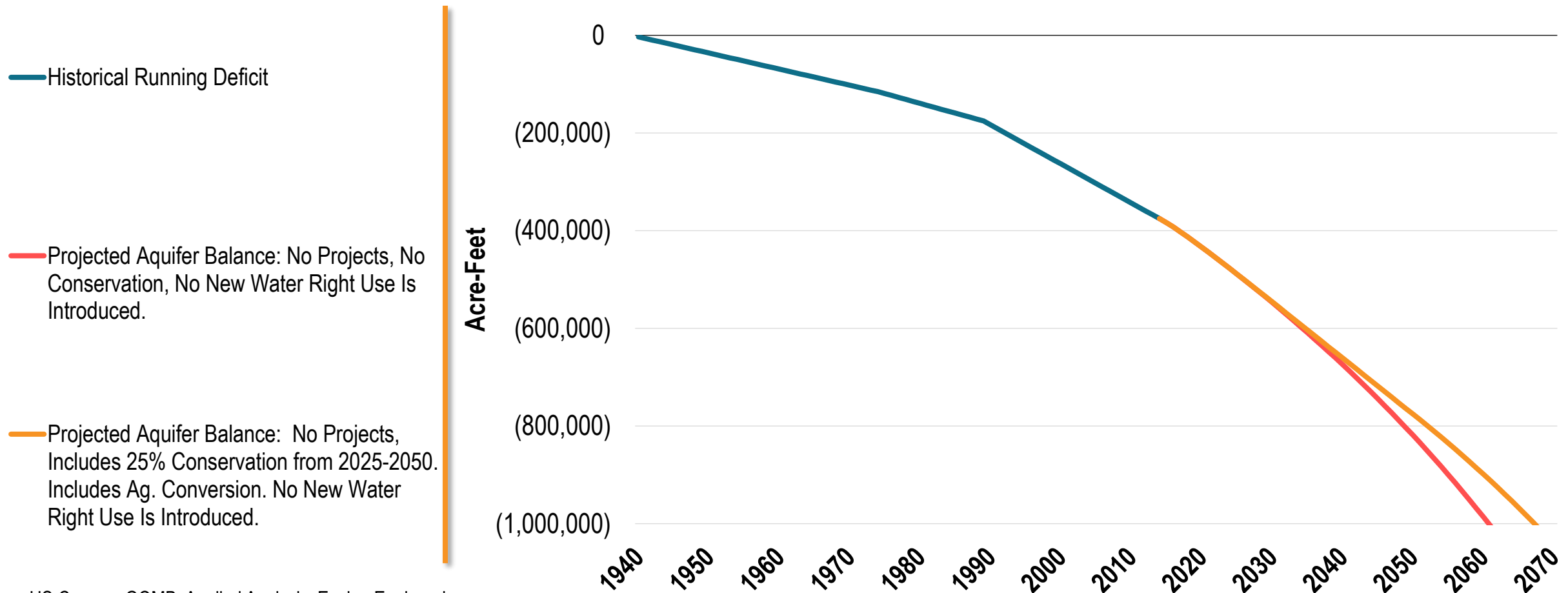


Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)

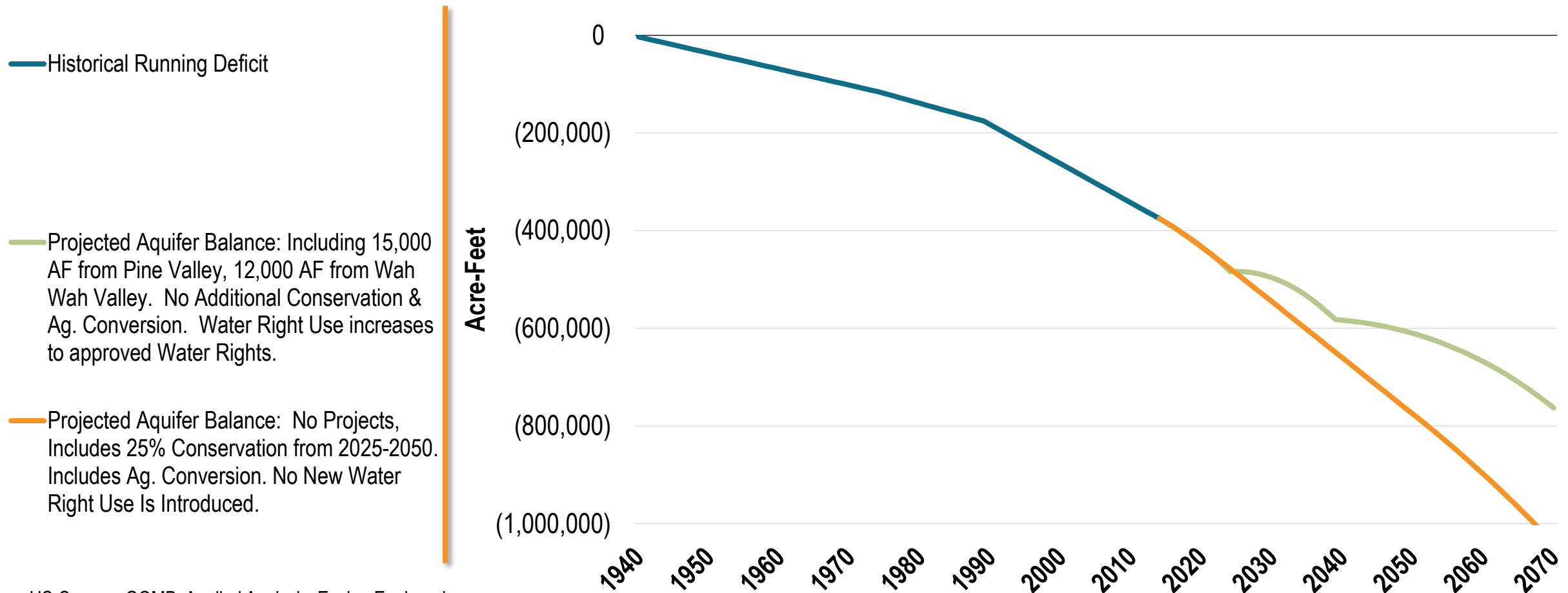


Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

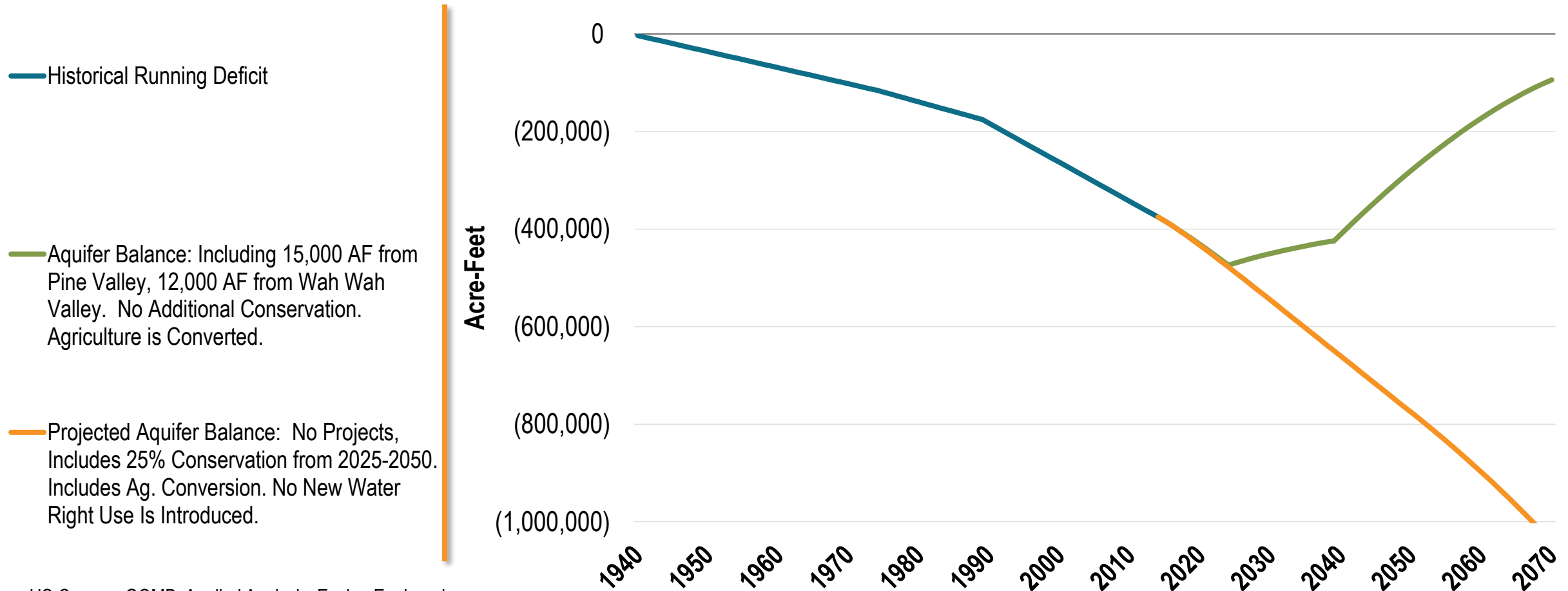
Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)



Source: US Census, GOMB, Applied Analysis, Ensign Engineering

Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)

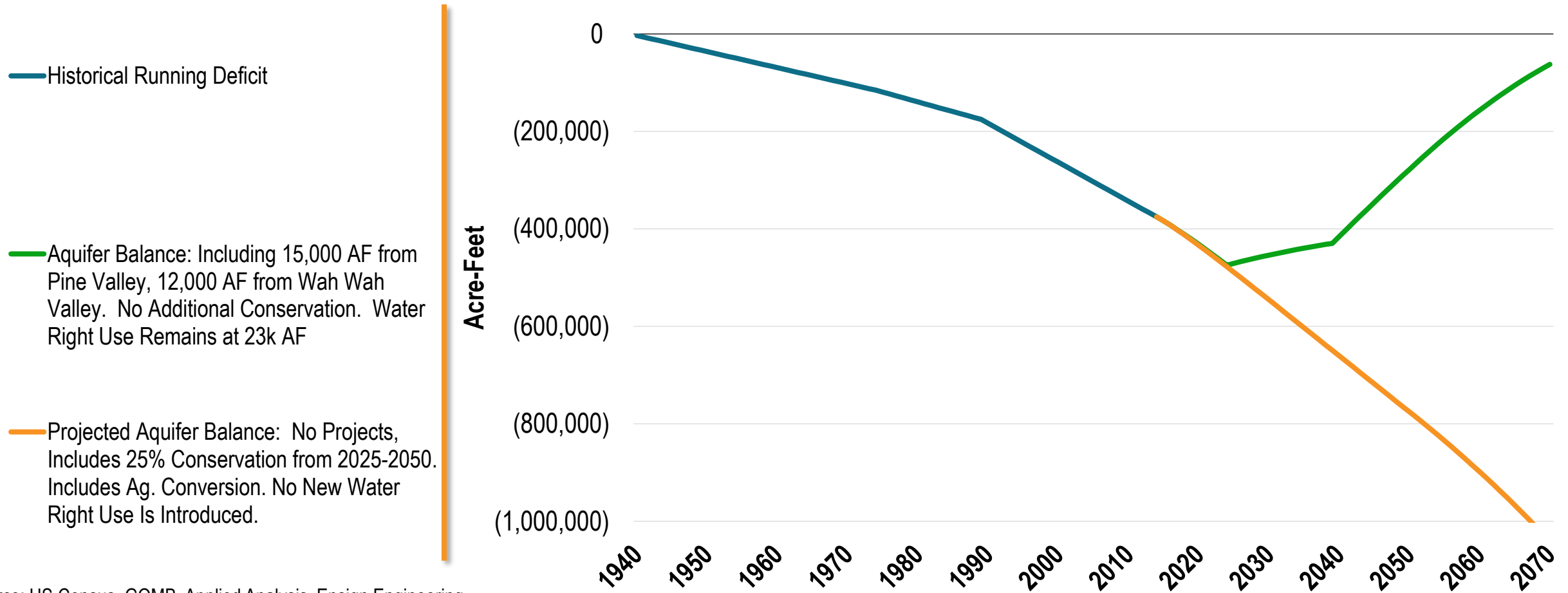


Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)

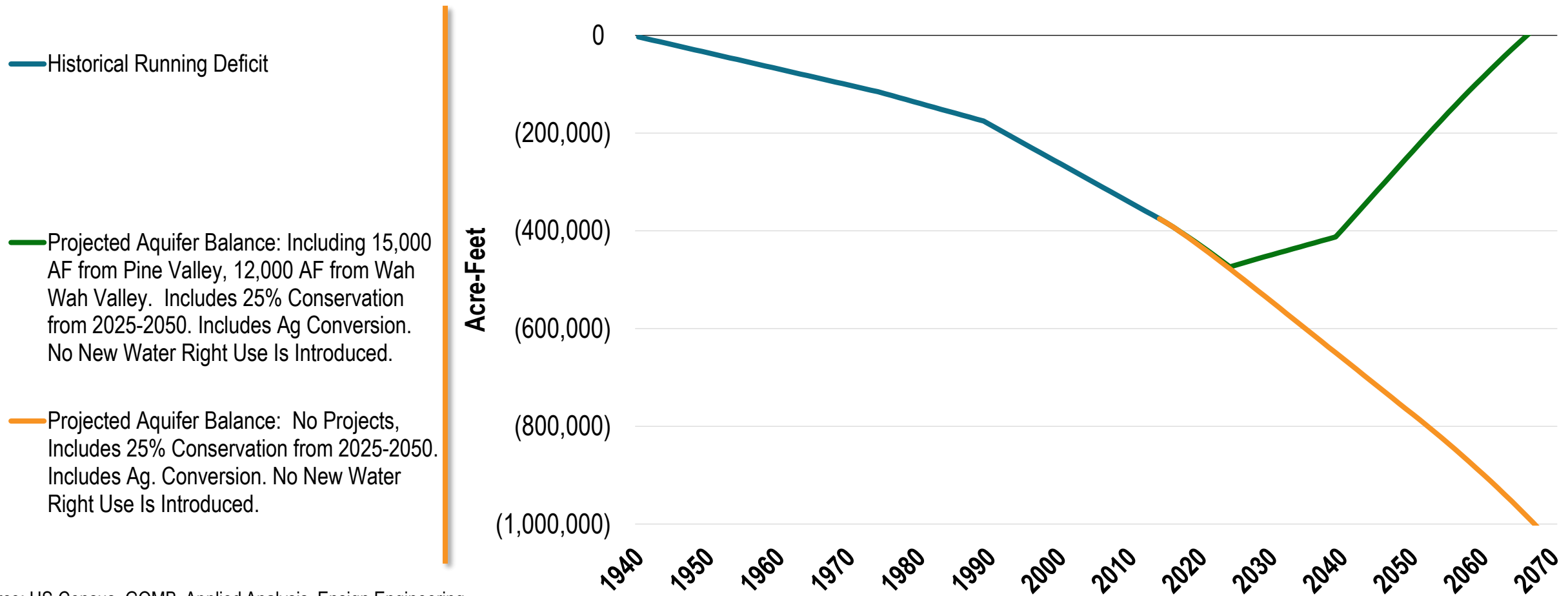


Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)



— Historical Running Deficit

— Projected Aquifer Balance: Including 15,000 AF from Pine Valley, 12,000 AF from Wah Wah Valley. Includes 25% Conservation from 2025-2050. Includes Ag Conversion. No New Water Right Use Is Introduced.

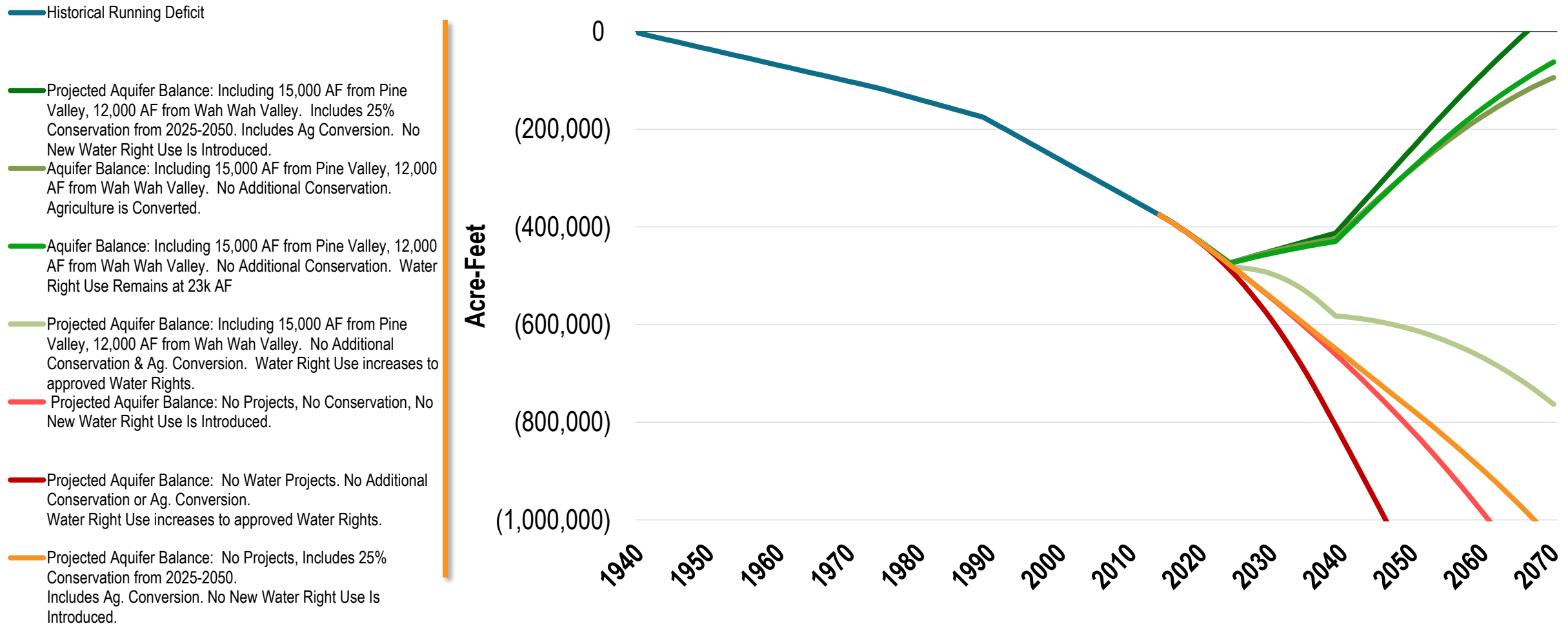
— Projected Aquifer Balance: No Projects, Includes 25% Conservation from 2025-2050. Includes Ag. Conversion. No New Water Right Use Is Introduced.

Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Groundwater Supply-Demand Balance

Running Deficit; Aquifer Budget (21,000 Acre Feet of Sustainable Yield)



Groundwater Supply-Demand Balance

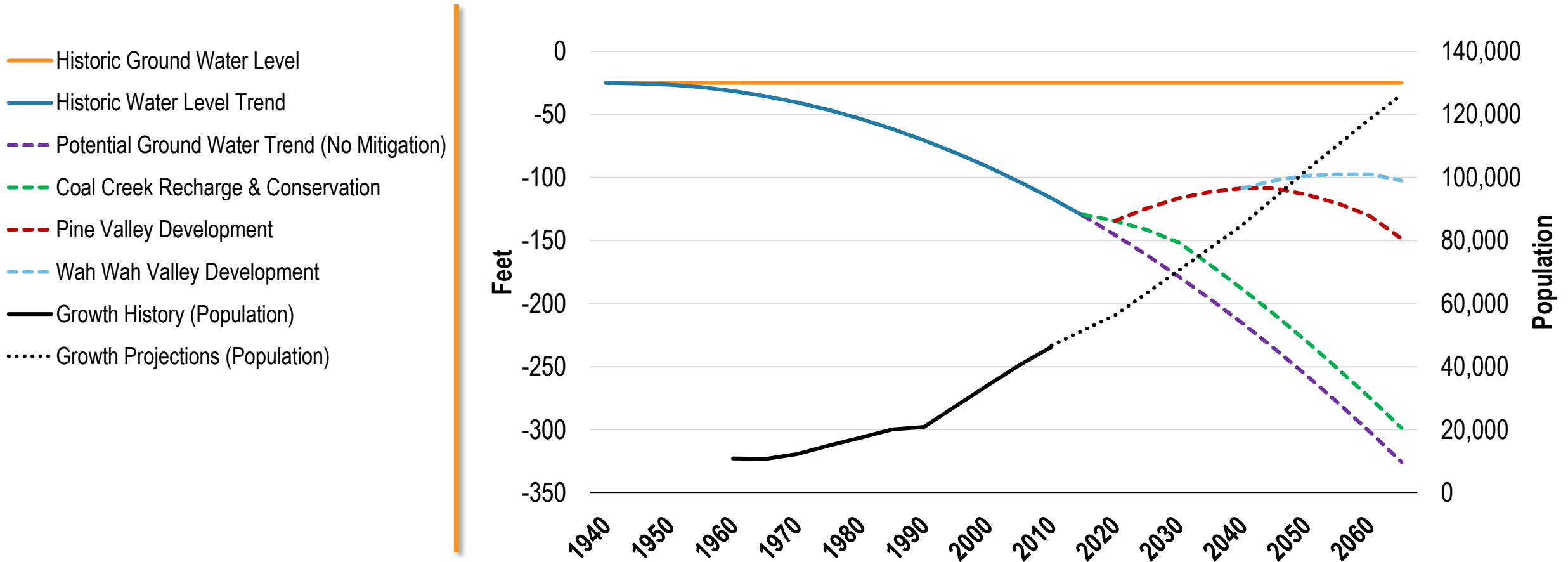
Putting It Into Perspective

**In addition to
measuring the impact
on the running deficit,
what are the
implications on
ground water levels**



Groundwater Supply-Demand Balance

Groundwater Level Trends vs. Population Trend



Source: US Census, GOMB, Applied Analysis, Ensign Engineering



Iron County Water Strategy

- **Develop a renewable, reliable source of potable water**
- **Least Aggressive Strategy:**
 - No new water projects
 - No additional conservation efforts
 - No agriculture conversion
 - Agriculture use increases to approved water right allowance
 - **This will increase the deficit to 1.7 million acre feet by 2070**

Summary

390,000 AF

Current Deficit

85,000 AF

Every 9 Years

Average Additional
Deficit

475,000 AF

2025 Deficit



Iron County Water Strategy

- **Develop a renewable, reliable source of potable water**
- **Most Aggressive Strategy:**
 - Bring in water from Pine and Wah Wah Valley
 - Perform a Coal Creek recharge project
 - Conserve an additional 25% of non-agricultural water from 2025 through 2050
 - Convert agriculture use water to non-agriculture use water at a fairly aggressive rate
 - Allow no new agriculture growth past 2018
 - **This will relieve the water deficit by 2066**

Summary

390,000 AF

Current Deficit

85,000 AF

Every 9 Years

Average Additional
Deficit

475,000 AF

2025 Deficit





- Summary of Findings
- Identifying the Issue
- Iron County's Economic Climate
- Iron County's Water Demand Outlook
- Iron County's Water Supply Outlook
- Supply-Demand Dynamics and Potential Solutions
- Economic Impacts of Investments in Infrastructure**
- Fiscal Considerations



Quantifying the Economic Impacts of the Alternatives

Two Key Considerations

Types of Economic Impacts Considered

1

POSITIVE IMPACTS

One-time construction impacts on the local economy that are sourced to new infrastructure investments (e.g., Pine Valley and Wah Wah Valley projects)

2

NEGATIVE IMPACTS

The recurring economic losses sourced to an insufficient water system in the event no infrastructure investments are made, limiting future growth potential



Quantifying the Economic Impacts of the Alternatives

Two Key Considerations

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One-time construction impacts on the local economy that are sourced to new infrastructure investments (e.g., Pine Valley and Wah Wah Valley projects)

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One-Time Economic Impact of Infrastructure Investments

Quantifying the Impacts

In addition to the broader implications of a reliable water supply system, there are one-time economic impacts associated with the development of new infrastructure

Types of Economic Impacts

Economic Output



Impact of Total Spending within the Local Economy

Wages and Salaries



Impact on Personal Incomes for Local Residents

Employment



Impact on the Number of Jobs within the Local Economy



One-Time Economic Impact of Infrastructure Investments

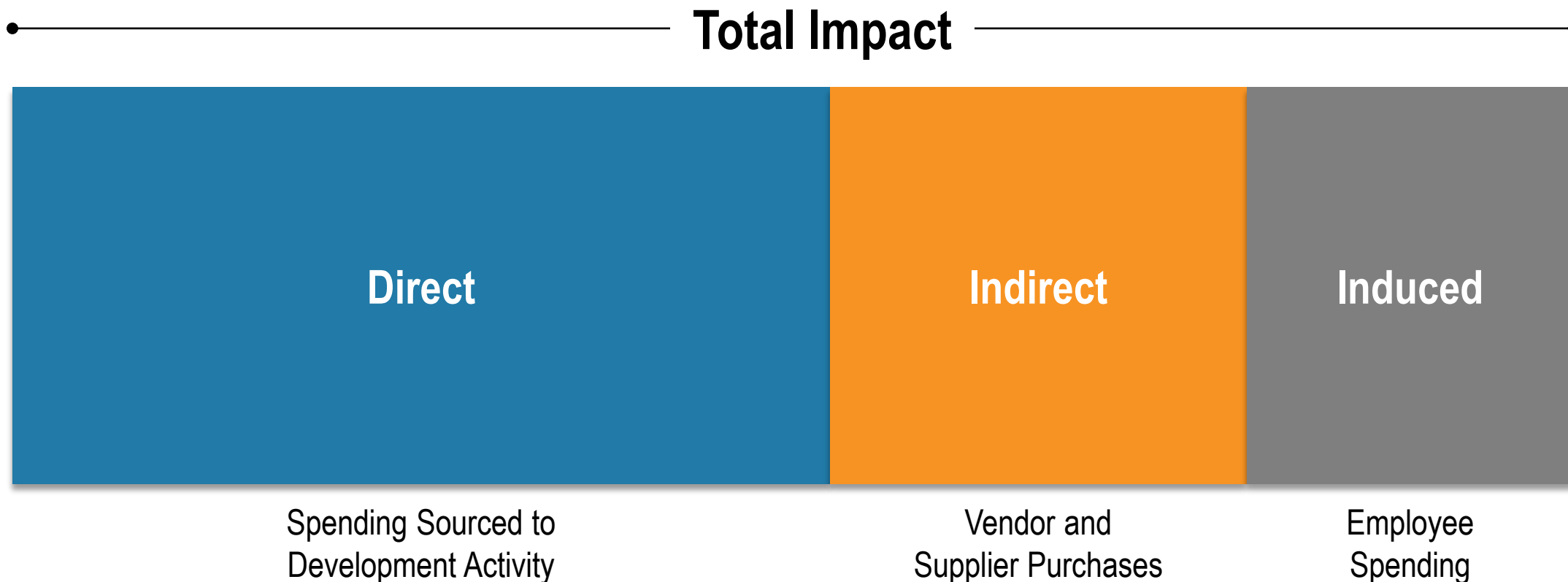
Approach, Methodology & Assumptions

- **IMPLAN Model:**
 - 1 of 3 nationally recognized impact analysis software tools
 - Developed by Minnesota IMPLAN Group, Inc. and used by more than 1,000 public and private institutions
 - IMPLAN is an input-output model that utilizes complex economic equations to explain how the “outputs” of one industry become the “inputs” of others, and vice versa
 - This relationship is sometimes referred to as the “multiplier effect”, illustrating how changes in one sector of the economy can affect other sectors
- **Types of Impacts:**
 - **Direct Impacts:** Generated by direct spending on the development of homes and other uses
 - **Indirect Impacts:** Secondary impacts generated by businesses supporting the economic activities of the development activity (e.g., vendors)
 - **Induced Impacts:** Sourced to businesses that are supported by the spending of employees supported by direct impacts (e.g., at grocery stores, in movie theaters or at doctor’s offices)
 - **Total Impacts:** The sum of direct, indirect and induced impacts



One-Time Economic Impact of Infrastructure Investments

Multiplier (“Ripple”) Effect



Note: Indirect and induced impacts sourced to IMPLAN.



One-Time Economic Impact of Infrastructure Investments

West Desert Pipeline Projects

PINE VALLEY **15,000 ACRE FEET**

Original Cost Estimate: **\$150.0 Million**

Revised Cost Estimate: **\$198.8 Million**

WAH WAH VALLEY **12,000 ACRE FEET**

Original Cost Estimate: **\$50.0 Million**

Revised Cost Estimate: **\$125.5 Million**

TOTAL INVESTMENT: \$324.3 MILLION

Source: Costs provided by CICWCD



One-Time Economic Impact of Infrastructure Investments

Economic Impact Summary

The potential economic impacts sourced to large-scale investment in infrastructure are significant with \$464 million in output, supporting approximately \$101 million in wages and an estimated 3,700 jobs.

(\$ in Millions)	Direct	Indirect	Induced	Total
<u>Pine Valley Only: \$199 Million Investment</u>				
Economic Output	\$198.8	\$52.3	\$33.0	\$284.1
Wages & Salaries	\$42.4	\$11.7	\$7.7	\$61.9
Employment	1,443	524	316	2,283
<u>Pine and Wah Wah Valleys: \$324 Million Investment</u>				
Economic Output	\$324.3	\$85.3	\$53.9	\$463.5
Wages & Salaries	\$69.2	\$19.2	\$12.6	\$100.9
Employment	2,355	854	516	3,725

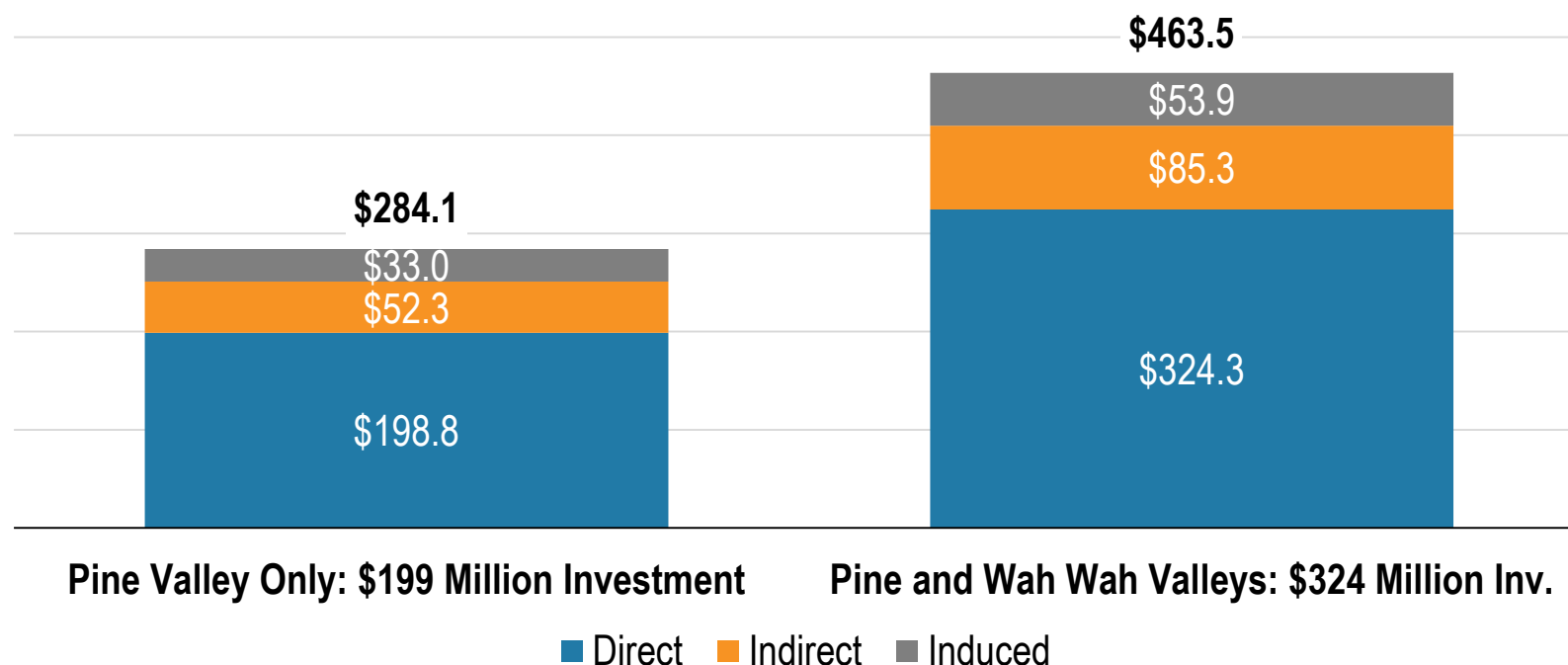
Note: Indirect and induced impacts sourced to IMPLAN; employment stated in person-years of employment (i.e., one person employed for an entire year).

One-Time Economic Impact of Infrastructure Investments

Economic Impact Summary

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Economic Output (in millions)



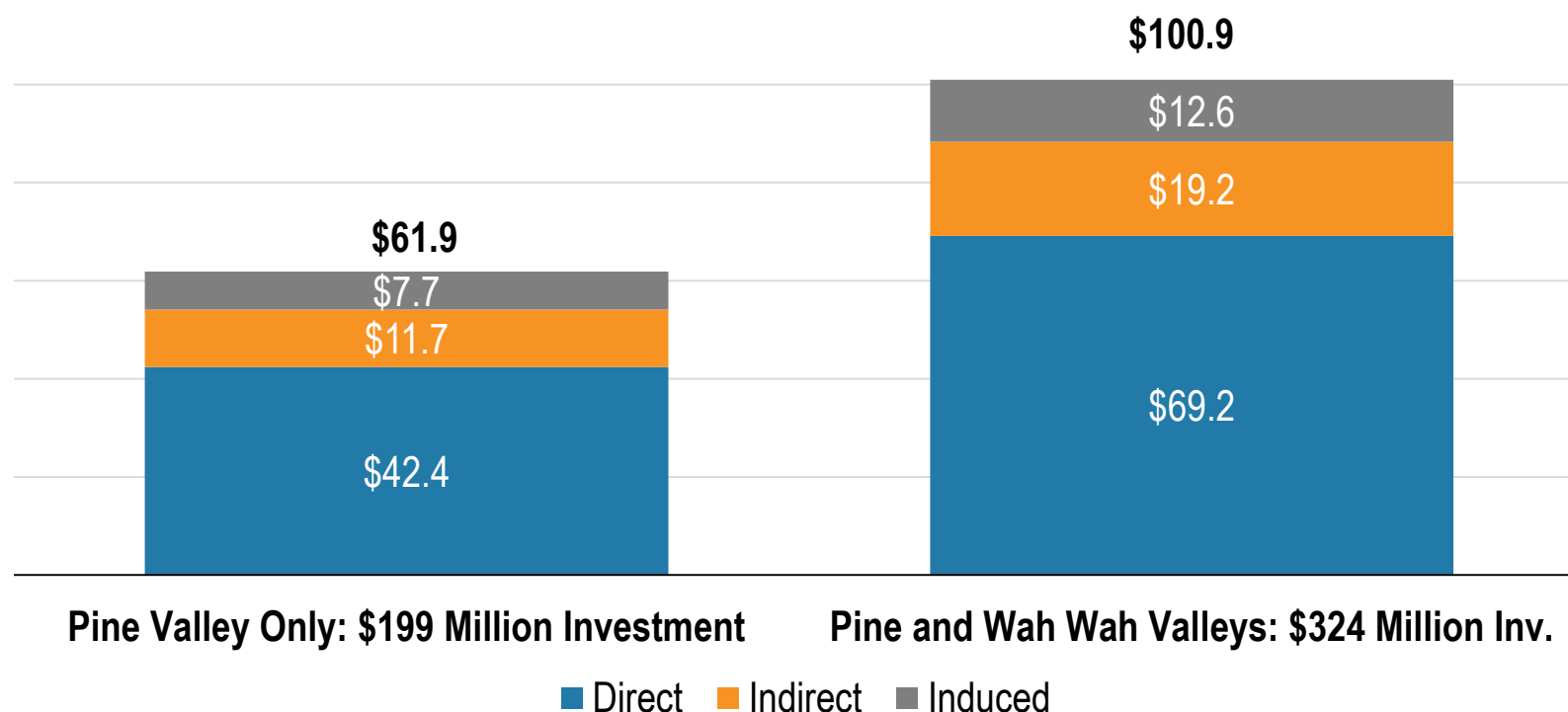
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One-Time Economic Impact of Infrastructure Investments

Economic Impact Summary

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Wages & Salaries (in millions)

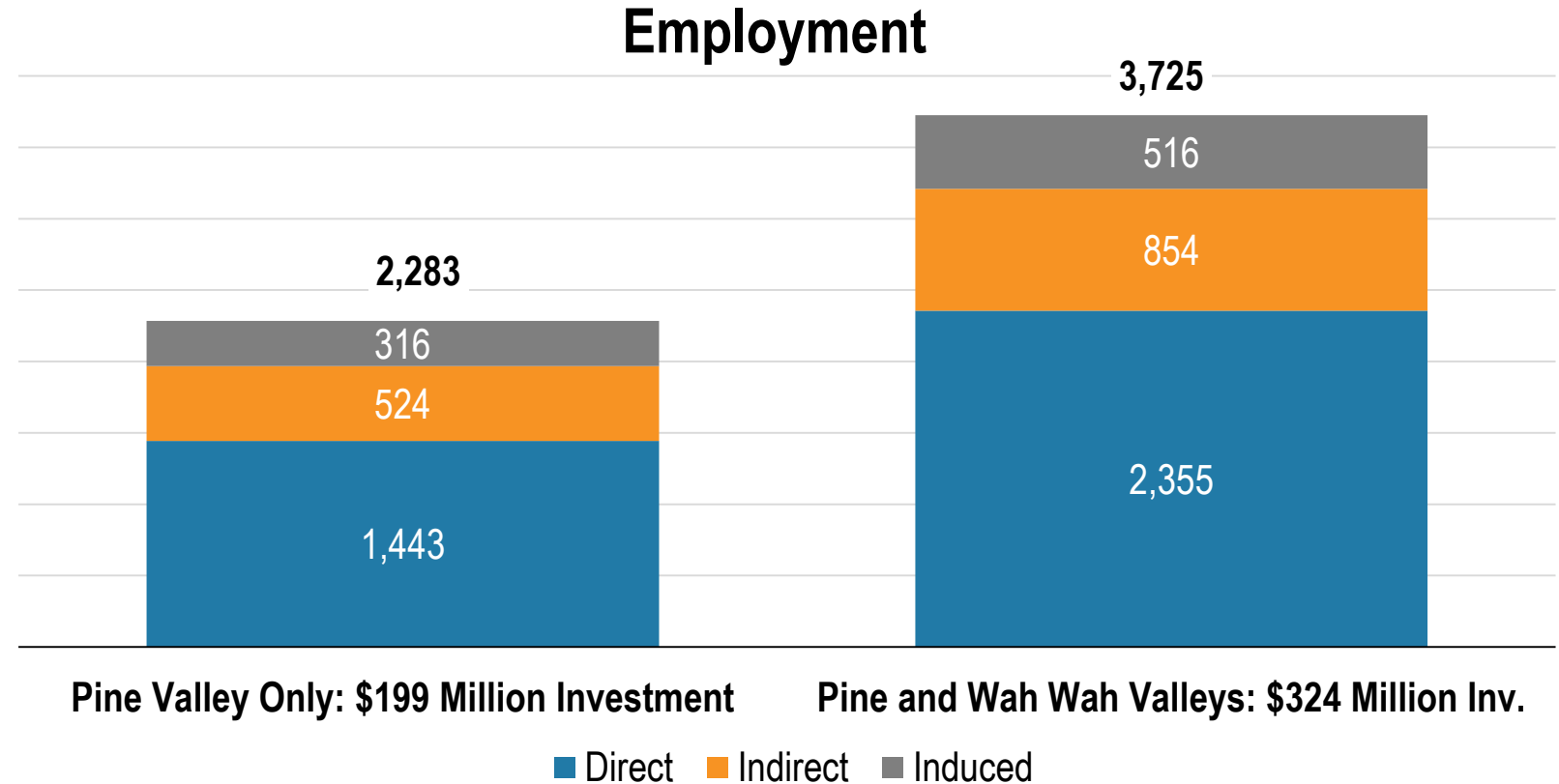


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The recurring economic losses sourced to an insufficient water system in the event no infrastructure investments are made, limiting future growth potential



Quantifying the Potential Impacts of Water Infrastructure

The Value per Acre Foot of Water

Based on current non-agricultural (M&I) demand levels, the value of each acre foot of water equates to:

- 6.13 residents
- 2.00 households
- 2.54 employees
- 0.18 businesses
- \$159,492 in personal income
- \$291,297 in gross product

		Current Demand		
		Muni. & Ind.	Agriculture	Combined
	<i>Count</i>	7,935 AF	22,000 AF	29,935 AF
Population	48,603	6.13	2.21	1.62
Households	15,870	2.00	0.72	0.53
Employees	20,126	2.54	0.91	0.67
No. of Business Establishments	1,435	0.18	0.07	0.05
Personal Income	\$1,265,597,000	\$159,492	\$57,527	\$42,278
Gross Product (est.)	\$2,311,409,002	\$291,287	\$105,064	\$77,214



Quantifying the Potential Impacts of Water Infrastructure

The Value per Acre Foot of Water

When agricultural demand is included, the value of each acre foot of water equates to:

- 1.62 residents
- 0.53 households
- 0.67 employees
- 0.05 businesses
- \$42,278 in personal income
- \$77,214 in gross product

	<i>Count</i>	Current Demand		
		Muni. & Ind.	Agriculture	Combined
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Quantifying the Potential Impacts of Water Infrastructure

Combined Water Use (Ag & Non-Ag): The Impacts of Pine Valley and Wah Wah Valley

When applying the value per acre foot to the additional capacity of new developments, local economy is expected support:

- Nearly 44,000 residents
- Over 14,000 households
- Approximately \$1.1 billion in additional personal income annually
- Nearly \$2.1 billion in economic activity annually

	Future Supply		
	Pine Valley	Wah Wah Valley	Combined
	15,000 AF	12,000 AF	27,000 AF
Population	24,354	19,483	43,838
Households	7,952	6,362	14,314
Employees	10,085	8,068	18,153
No. of Business Establishments	719	575	1,294
Personal Income	\$634,169,309	\$507,335,447	\$1,141,504,757
Gross Product (est.)	\$1,158,208,063	\$926,566,450	\$2,084,774,513



Quantifying the Potential Impacts of Water Infrastructure

Muni. & Ind. Water Use (Non-Ag): The Impacts of Pine Valley and Wah Wah Valley

When applying the value per acre foot of municipal and industrial water to the additional capacity of new developments, local economy is expected support:

- Approximately 165,000 residents
- An estimated 54,000 households
- Approximately \$4.3 billion in additional personal income annually
- Nearly \$7.9 billion in economic activity annually

	Future Supply		
	Pine Valley	Wah Wah Valley	Combined
	15,000 AF	12,000 AF	27,000 AF
Population	91,876	73,500	165,376
Households	30,000	24,000	54,000
Employees	38,045	30,436	68,480
No. of Business Establishments	2,713	2,170	4,883
Personal Income	\$2,392,386,905	\$1,913,909,524	\$4,306,296,430
Gross Product (est.)	\$4,369,309,210	\$3,495,447,368	\$7,864,756,579



Quantifying the Potential Impacts of Water Infrastructure

Personal Income Impacts

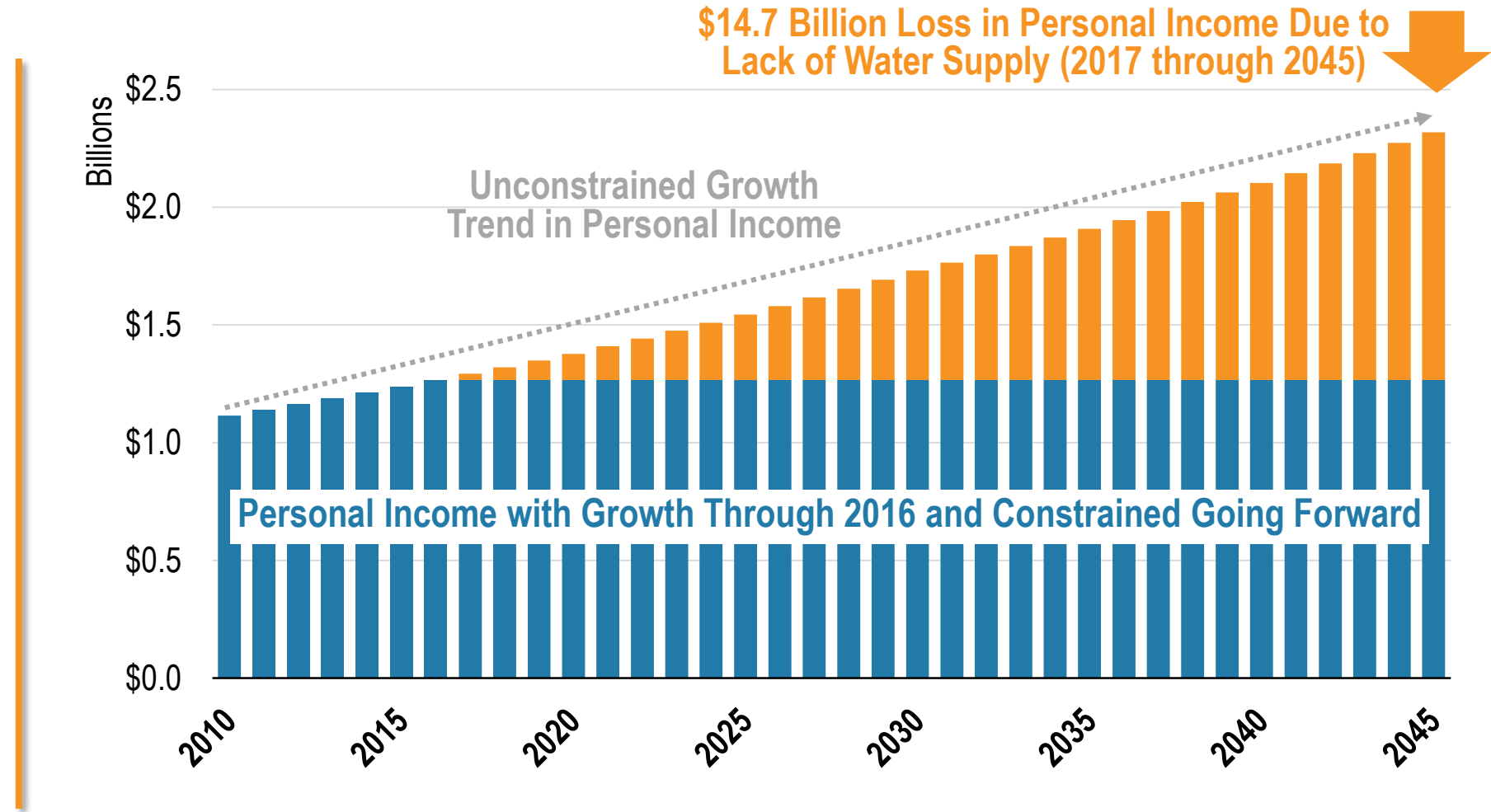
What are the impacts on personal income to the community under potential water constraint scenarios



Quantifying the Potential Impacts of Water Infrastructure

Personal Income Impacts Next 30 Years: Constrained Today

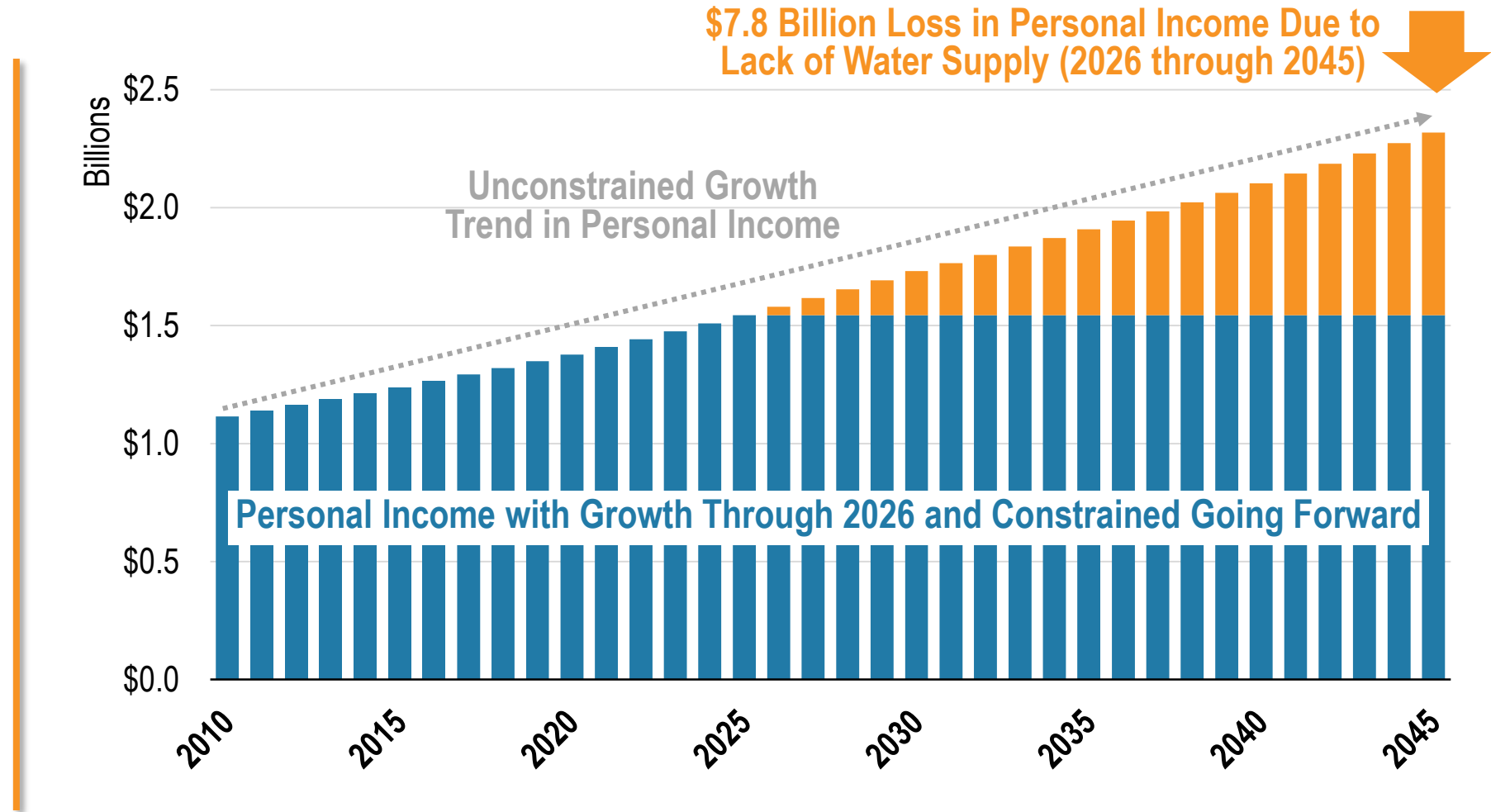
- When applying the per-capita personal income estimate of \$26,039 to projected population in the Iron County area (2016 dollars), personal income is estimated to reach \$2.3 billion annually by 2045 (in 30 years)
- Assuming growth is constrained next year (2017), the remaining 29-year impact (loss) to the community is \$14.7 billion



Quantifying the Potential Impacts of Water Infrastructure

Personal Income Impacts Next 30 Years: Constrained by 2025

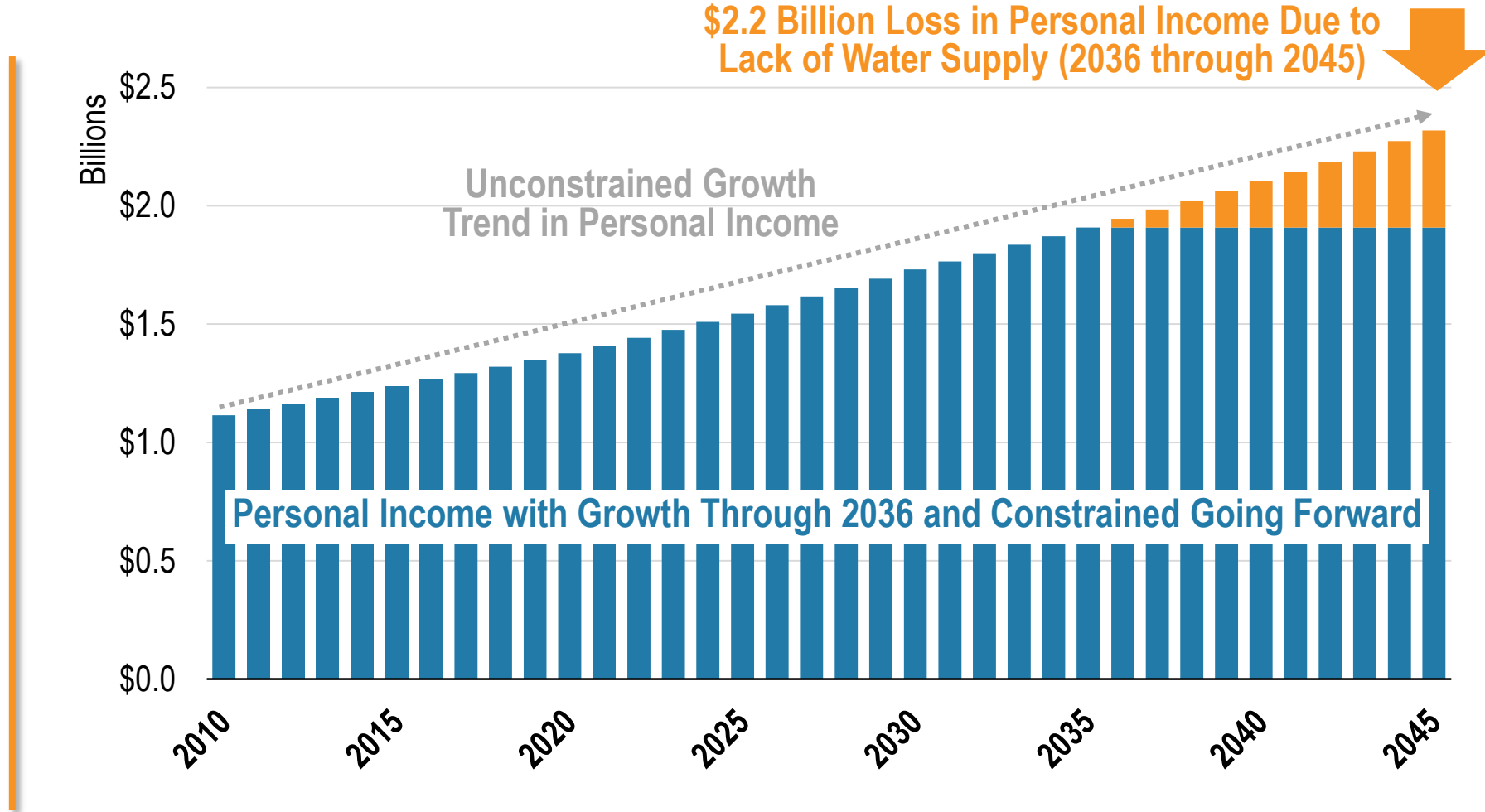
- When applying the per-capita personal income estimate of \$26,039 to projected population in the Iron County area (2016 dollars), personal income is estimated to reach \$2.3 billion annually by 2045 (in 30 years)
- Assuming growth is constrained by 2025 (10 years), the remaining 20-year impact (loss) to the community is \$7.8 billion



Quantifying the Potential Impacts of Water Infrastructure

Personal Income Impacts Next 30 Years: Constrained by 2035

- When applying the per-capita personal income estimate of \$26,039 to projected population in the Iron County area (2016 dollars), personal income is estimated to reach \$2.3 billion annually by 2045 (in 30 years)
- Assuming growth is constrained by 2035 (20 years), the remaining 10-year impact (loss) to the community is \$2.2 billion



Quantifying the Potential Impacts of Water Infrastructure

Gross Product Impacts

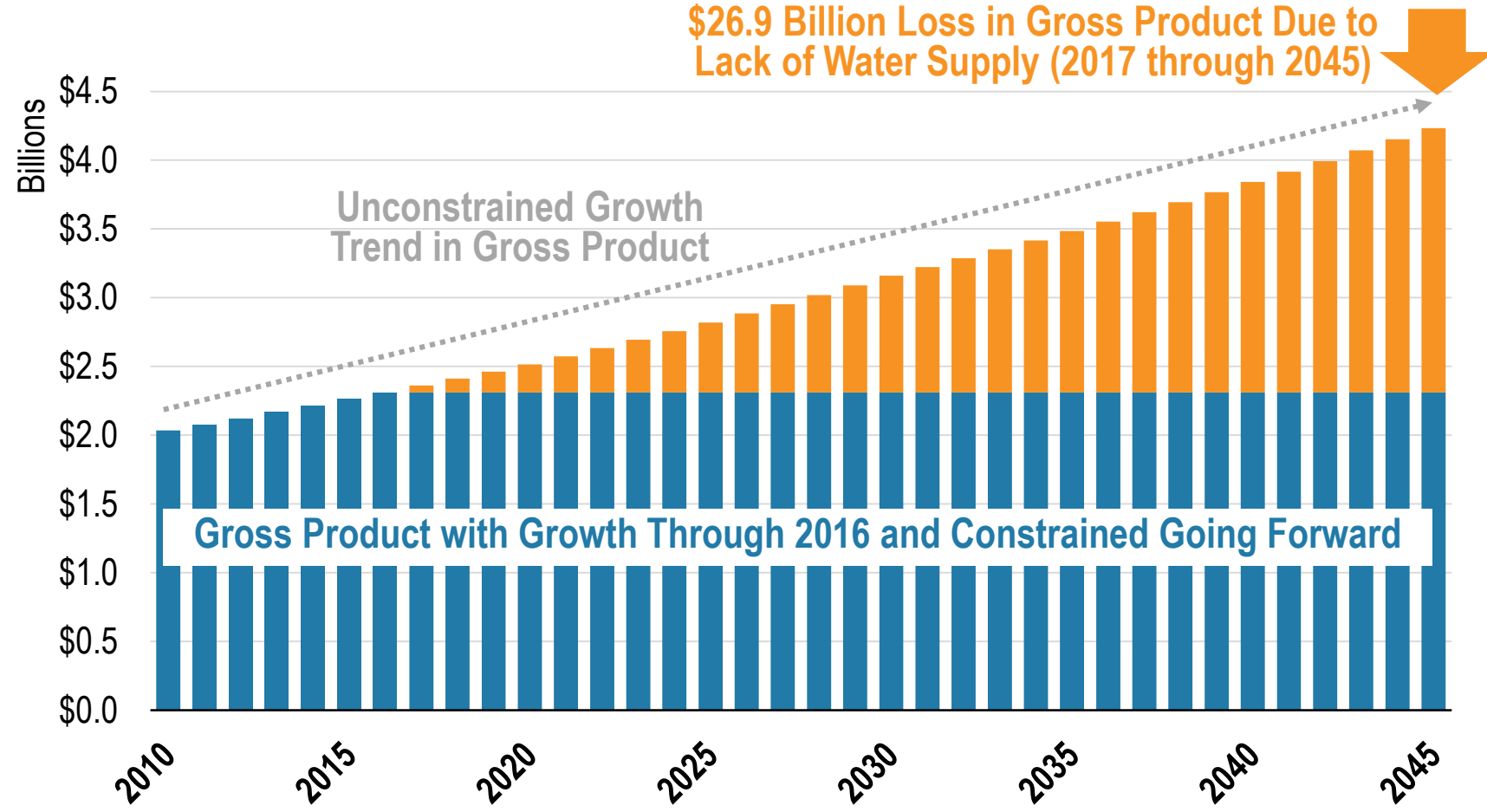
**What are the impacts
on gross product
(economic activity) to
the community under
potential water
constraint scenarios**



Quantifying the Potential Impacts of Water Infrastructure

Gross Product Impacts Next 30 Years: Constrained Today

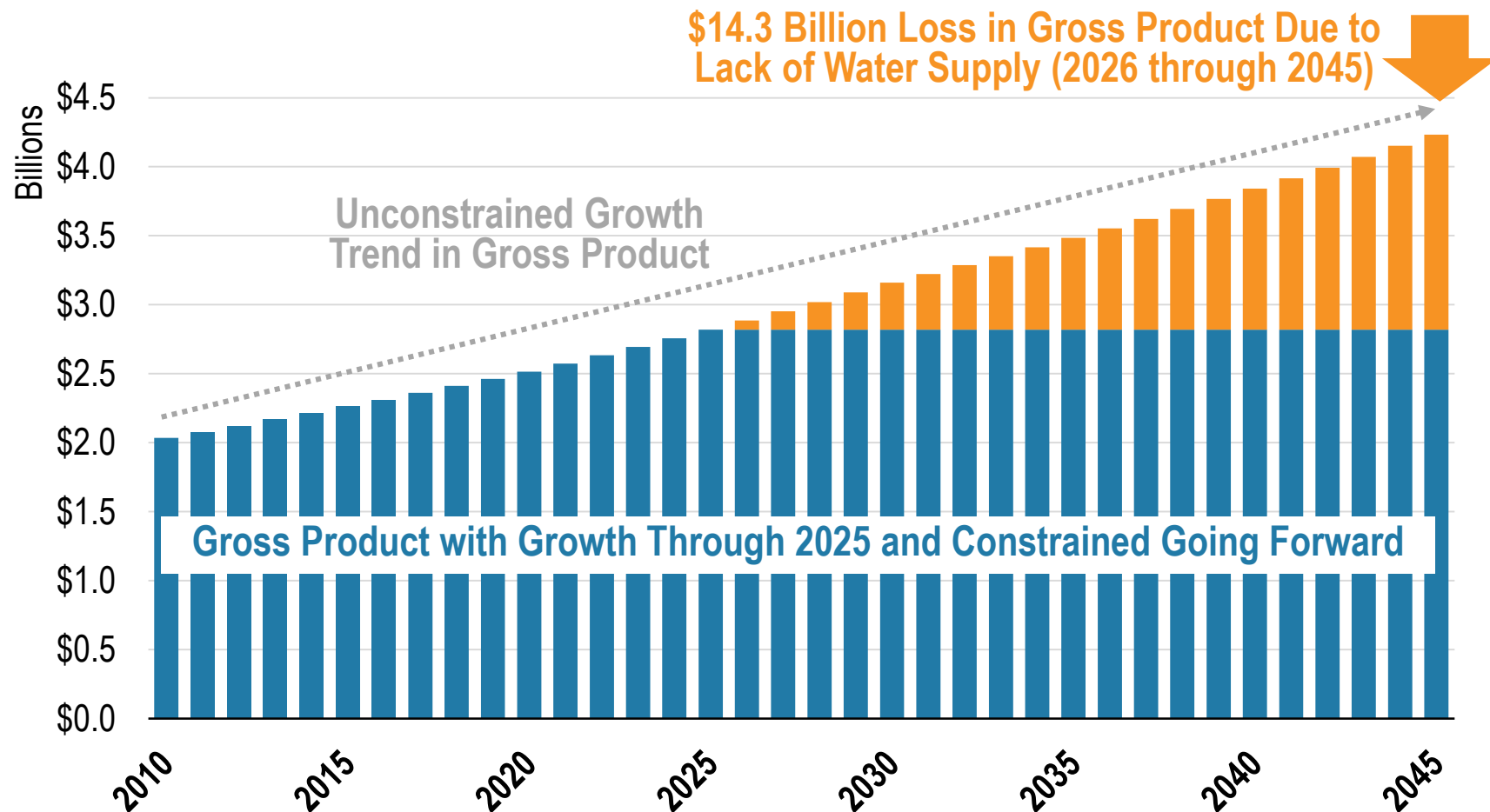
- When applying the per-capita gross product estimate of \$47,556 to projected population in the Iron County area (2016 dollars), gross product is estimated to reach \$4.2 billion annually by 2045 (in 30 years)
- Assuming growth is constrained next year (2017), the remaining 29-year impact (loss) to the community is \$26.9 billion



Quantifying the Potential Impacts of Water Infrastructure

Gross Product Impacts Next 30 Years: Constrained by 2025

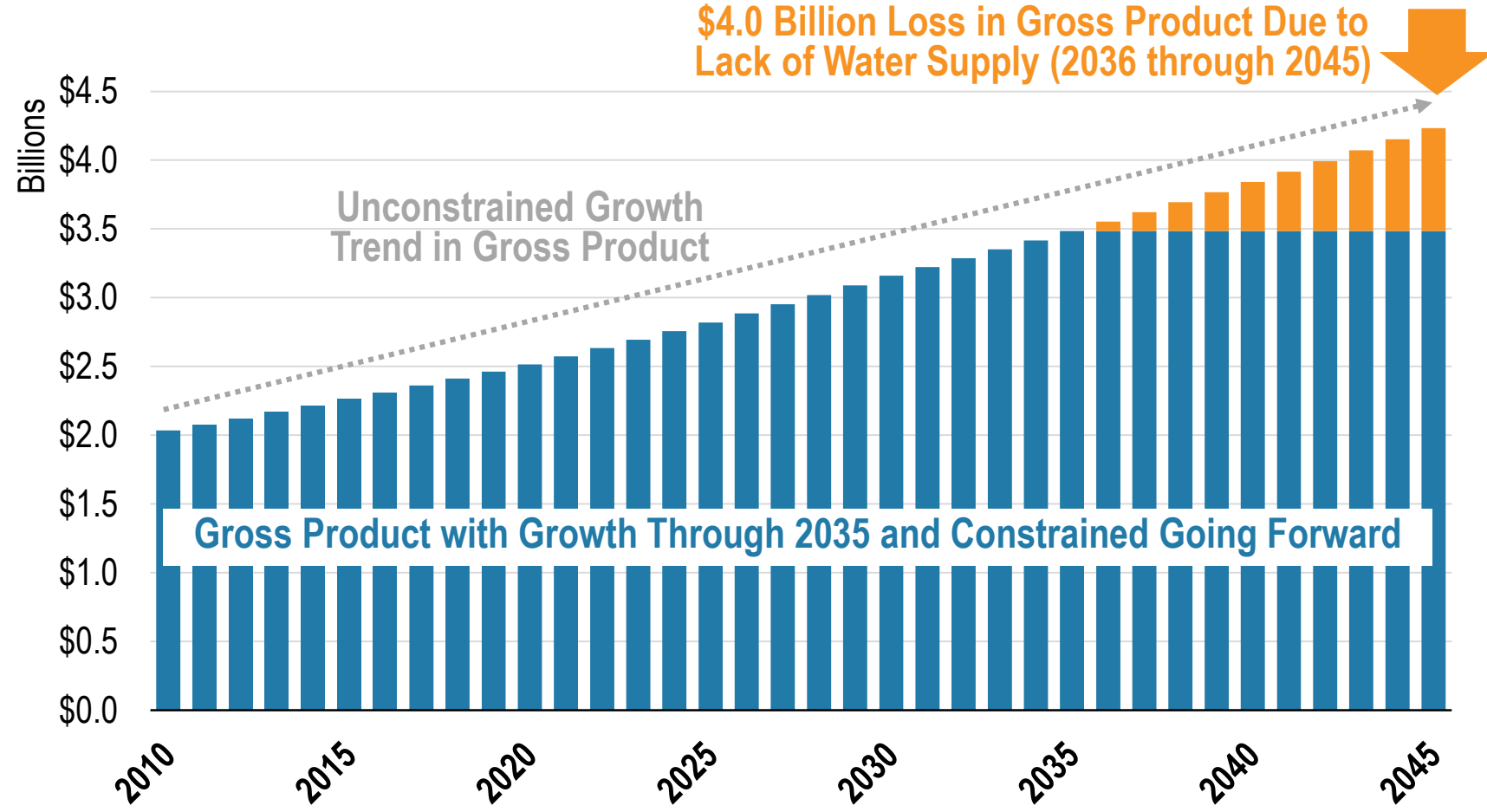
- When applying the per-capita gross product estimate of \$47,556 to projected population in the Iron County area (2016 dollars), gross product is estimated to reach \$4.2 billion annually by 2045 (in 30 years)
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Quantifying the Potential Impacts of Water Infrastructure

Gross Product Impacts Next 30 Years: Constrained by 2035

- When applying the per-capita gross product estimate of \$47,556 to projected population in the Iron County area (2016 dollars), gross product is estimated to reach \$4.2 billion annually by 2045 (in 30 years)
- Assuming growth is constrained by 2035 (20 years), the remaining 10-year impact (loss) to the community is \$4.0 billion



Quantifying the Potential Impacts of Water Infrastructure

A Range of Returns on Investment

- When comparing the potential economic implications of a constrained growth environment with the investment, or cost, associated with the Pine Valley and Wah Wah Valley pipeline projects, the ratios are significant:
 - **Personal Income:** Assuming water infrastructure investments of \$324.3 million were able to secure an additional 10 years of community growth (2035 to 2045), the impact of an additional \$2.2 billion of personal income translates into a return of \$6.80 for every \$1.00 invested; more near-term constraint scenarios increase that ratio significantly
 - **Gross Product:** Similarly, gross product returns during the 10-year period from 2036 to 2045 are estimated to be \$4.0 billion – equating to a return of 12.3-to-1.0 with larger impacts under more conservative scenarios

Based on an Investment/Cost
of \$324.3 Million

Potential
Impacts

Rate of
Return

Personal Income Impacts for the Next 30 Years:

Constrained in 2017 (Next Year)	\$14,734,091,773	45.4 : 1.0
Constrained in 2025 (in 10 Years)	\$7,836,026,018	24.2 : 1.0
Constrained in 2035 (in 20 Years)	\$2,189,335,505	6.8 : 1.0

Gross Product Impacts for the Next 30 Years:

Constrained in 2017 (Next Year)	\$26,909,444,601	83.0 : 1.0
Constrained in 2025 (in 10 Years)	\$14,311,238,945	44.1 : 1.0
Constrained in 2035 (in 20 Years)	\$3,998,468,544	12.3 : 1.0



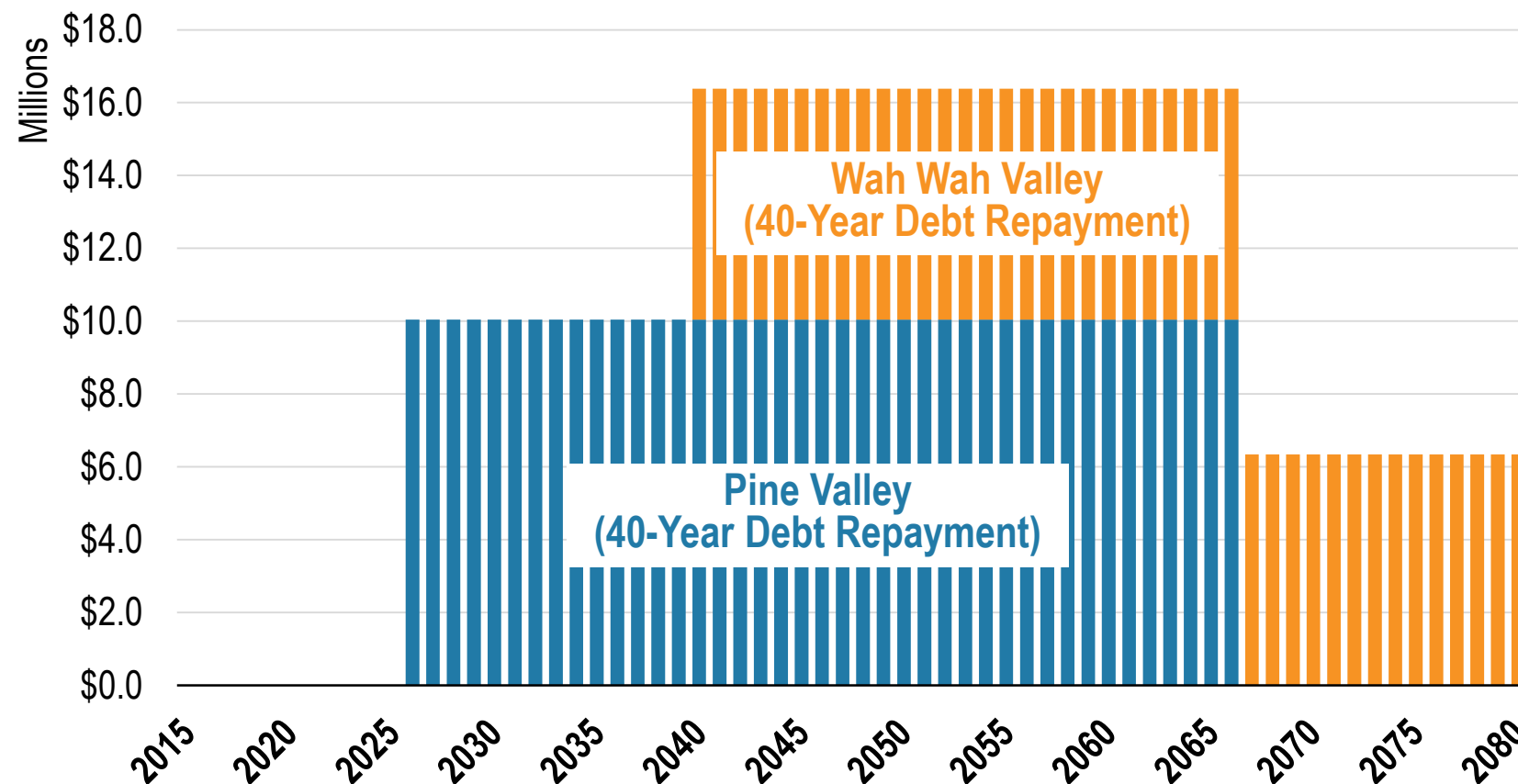
- Summary of Findings
- Identifying the Issue
- Iron County's Economic Climate
- Iron County's Water Demand Outlook
- Iron County's Water Supply Outlook
- Supply-Demand Dynamics and Potential Solutions
- Economic Impacts of Investments in Infrastructure
- Fiscal Considerations**



Potential Debt Financing Scenario of New Infrastructure

- While there are a number of financing alternatives, this analysis assumes:
 - Term: 40-Year Repayment
 - Interest Rate: 4.0%
 - Fixed Payments

- Amortization and Debt Service:
 - Pine Valley:
 - Starts: 2026
 - Annual Debt Service: \$10.0 M
 - Wah Wah Valley:
 - Starts: 2040
 - Annual Debt Service: \$6.3 M



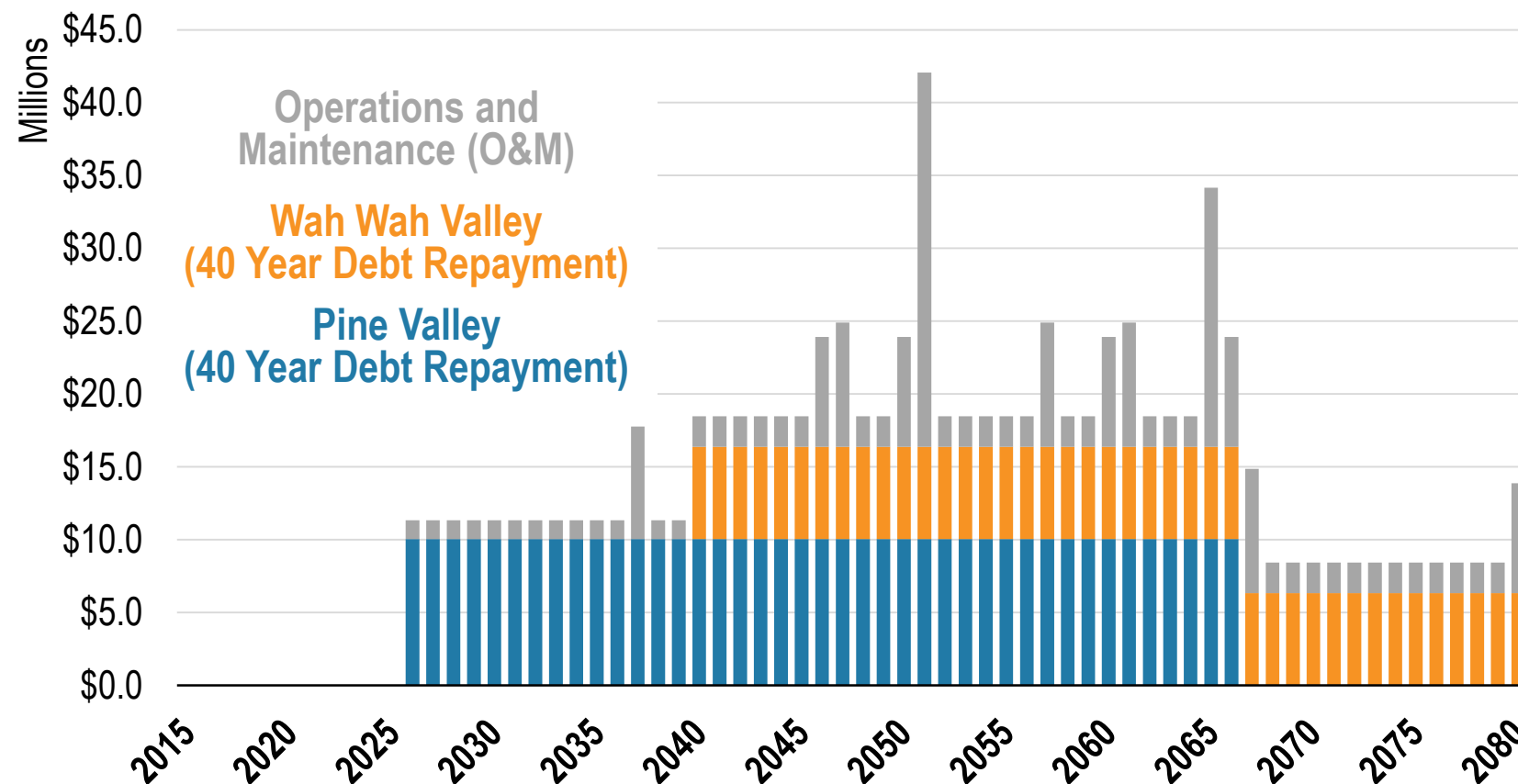
Source: CICWCD



Total Debt Service, Plus O&M of New Infrastructure

- While there are a number of financing alternatives, this analysis assumes:
 - Term: 40-Year Repayment
 - Interest Rate: 4.0%
 - Fixed Payments

- Amortization and Debt Service:
 - Pine Valley:
 - Starts: 2026
 - Annual Debt Service: \$10.0 M
 - Wah Wah Valley:
 - Starts: 2040
 - Annual Debt Service: \$6.3 M



Source: CICWCD

Potential Funding Sources for New Infrastructure

User Fees (Incremental Water Usage Fees)



<u>Period</u>	<u>Annual per HH</u>
2017-2026	\$0.50
2026-2030	\$2.30
2030-2040	\$2.50
2040-2050	\$2.60
2050-2060	\$2.50
2060-2080	\$2.00

Impact Fees (Development/Investment Community)



<u>Period</u>	<u>Per New HH</u>
2017-2026	\$500
2026	\$5,000
2026-2030	+3.0%
2030-2040	+3.0%
2040-2050	+3.0%
2050-2060	+1.0%
2060-2080	0.0%

Property Taxes (Residents, Businesses and Landowners)



<u>Period</u>	<u>% To Project</u>
2017-2026	0.0%
2026-2030	1.0%
2030-2040	1.0%
2040-2050	1.0%
2050-2060	1.0%
2060-2080	1.0%

Source: CICWCD



Residential Water Bills and Rates: Current

Average Monthly Water Bill
\$2.24 per 1,000 Gallons

Average Monthly Water Bill
15,926 Gallons / \$35.71 per month

Average Monthly Water Bill
191,112 Gallons / \$428.52 per year

Level	Description	Cost	Includes
#0	Minimum Monthly Fee	\$30.00	No Water, Minimum Monthly Fee
#1	Plus \$0.70 per 1,000 Gallons	\$0.70	0 to 12,000 Gallons per Month
#2	Plus \$0.80 per 1,000 Gallons	\$0.80	12,001 to 20,000 Gallons per Month
#3	Plus \$1.50 per 1,000 Gallons	\$1.50	20,001 to 30,000 Gallons per Month
#4	Plus \$2.50 per 1,000 Gallons	\$2.50	30,001 and Above Gallons per Month

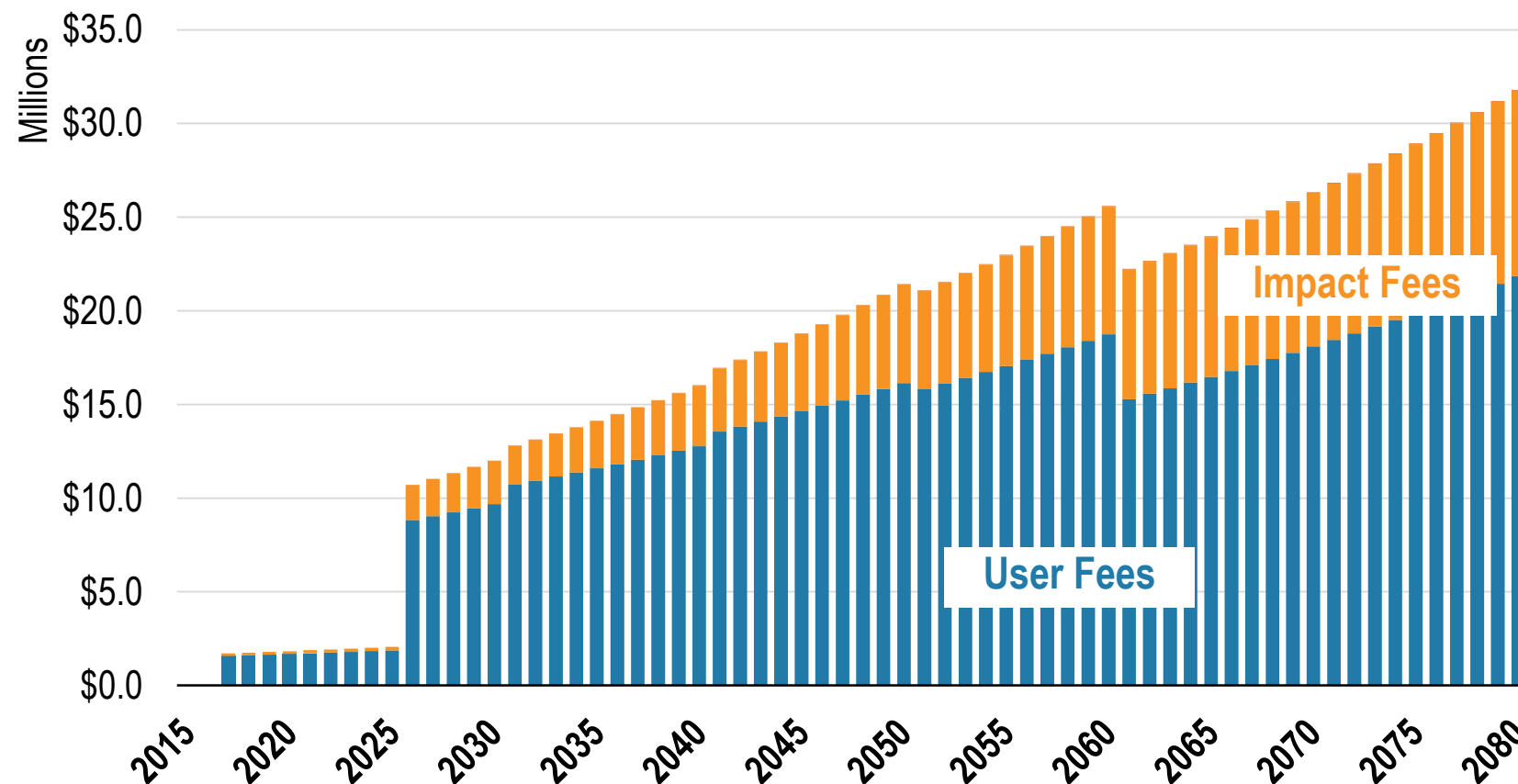
Source: <http://www.cicwcd.org/Documents/Water%20rate%20schedules.pdf>

Source: Water Master Plan Report, 2014;
 Ensign Engineering & Land Surveying.



Potential Revenue Scenario

- There are a number of potential financing scenarios for the project; this scenario reflects one alternative to fully fund the investments and payback going forward

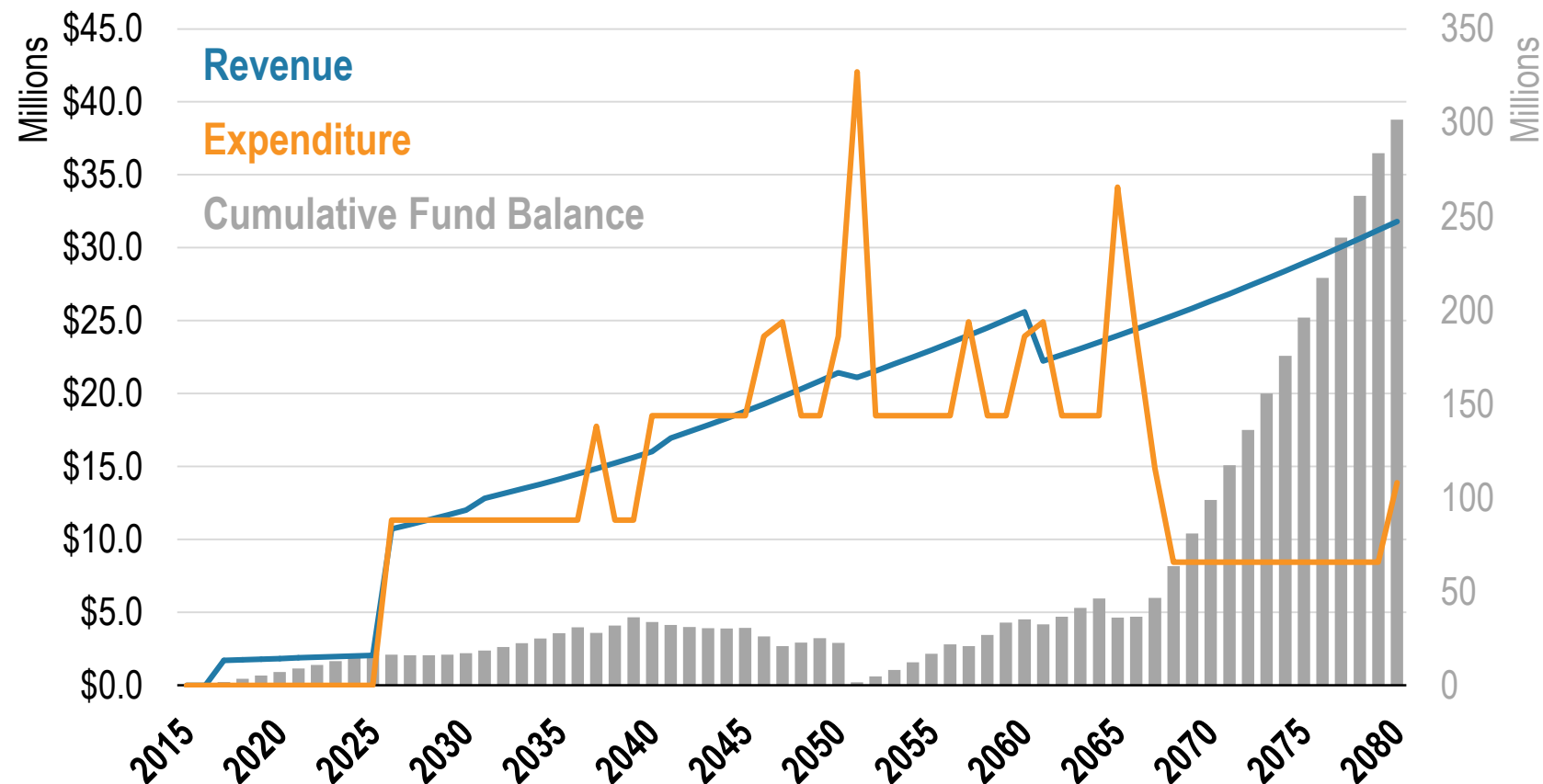


Source: CICWCD



Potential Revenue and Expenditure Scenario

- The proposed structure provides sufficient cash flow to service debt and operating and maintenance costs
- Once outstanding debt obligations are extinguished, revenues exceed expenditures and generates a cumulative fund balance
 - CICWCD could decide to roll back cost structure, or
 - Invest in further water resource infrastructure if deemed necessary at that time

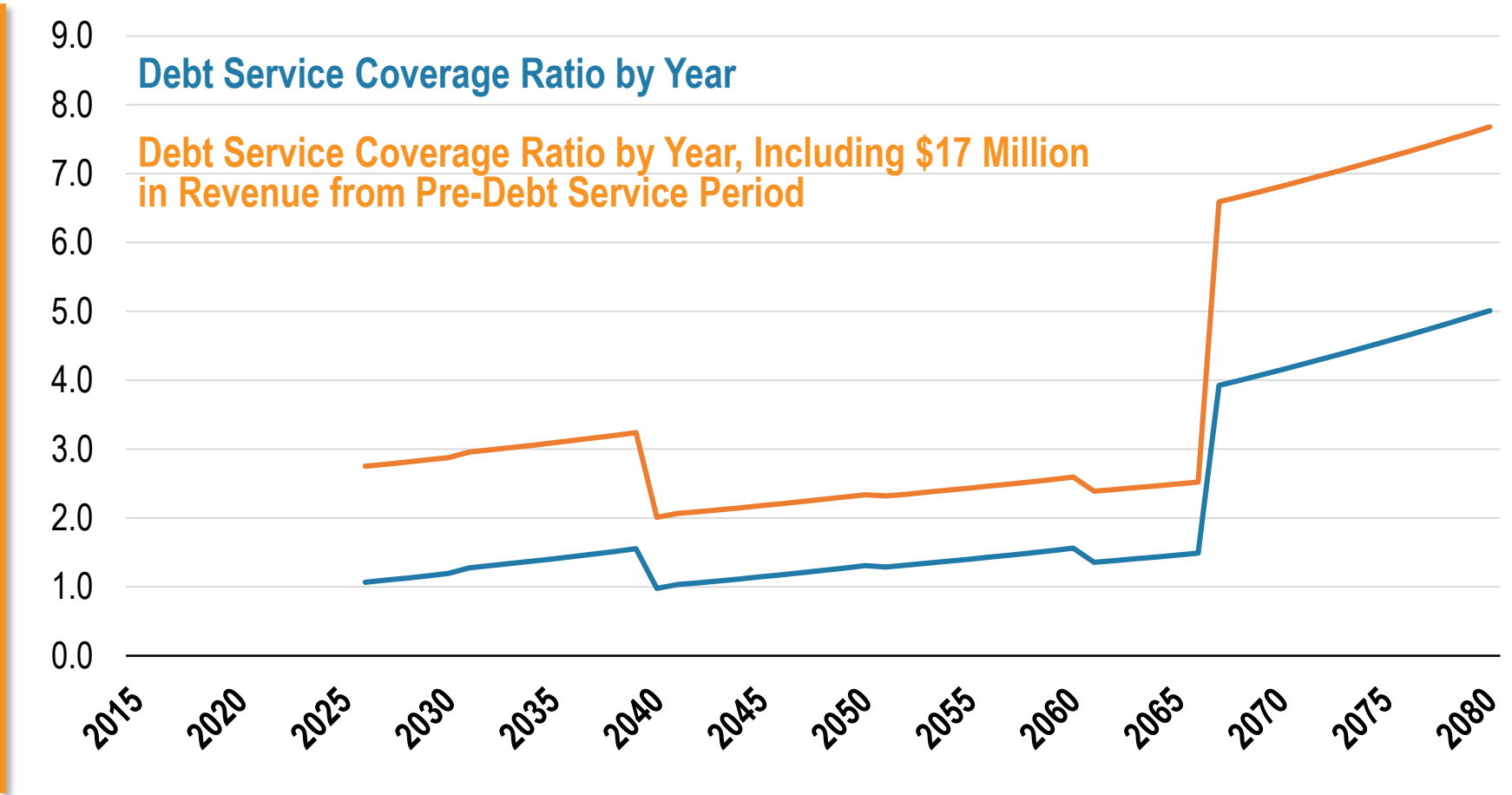


Source: CICWCD



Potential Debt Service Coverage (DSC) Ratio Scenario

- When reviewing the projected revenues relative to the amount of annual debt service (starting in 2025), the ratio remains positive, barring the first year when the second debt tranche would be expected to come online (2040)
- However, revenues are designed to commence ahead of the debt financing, so when those cumulative revenues of nearly \$17 million are considered, DSC remains at or above 2.0 throughout the study period



Source: CICWCD





WATER RESOURCE

ECONOMIC AND FISCAL ANALYSIS

DISCLOSURES



Data Collection Process, Underlying Analyses and Limitations

Our analysis began by collecting data, which included background economic, development and demographic information covering southern Utah and the state of Utah as a whole. Other relevant market and development information on the surrounding area were also collected, analyzed and considered.

Subsequently, we performed a demand analysis based on historical market performance and consumer demand trends. This includes the identification of appropriate demand factors, analyzing demographics and considering several other key elements. Based on these estimates, demand projections were prepared. Following the demand analysis, we independently performed a supply analysis by reviewing the quantity and quality of existing water capacity in the region. The supply-side assessment was followed by an equilibrium analysis in which we used an economic modeling approach to assess the balance between supply and demand. It is from the combination of these analyses that our ultimate conclusions were derived.

The information used in, and arising from, this analysis is based upon assumptions that are subject to uncertainty and variation. As a result, the estimates do not represent results that will be achieved in the future. There will usually be differences between projected and actual results as events and circumstances frequently do not occur as expected; the differences may be material. This report, the findings contained herein, and the analysis underlying the findings have been prepared to demonstrate the possible effect of future hypothetical occurrences showing potential water supply and demand. These occurrences are deemed reasonable based on the assumptions and underlying analyses contained herein.

Right to Amend or Supplement Analysis

The analysis and conclusions contained in this report are subject to further revisions, amendments and adjustments as additional information may become available. Additionally, I may generate updated or supplemental graphs, charts, exhibits and/or analyses to assist in explaining conclusions in the future.