

THE ECONOMIC IMPACT OF THE CENTRAL ARIZONA PROJECT TO THE STATE OF ARIZONA



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EXECUTIVE SUMMARY

- This study examines the economic impact of the Central Arizona Project (CAP) to the State of Arizona in two aspects:
 - The construction of CAP, 1973-1993; and
 - The impact of CAP’s water supply delivery operations, 1986-2010.
- A modified IMPLAN input-output model for the State of Arizona is used to implement both analyses.
- The economic impacts for each analysis are assessed in terms of gross state product (GSP) and employment.
- The annual total field project costs by year of completion for the construction phase analysis, supplied by CAP, are:

Total Construction Costs by Year of Completion, 1973-1993

TOTAL FIELD PROJECT COSTS (Millions Nominal \$)	
1973	\$1.2
1976	\$223.7
1977	\$33.5
1978	\$85.5
1979	\$28.4
1980	\$115.9
1981	\$22.4
1982	\$111.1
1983	\$69.5
1984	\$261.3
1985	\$230.8
1986	\$73.3
1987	\$406.1
1988	\$39.1
1989	\$137.1
1990	\$79.9
1991	\$784.6
1992	\$423.9
1993	\$190.9
Total	\$3,318.3

Source: CAP/R.W. Beck ¹

- The cumulative total field project costs for CAP up to and including 1993 is therefore \$3.3 billion (nominal \$).
- The estimated statewide economic impacts of the construction of CAP are:

¹ Data supplied as part of private correspondence with CAP representatives.

Statewide Economic Impacts for the Construction of CAP, 1973-1993

	Time Horizon	Direct Impacts	Indirect Impacts	Induced Impacts	Total Impacts
Gross State Product ² (Millions 2013\$)	1973-1993	\$996.1	\$653.0	\$715.8	\$2,364.8
Employment ³ (Job Years) ⁴	1985 ⁵	1,486	559	736	2,780
	1993 ⁶	1,359	511	673	2,543

Source: Authors' Calculations

- The construction of CAP, 1973-1993, is cumulatively estimated to generate approximately \$2.4 billion GSP (2013\$).
- The statewide GSP contribution resulting from the construction of CAP is equivalent to 0.13% of Arizona's cumulative GSP, 1973 – 1993.
- CAP's construction is also estimated to generate annual employment impacts of up to 9,412 job years, dependent on the year in question.
- In 1973, the construction of CAP is estimated to generate 18 jobs in the State of Arizona.
- In 1985 - the first year that CAP delivered water to customers - the construction of the aqueduct system is estimated to generate 2,780 direct, indirect and induced jobs.
- In 1993, the construction of CAP is estimated to generate 2,543 direct, indirect and induced jobs.
- The study also assesses the statewide economic impact of an absence of the 27.3 million acre-feet of water delivered by CAP to municipal, industrial and agricultural customers in Maricopa, Pima, and Pinal Counties, between 1986 and 2010.
- Assuming that CAP's annual water deliveries would not have been sourced elsewhere, the second analysis estimates the economic impacts of CAP's water supply for 22 sectors throughout the State.
- The estimated statewide economic impacts of CAP's supply of water, 1986-2010, are:

² Gross State Product can be defined as the sum of employee compensation (wages, salaries and benefits, including employer contributions to health insurance and retirement pensions), proprietor income, property income, and indirect business taxes.

³ Employment is a count of full- and part-time jobs. It includes both wage and salary workers, and the self-employed.

⁴ A job year is equivalent to one person having a full-time job for exactly one year. This means, for example, that one person working on the construction of CAP, 1973-1993, accounted for 21 job years, but only represented 1 job. A cumulative total employment impact for the entire 21 year period is therefore not appropriate.

⁵ These are the full-time (or equivalent) jobs associated with the construction of CAP only in 1985.

⁶ These are the full-time (or equivalent) jobs associated with the construction of CAP only in 1993.

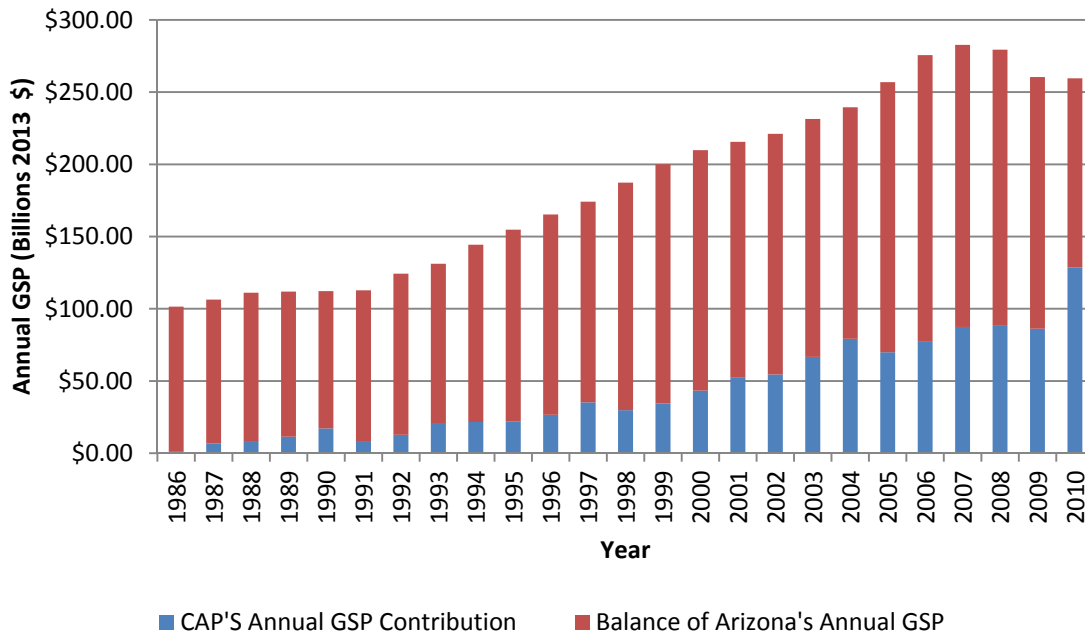
Statewide Economic Impacts of CAP's Supply of Water, 1986-2010

	Time Horizon	Total Impacts
Gross State Product ⁷ (Billions 2013\$)	1986-2010	\$1,090.0
Employment ⁸ (Job Years) ⁹	1993 ¹⁰ 2010 ¹¹	252,772 1,603,287

Source: Authors' Calculations

- CAP's supply of water, 1986-2010, is cumulatively estimated to generate \$1,090 billion GSP (2013\$).
- This GSP contribution accounts for approximately 23.3% of cumulative statewide GSP throughout the study period, including a contribution of 49.5% of Arizona's GSP in 2010.
- The top five sectors estimated to decline the most in terms of contribution to GSP if CAP's water supply had been lost to customers between 1986 and 2010 are: Government (\$221.1 billion), Healthcare (\$189.4 billion), Real Estate & Travel (\$165.2 billion), Retail (\$113 billion), and Finance & Insurance (\$72.9 billion).

CAP's Contribution to Statewide GSP, 1986-2010



Source: Authors' Calculations

⁷ Gross State Product can be defined as the sum of employee compensation (wages, salaries and benefits, including employer contributions to health insurance and retirement pensions), proprietor income, property income, and indirect business taxes.

⁸ Employment is a count of full- and part-time jobs. It includes both wage and salary workers, and the self-employed.

⁹ A job year is equivalent to one person having a full-time job for exactly one year. This means, for example, that one person working on the construction of CAP, 1973-1993, accounted for 21 job years, but only represented 1 job. A cumulative total employment impact for the entire 21 year period is therefore not appropriate.

¹⁰ These are the full-time (or equivalent) jobs associated with the construction of CAP only in 1993.

¹¹ These are the full-time (or equivalent) jobs associated with the construction of CAP only in 2010.

- CAP's supply of water to municipal, industrial, and agricultural customers in 1986 is estimated to generate annual employment of 18,151 jobs.
- CAP's supply of water to municipal, industrial, and agricultural customers in 1993 is estimated to generate annual employment of 252,772 jobs.
- CAP's supply of water to municipal, industrial, and agricultural customers in 2010 is estimated to generate annual employment of over 1.6 million jobs.
- A cumulative employment impact for the 1986-2010 study period is not appropriate as the unit of measurement is job years.
- The Government, Healthcare, Retail, and Real Estate & Travel sectors are estimated to have lost over 60% of these jobs, if CAP's water supply had been unavailable to customers during the 1986-2010 study period.
- CAP's establishment and subsequent delivery of water to municipal, industrial, and agricultural customers, has therefore had a crucial impact on the economic development of the state.
- Without the availability of water from CAP, the economic development of the state would have followed a radically different trajectory.
- If CAP's leisure benefits and other impacts associated with the operation and maintenance of the aqueduct system are added to the water supply analysis, the statewide economic impacts of the operation of CAP would be even greater.

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1. INTRODUCTION

The Central Arizona Project (CAP) supplies approximately 1.5 million acre-feet of Colorado River water per year to businesses and residents in Pima, Pinal and Maricopa counties. A 336-mile aqueduct with 14 pumping plants, 1 hydroelectric pump, 8 inverted siphons, 39 radial gate structures, over 50 turnouts, and 3 tunnels, the entire system is operated 24/7 from a control center in north Phoenix. As the largest single resource of renewable water supplies in the State of Arizona, CAP carries water from Lake Havasu to the southern boundary of the San Xavier Indian Reservation.

Approved by Congress in 1968, construction began at Lake Havasu in 1973, and was declared “...substantially complete” 20 years later southwest of Tucson. The largest and most expensive aqueduct system ever constructed in the United States, CAP cost over \$3.3 billion to build, and is currently managed and operated by the Central Arizona Water Conservation District (CAWCD).

In summer 2013, CAWCD commissioned the Seidman Research Institute to estimate the economic impact of CAP for the State of Arizona. The primary objective of this request is to not only quantify the direct, indirect and induced effects of the construction of CAP, but to also estimate the economic impact of CAP’s water deliveries to the economic development of the State of Arizona.

Section 2 offers a brief history of CAP. Section 3 describes water availability in Arizona, and Section 4 outlines CAP’s current customer base and operations. The direct, indirect and induced economic impacts of the construction of CAP are quantified in Section 5, followed by an estimate of statewide economic losses likely if CAP had not been built to supply water to Maricopa, Pima and Pinal Counties in Section 6. Conclusions and recommendations are provided in Section 7.

2. BRIEF HISTORY AND BUILD-OUT

Authorized by Congress and signed by President Johnson as part of the September 1968 Colorado River Basin Project Act, the Bureau of Land Reclamation began the construction of CAP at Lake Havasu on May 6, 1973. The first CAP water was delivered through the early segments of the aqueduct to the Harquahala Valley Irrigation District in 1985, with CAP water reaching the Phoenix Metropolitan Area by November of that year. Tucson customers received their first CAP water in 1992; and in 1993, Reclamation declared the CAP water supply system “...substantially complete”, although several ancillary Indian distribution systems took another 10 to 20 years to construct. Figure 1 presents a historical chronology of events.

The largest and most expensive aqueduct system ever constructed in the United States, CAP cost over \$3.3 billion to build (nominal \$). Currently managed and operated by CAWCD, this latter organization was first established in 1971 in Maricopa, Pinal and Pima Counties to repay the state’s share of the construction costs.

Since 1993, CAP has also developed and operated seven recharge facilities, one of which (Avra Valley) was sold to Metro Water in 2010.¹² Two of the recharge facilities are in the Tucson Active Management Area (AMA) and have

¹² Recharge is a long-established and effective water management tool that allows renewable surface water supplies to be stored underground now for recovery later during periods of reduced water supply.

a cumulative recharge capacity of 80,000 acre-feet per year. The other four recharge facilities are in Phoenix AMA and have a combined annual permitted capacity of 310,000 acre-feet per year.

Figure 1: CAP - A Historical Timeline, 1967-2011

1967:	<i>U.S. Senate introduces bill S.1004 to authorize CAP</i>
1968:	<i>President Johnson signs S.1004, thereby authorizing the creation of CAP</i>
1970:	<i>Construction begins on NGS, which will supply 24.3% of CAP's electricity</i>
1971:	<i>Formation of CAWCD</i>
1972:	<i>CAWCD agrees \$1.2 billion master repayment limit for CAP</i>
1973:	<i>CAP construction begins at Lake Havasu</i>
1974:	<i>NGS opens and concrete laid at Granite Reef Aqueduct Reach 11</i>
1977:	<i>Municipal and industrial allocations finalized</i>
1980:	<i>Indian allocations finalized</i>
1981:	<i>Control system specifications completed</i>
1984:	<i>Construction of Tucson Aqueduct begins</i>
1985:	<i>Granite-Reef Aqueduct completed, and first delivery to Harquahala Valley Irrigation District</i>
1987:	<i>Construction starts on New Waddell Dam; Santa Rosa Canal receives first delivery</i>
1988:	<i>CAWCD signs an amended \$1.78 billion repayment contract</i>
1989:	<i>Revegetation of Avra Valley</i>
1992:	<i>Tucson receives first CAP delivery; work completed on New Waddell Dam</i>
1993:	<i>CAP's water delivery system is completed and CAGR established</i>
1994:	<i>CAP produces hydroelectric power, and a record 785,000 acre-feet of water</i>
1996:	<i>CAP delivers 1 million acre-feet (MAF) of water</i>
1997:	<i>Avra Valley recharge facility completed</i>
1998:	<i>Pima Mina Road recharge facility completed</i>
2000:	<i>\$1.65 Bn repayment refixed; CAP delivers 1.5 MAF water; Lower Santa Cruz recharge facility completed</i>
2001:	<i>Agua Fria recharge facility completed</i>
2002:	<i>Hieroglyphic Mountains recharge facility completed</i>
2003:	<i>New CAP maintenance excellence program launched</i>
2006:	<i>Tonopah recharge facility completed</i>
2007:	<i>New shortage sharing rules for Lakes Powell and Mead</i>
2011:	<i>Superstition Mountain recharge facility completed</i>

3. WATER AVAILABILITY IN ARIZONA

Four categories of water supply are available in the State of Arizona. These are surface water, Colorado River water, groundwater, and effluent.

Surface water comes from lakes, rivers, and streams, stored in reservoirs or delivery systems. The availability of surface water can vary dramatically by year or location.

The State of Arizona has the right to use 2.8 million acre feet of water from the Colorado River each year, over half of which is delivered by CAP to Maricopa, Pinal, and Pima Counties. Mohave, La Paz, and Yuma Counties also rely on the Colorado River as their principal water supply.¹³

Groundwater is found beneath the earth's surface in natural reservoirs called aquifers. The Arizona Department of Water Resources estimates that up to 43% of the state's water comes from groundwater sources; and this category of supply is carefully managed by an Arizona Groundwater Management Code first launched in 1980.

Effluent is reclaimed water, used by agriculture, on golf courses, in parks, for industrial cooling, and to maintain wildlife areas.

4. CAP'S CUSTOMER BASE AND OPERATIONS

Table 1 illustrates the volume of water delivered each year by CAP, up to and including 2012. The table shows how from an initial lowly base of 11,783 acre-feet in 1985, CAP's water deliveries quickly grew to over one million acre-feet of water in 1996 and hit a record 1.7 million acre-feet in 2007.

Currently designed to deliver approximately 1.5 to 1.6 million acre-feet of water each year, CAP's customers include 52 long-term municipal and industrial contractors, 12 Arizona Indian Tribes, and 20 excess water contractors including the Agricultural Settlement Pool.¹⁴ Figure 2 illustrates the principal recipients by type of CAP's water delivery in select years, up to and including 2012.

CAP also provides flood control, power, recreation, and fish and wildlife benefits. Daily operations are managed by approximately 475 employees in areas such as operations and maintenance, repayment obligations, public education and policy, and water resource management.

As the biggest user of electricity in the state, CAP requires around 2.8 billion kWh of electricity each year to deliver water to approximately 80% of the state's population. Some of this electricity is self-generated by CAP at Lake Pleasant; and almost a quarter of Navajo Generating Station's (NGS) generating capacity is also dedicated to the operation of the aqueduct system each year.

¹³ Source: Arizona Department of Water Resources, (date unknown). *Securing Arizona's Water Future*, available at: <http://www.azwater.gov/AzDWR/PublicInformationOfficer/documents/supplydemand.pdf>

¹⁴ Source: McCann, Thomas W., (2013). *Central Arizona Project – A Brief History*, unpublished PowerPoint, available at: http://www.cpwac.org/presentationfiles/SPR_CAP_history_4_26_2013.pdf

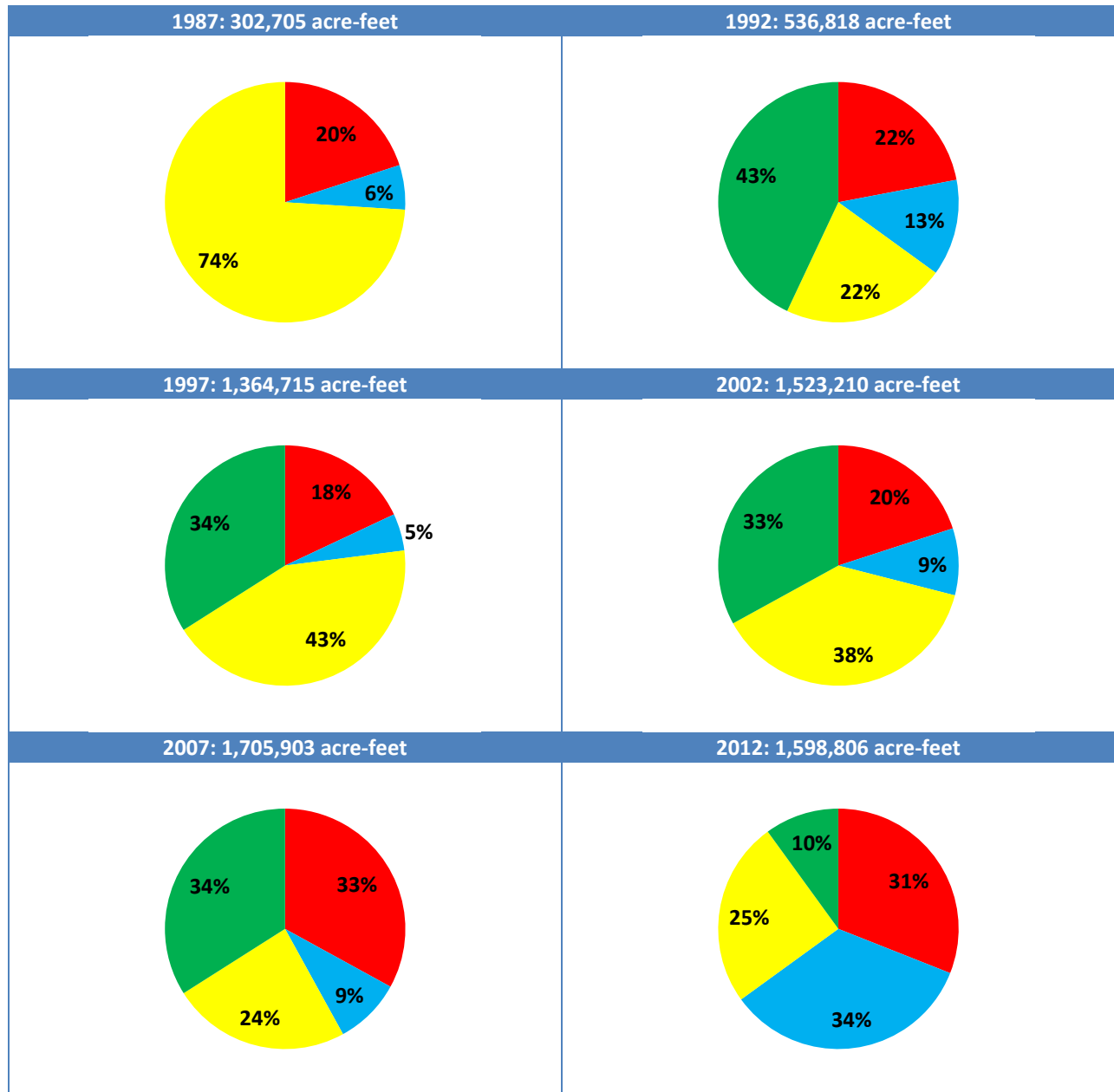
Table 1: CAP's Annual Volume of Water Delivered, 1985-2012

VOLUME OF WATER (Acre-Feet)	
1985	11,783
1986	92,123
1987	302,705
1988	468,392
1989	715,365
1990	744,506
1991	420,980
1992	536,818
1993	669,686
1994	808,037
1995	952,903
1996	1,115,839
1997	1,364,715
1998	1,024,978
1999	1,252,870
2000	1,540,312
2001	1,321,305
2002	1,523,210
2003	1,553,491
2004	1,598,131
2005	1,276,924
2006	1,504,326
2007	1,705,903
2008	1,549,023
2009	1,610,233
2010	1,599,057
2011	1,619,712
2012	1,598,806

Source: CAP¹⁵

¹⁵ Data supplied as part of private correspondence with CAP representatives.

Figure 2: CAP's Water Delivery by Customer Type, 1987-2012



Source: CAP¹⁶



¹⁶ Data supplied as part of private correspondence with CAP representatives.

5. STATEWIDE ECONOMIC IMPACTS RESULTING FROM THE CONSTRUCTION OF CAP, 1973-1993

5.1 Method

Economic impact analysis traces the full impact - direct, indirect and induced - of an economic activity on jobs and incomes in a defined economy. The construction of CAP has directly affected the State of Arizona's economy through the direct jobs provided to construction workers. Indirect effects have arisen through the purchase of construction materials from suppliers to support the build-out. Induced effects have occurred when workers either directly or indirectly associated with the construction of CAP spent their incomes in the local economy, when suppliers placed upstream demands on other producers, and when governments spent new tax revenues. The cumulative changes in jobs and incomes associated with the construction of CAP are a multiple of the initial direct effects.

To estimate the economic impacts of the construction of CAP, the Seidman Research Institute has used a modified version of an IMPLAN input-output model for the State of Arizona.

Originally developed by the University of Minnesota, IMPLAN is widely used for economic assessment and can provide detailed estimates of secondary expenditures and income generated as a result of a business investment or operation for a finite period of time (typically one full calendar year). The research team has calculated impacts for each year of CAP's construction, and summed the results to arrive at cumulative multi-year (1973-1993) estimate of impacts.

Two variables are used to quantify the economic impacts of CAP's construction phase in Seidman's analysis. These are:

- **Gross State Product (GSP):** this is synonymous with value added. It represents the dollar value of all goods and services produced for final demand in the state or county. It excludes the value of intermediate goods and services purchased as inputs to final production. It can also be defined as the sum of employee compensation (wages, salaries and benefits, including employer contributions to health insurance and retirement pensions), proprietor income, property income, and indirect business taxes.
- **Employment:** this is a count of full- and part-time jobs. It includes both wage and salary workers, and the self-employed.

Table 2 summarizes the inputs used by Seidman to estimate the annual and cumulative statewide economic impacts of the construction of CAP, 1973 to 1993.¹⁷ The table displays R. W. Beck's estimated total field project costs by the year of completion, supplied by CAP's management team. The annual costs are displayed in nominal dollars; and Seidman's analysis assumes that each annual cost is spent in full in the year identified in Table 2.

The total field project costs for the construction of CAP, 1973-1993, used by Seidman in the economic impact analysis are therefore just over \$3.3 billion (nominal \$).

¹⁷ CAP was declared "...substantially complete" in 1993. Seidman's analysis therefore assumes that all project costs after this date are primarily for operations and maintenance, and therefore excluded from the construction impacts analysis.

Table 2: Total Construction Costs by Year of Completion, 1973-1993¹⁸

TOTAL FIELD PROJECT COSTS (Millions Nominal \$)	
1973	\$1.2
1976	\$223.7
1977	\$33.5
1978	\$85.5
1979	\$28.4
1980	\$115.9
1981	\$22.4
1982	\$111.1
1983	\$69.5
1984	\$261.3
1985	\$230.8
1986	\$73.3
1987	\$406.1
1988	\$39.1
1989	\$137.1
1990	\$79.9
1991	\$784.6
1992	\$423.9
1993	\$190.9
Total	\$3,318.3

Source: CAP/R.W. Beck¹⁹

5.2 Annual and Cumulative Economic Impacts, 1973-1993

The estimated gross state product (GSP) impacts associated with the construction phase are summarized in Table 3. All GSP impacts are expressed in millions 2013\$.

Table 3 illustrates that in the first year of construction (1973), CAP is estimated to contribute approximately \$1 million (2013\$) GSP to the State of Arizona economy.

In 1985 - the first year that CAP delivered water to customers - an estimated \$160.7 million (2013\$) is added to the state's GSP.

In 1993 - the year in which CAP was declared "...substantially complete" - an estimated \$147 million (2013\$) is added to the state's GSP.

For the entire construction phase, an estimated cumulative total of \$2.4 billion GSP (2013\$) is added to the State of Arizona economy. This represents 0.13% of the state's GDP throughout the construction of CAP. An estimated 42.1% of the \$2.4 billion GSP is from direct impacts, 27.6% from indirect impacts, and 30.3% from induced impacts.

¹⁸ Numbers may not tally exactly due to rounding-up.

¹⁹ Data supplied as part of private correspondence with CAP representatives.

Table 3: The Construction of CAP - Statewide GSP Impacts, 1973-1993²⁰

	DIRECT GSP IMPACTS (Millions 2013\$)	INDIRECT GSP IMPACTS (Millions 2013\$)	INDUCED GSP IMPACTS (Millions 2013\$)	TOTAL ANNUAL GSP IMPACTS (Millions 2013\$)
1973	\$0.44	\$0.29	\$0.31	\$1.04
1974	\$0.00	\$0.00	\$0.00	\$0.00
1975	\$0.00	\$0.00	\$0.00	\$0.00
1976	\$65.75	\$43.10	\$47.24	\$156.09
1977	\$10.08	\$6.61	\$7.24	\$23.93
1978	\$26.69	\$17.50	\$19.18	\$63.37
1979	\$8.95	\$5.86	\$6.43	\$21.24
1980	\$34.30	\$22.49	\$24.65	\$81.44
1981	\$6.18	\$4.05	\$4.44	\$14.67
1982	\$28.39	\$18.61	\$20.40	\$67.39
1983	\$18.27	\$11.98	\$13.13	\$43.38
1984	\$74.27	\$48.69	\$53.37	\$176.33
1985	\$67.68	\$44.37	\$48.63	\$160.69
1986	\$22.76	\$14.92	\$16.35	\$54.03
1987	\$128.88	\$84.48	\$92.61	\$305.97
1988	\$12.52	\$8.21	\$9.00	\$29.73
1989	\$42.55	\$27.89	\$30.58	\$101.02
1990	\$23.99	\$15.73	\$17.24	\$56.95
1991	\$229.12	\$150.19	\$164.64	\$543.95
1992	\$133.37	\$87.43	\$95.84	\$316.64
1993	\$61.90	\$40.58	\$44.48	\$146.96
CUMULATIVE IMPACTS, 1973-1993 (Millions 2013\$)	\$996.10	\$652.97	\$715.76	\$2,364.83

Source: Authors' Calculations

The estimated employment impacts associated with the construction phase are summarized in Table 4. The data is expressed in job years. The label “job year” is important and should not be simplified or abbreviated to “job”. A “job year” is defined as one person having a full-time job for exactly one year. This means, for example, that one person working on the construction of CAP from 1973 to 1993 accounts for 21 job years, but only represents 1 job. A cumulative total employment impact for the entire 21 year period is therefore not appropriate.

Table 4 illustrates that in 1973 - the first year of construction – CAP is estimated to generate a total of 18 jobs in the State of Arizona.

In 1985 - the first year that CAP delivered water to customers - the construction of the aqueduct system is estimated to generate 2,780 direct, indirect and induced jobs.

In 1993 - the year in which CAP was declared “...substantially complete” - the construction of the aqueduct system is estimated to generate 2,543 direct, indirect and induced jobs.

²⁰ Numbers may not tally exactly due to rounding-up.

Table 4: The Construction of CAP - Statewide Employment Impacts, 1973-1993²¹

	DIRECT EMPLOYMENT (Job Years)	INDIRECT EMPLOYMENT (Job Years)	INDUCED EMPLOYMENT (Job Years)	TOTAL ANNUAL EMPLOYMENT (Job Years)
1973	10	4	5	18
1974	0	0	0	0
1975	0	0	0	0
1976	1,443	543	715	2,701
1977	221	83	110	414
1978	586	220	290	1,097
1979	196	74	97	368
1980	753	283	373	1,409
1981	136	51	67	254
1982	623	234	308	1,166
1983	401	151	199	751
1984	1,630	613	807	3,051
1985	1,486	559	736	2,780
1986	500	188	247	935
1987	2,829	1,064	1,401	5,294
1988	275	103	136	514
1989	934	351	462	1,748
1990	527	198	261	985
1991	5,030	1,892	2,490	9,412
1992	2,928	1,102	1,449	5,479
1993	1,359	511	673	2,543

Source: Authors' Calculations

6 STATEWIDE ECONOMIC IMPORTANCE OF CAP'S WATER SUPPLIES, 1986-2010

The previous section estimates the direct, indirect and induced impacts associated with the construction of CAP in terms of GSP and employment. However, CAP's significance for the State of Arizona economy extends far beyond these construction impacts. Water availability is a critical component in the economic development of a state; and if CAP hadn't been established to deliver a significant proportion of total water supply to Maricopa, Pima and Pinal Counties since 1985, the State of Arizona's economic development would almost certainly have followed a different trajectory.

The purpose of this section is to therefore estimate the extent to which the State of Arizona economy would have been smaller, 1986-2010, without the annual availability and supply of water from CAP. Please note, this analysis assumes the non-substitutability of CAP's annual water deliveries in the State.²²

²¹ Numbers may not tally exactly due to rounding-up.

²² The ADWR suggested that without CAP, the state would have been forced to draw more heavily from groundwater supplies, thereby undermining the availability of water for future generations living and working in Arizona.

6.1 Method

A series of customized input-output models for the State of Arizona have been used to estimate annual and cumulative economic impacts with and without the existence of CAP's annual water deliveries, 1986-2010.

Seidman's method for estimating these economic impacts consists of five fundamental steps:

- 1. Prepare a baseline forecast for the State of Arizona economy:** This Business As Usual (BAU) case consists of a historical input-output table for each year, in which the intermediate demand and final demand of a 22 sector version of the state's economy is described, and a distinction made between the use of water as a primary input to the production process of each industry or sector, and other water supplies that are directly consumed.
- 2. Develop a policy scenario:** This policy scenario reduces the annual availability of water in an economy by the historical amount of water supplied by CAP for the 22 sectors in the input-output tables.
- 3. Compare the baseline and policy scenario forecasts.**
- 4. Produce the "delta" results:** Differences between the values for each sector estimate the potential impact of the non-availability of water supplied by CAP on the state economy, relative to the baseline, for each year of study.
- 5. Run an IMPLAN analysis on each series of delta results:** This produces annual and cumulative economic impact estimates for GSP and employment.

Table 5 estimates the annual extent to which municipal, industrial, and agricultural water availability in the state would have declined, if CAP had not been established, based on AMA data supplied by the ADWR, and an assumption that other sources of water were not available to compensate for the loss of CAP's water deliveries.

The table estimates, for example, that the non-availability of CAP water in 1986 would have resulted in a 1.36% decline in water availability for municipal users, and a 0.15% decline in water availability for agricultural users.

In 1993, the table estimates that the non-availability of CAP water would have resulted in a 14.46% decline in water availability for municipal users, a 0.28% decline in water availability for industrial users, and a 7.5% decline in water availability for agricultural users.

The table also estimates that the non-availability of CAP water in 2010 would have resulted in a 46.42% decline in water availability for municipal users, a 0.77% decline in water availability for industrial users, and a 17.84% decline in water availability for agricultural users.

Table 5: Percent Decline in Water Availability by Customer Type in the Absence of CAP, 1986-2010

	ESTIMATED SHORTFALL		
	Municipal	Industrial	Agricultural
1986	1.36%	0.00%	0.15%
1987	5.73%	0.31%	1.64%
1988	7.01%	0.27%	3.65%
1989	9.45%	0.33%	5.93%
1990	14.28%	0.28%	6.79%
1991	6.89%	0.27%	4.05%
1992	9.58%	0.24%	6.30%
1993	14.46%	0.28%	7.50%
1994	14.04%	0.27%	7.56%
1995	13.20%	0.24%	8.33%
1996	14.98%	0.45%	9.39%
1997	18.78%	0.67%	12.70%
1998	14.59%	0.84%	10.00%
1999	15.80%	0.93%	11.71%
2000	18.93%	1.17%	12.79%
2001	22.35%	1.51%	12.31%
2002	22.79%	0.95%	12.68%
2003	26.73%	1.01%	11.91%
2004	30.18%	2.19%	11.97%
2005	25.32%	0.76%	11.18%
2006	26.00%	0.88%	11.35%
2007	28.44%	1.62%	11.29%
2008	28.96%	1.78%	11.17%
2009	30.64%	1.33%	11.01%
2010	46.42%	0.77%	17.84%

Source: ADWR and Authors' Calculations

6.2 Sectoral Economic Impacts by Year, 1986-2010

Tables 6 and 7 illustrate the annual estimated economic impacts by sector for the State of Arizona economy due to a shortfall in water availability caused by the non-existence of CAP.

Table 6 estimates the gross state product (GSP) losses by year and sector without the availability of CAP's water supply, 1986-2010.

The table estimates that in 1986, total GSP across all sectors would have been lower by almost \$1.5 billion (2013\$). The top five sectors estimated to decline the most in terms of contribution to GSP in 1986 are: Government (\$301 million), Healthcare (\$258 million), Real Estate & Travel (\$221 million), Retail (\$154 million), and Finance & Insurance (\$94 million).

In 1993 - the year that CAP was declared "...substantially complete" - Arizona's GSP across all sectors would have been lower by almost \$20.3 billion (2013\$). The top five sectors estimated to decline the most in terms of contribution to GSP in 1993 are: Government (\$4.2 billion), Healthcare (\$3.6 billion), Real Estate & Travel (\$3.1 billion), Retail (\$2.1 billion), and Finance & Insurance (\$1.3 billion).

Table 6: Estimated GSP Losses by Year & Sector without the Availability of CAP Water, 1986-2010²³

GROSS STATE PRODUCT (GSP) LOSSES (Millions 2013\$)																									
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Government	-301.3	-1,337.0	-1,707.7	-2,316.7	-3,511.2	-1,704.6	-2,609.3	-4,154.4	-4,439.0	-4,477.2	-5,427.7	-7,166.2	-5,996.8	-6,935.4	-8,715.5	-10,568.5	-11,048.4	-13,565.0	-15,865.7	-14,261.1	-15,706.9	-17,640.2	-17,753.7	-17,495.8	-26,391.3
Other Services	-53.3	-242.9	-307.8	-417.0	-627.2	-307.3	-467.3	-741.9	-792.9	-799.1	-974.5	-1,290.5	-1,091.5	-1,263.2	-1,589.3	-1,932.6	-1,995.2	-2,444.6	-2,907.9	-2,560.2	-2,825.1	-3,208.7	-3,236.3	-3,161.3	-4,706.7
Accommodation & Food	-62.0	-278.4	-354.3	-480.3	-725.5	-353.7	-539.7	-858.3	-917.2	-924.7	-1,124.0	-1,485.9	-1,249.4	-1,445.3	-1,817.3	-2,206.5	-2,293.9	-2,813.8	-3,316.0	-2,953.2	-3,255.3	-3,674.4	-3,701.6	-3,633.6	-5,449.2
Arts	-19.9	-89.7	-114.1	-154.7	-233.6	-113.9	-173.8	-276.4	-295.3	-297.8	-362.0	-478.7	-402.8	-466.0	-585.9	-711.5	-739.1	-906.5	-1,069.3	-951.2	-1,048.6	-1,184.4	-1,193.3	-1,170.8	-1,754.5
Healthcare	-258.2	-1,145.0	-1,462.8	-1,984.5	-3,008.5	-1,460.1	-2,235.6	-3,559.6	-3,803.5	-3,836.2	-4,649.8	-6,138.6	-5,135.2	-5,938.8	-7,462.8	-9,048.6	-9,463.3	-11,619.6	-13,583.0	-12,217.3	-13,455.1	-15,105.9	-15,202.1	-14,985.4	-22,613.7
Education	-39.8	-176.7	-225.7	-306.3	-464.1	-225.3	-345.0	-549.2	-586.8	-591.9	-717.5	-947.4	-792.6	-916.7	-1,152.0	-1,396.6	-1,460.4	-1,792.9	-2,096.3	-1,885.0	-2,076.0	-2,331.1	-2,345.9	-2,312.1	-3,488.5
Administrative & Waste	-21.1	-110.7	-134.8	-181.2	-262.1	-134.8	-197.9	-309.6	-331.3	-332.5	-418.1	-562.1	-500.8	-581.5	-736.0	-907.0	-882.0	-1,069.9	-1,379.7	-1,098.8	-1,224.3	-1,469.8	-1,497.6	-1,402.3	-1,951.8
Management of Companies	0.0	-7.2	-6.3	-7.9	-6.7	-6.4	-6.3	-7.7	-8.5	-7.8	-15.8	-25.0	-33.7	-39.9	-52.4	-69.7	-45.1	-50.0	-112.4	-41.7	-51.8	-98.0	-106.4	-74.0	-43.0
Professional & Technical	-42.9	-219.7	-269.4	-362.8	-528.3	-269.4	-398.1	-624.2	-667.9	-671.0	-839.1	-1,125.3	-993.7	-1,153.2	-1,457.9	-1,792.0	-1,760.3	-2,138.4	-2,719.7	-2,203.7	-2,451.1	-2,914.3	-2,964.3	-2,795.5	-3,938.0
Real Estate & Travel	-220.9	-1,002.3	-1,274.1	-1,727.8	-2,600.6	-1,272.7	-1,938.9	-3,077.2	-3,289.1	-3,317.5	-4,040.1	-5,348.3	-4,513.1	-5,224.2	-6,568.5	-7,975.8	-8,257.4	-10,114.6	-11,982.8	-10,601.6	-11,693.1	-13,244.6	-13,351.3	-13,065.0	-19,511.5
Finance & Insurance	-93.9	-446.8	-560.2	-757.8	-1,125.5	-559.9	-843.0	-1,331.2	-1,423.5	-1,434.0	-1,764.4	-2,347.9	-2,017.6	-2,338.3	-2,946.1	-3,594.0	-3,642.7	-4,446.0	-5,420.0	-4,629.0	-5,122.4	-5,915.1	-5,984.5	-5,769.0	-8,421.0
Information	-35.7	-165.9	-209.0	-282.8	-423.3	-208.7	-315.9	-500.6	-535.1	-539.0	-659.9	-875.6	-746.0	-863.7	-1,087.7	-1,325.2	-1,356.6	-1,660.0	-1,997.2	-1,733.9	-1,915.8	-2,192.8	-2,214.9	-2,150.8	-3,173.4
Transportation	-24.1	-114.9	-144.2	-195.3	-289.6	-144.2	-217.2	-342.7	-366.5	-369.4	-454.6	-605.2	-520.2	-603.1	-759.6	-925.9	-938.2	-1,144.1	-1,395.0	-1,191.1	-1,318.1	-1,522.1	-1,539.9	-1,483.8	-2,165.5
Retail	-153.7	-683.8	-872.9	-1,184.0	-1,793.3	-871.3	-1,333.0	-2,121.7	-2,267.2	-2,286.5	-2,773.3	-3,662.5	-3,067.7	-3,548.0	-4,459.1	-5,408.4	-5,648.0	-6,933.2	-8,120.7	-7,286.7	-8,026.7	-9,023.2	-9,082.9	-8,944.3	-13,477.1
Wholesale	-66.0	-299.6	-380.8	-516.4	-777.0	-380.4	-579.3	-919.4	-982.7	-991.2	-1,207.3	-1,598.5	-1,349.4	-1,562.1	-1,964.1	-2,385.1	-2,468.1	-3,022.9	-3,583.6	-3,168.0	-3,494.4	-3,959.8	-3,992.0	-3,905.0	-5,828.8
Manufacturing	-22.5	-106.8	-134.5	-182.3	-270.7	-134.6	-203.1	-320.4	-342.7	-345.7	-424.7	-565.2	-484.5	-561.8	-707.1	-860.7	-874.9	-1,066.8	-1,294.8	-1,111.6	-1,229.5	-1,415.4	-1,431.1	-1,381.8	-2,023.8
Construction	-4.3	-24.3	-29.2	-39.3	-55.6	-29.3	-42.4	-65.7	-70.4	-70.7	-90.1	-122.1	-111.3	-129.5	-164.1	-202.7	-192.3	-231.6	-308.7	-235.8	-263.8	-324.2	-331.6	-304.8	-411.5
Water	-7.3	-33.0	-42.2	-57.2	-86.3	-42.1	-64.3	-102.1	-109.2	-110.2	-133.9	-177.2	-149.0	-172.5	-216.8	-262.8	-273.1	-334.6	-394.2	-351.1	-387.0	-436.8	-440.0	-431.7	-647.4
Natural Gas	-3.5	-16.3	-20.6	-27.9	-41.9	-20.6	-31.3	-49.5	-52.9	-53.4	-65.2	-86.5	-73.4	-85.0	-107.0	-130.1	-133.7	-163.6	-195.6	-171.1	-188.9	-215.3	-217.3	-211.6	-313.7
Electric	-22.3	-103.5	-131.0	-177.5	-265.3	-130.9	-198.5	-314.0	-335.7	-338.7	-414.3	-549.8	-467.8	-541.9	-681.7	-828.9	-850.1	-1,038.9	-1,246.3	-1,085.7	-1,199.2	-1,369.7	-1,382.9	-1,344.0	-1,987.3
Mining	0.0	-3.8	-3.5	-4.4	-4.0	-3.6	-3.6	-4.6	-5.0	-4.8	-9.0	-14.0	-18.2	-21.5	-28.2	-37.2	-24.8	-27.6	-59.7	-23.5	-28.9	-52.7	-56.9	-40.4	-26.1
Agriculture	-2.2	-12.2	-17.2	-24.6	-33.6	-17.8	-27.7	-40.7	-44.0	-46.4	-57.1	-78.0	-67.6	-80.3	-98.3	-113.4	-114.3	-131.7	-158.7	-136.4	-150.7	-172.1	-173.4	-163.5	-239.0
Annual Total	-1,455	-6,621	-8,403	-11,389	-17,134	-8,392	-12,771	-20,271	-21,666	-21,846	-26,623	-35,251	-29,782	-34,472	-43,357	-52,683	-54,462	-66,717	-79,207	-69,898	-77,113	-87,470	-88,200	-86,227	-128,563

Source: Authors' Calculations

²³ Annual totals may not tally exactly due to rounding-up.

Table 7: Estimated Employment Losses by Year & Sector without the Availability of CAP Water, 1986-2010²⁴

	ESTIMATED EMPLOYMENT LOSSES (Job Years)																								
	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Government	-3,503	-15,544	-19,854	-26,934	-40,821	-19,818	-30,336	-48,299	-51,609	-52,052	-63,103	-83,315	-69,720	-80,631	-101,327	-122,870	-128,450	-157,708	-184,456	-165,801	-182,610	-205,087	-206,407	-203,409	-306,829
Other Services	-867	-3,955	-5,012	-6,789	-10,211	-5,004	-7,608	-12,078	-12,909	-13,011	-15,866	-21,010	-17,770	-20,566	-25,876	-31,465	-32,485	-39,801	-47,344	-41,683	-45,996	-52,242	-52,691	-51,471	-76,630
Accommodation & Food	-1,165	-5,234	-6,661	-9,030	-13,640	-6,649	-10,148	-16,137	-17,244	-17,386	-21,132	-27,938	-23,490	-27,175	-34,169	-41,487	-43,129	-52,905	-62,346	-55,525	-61,205	-69,085	-69,597	-68,317	-102,455
Arts	-416	-1,872	-2,382	-3,229	-4,875	-2,378	-3,628	-5,767	-6,163	-6,214	-7,555	-9,990	-8,405	-9,724	-12,228	-14,848	-15,425	-18,919	-22,316	-19,851	-21,884	-24,718	-24,904	-24,433	-36,615
Health	-3,558	-15,778	-20,158	-27,347	-41,457	-20,120	-30,806	-49,052	-52,412	-52,864	-64,075	-84,590	-70,764	-81,837	-102,838	-124,691	-130,405	-160,118	-187,175	-168,355	-185,412	-208,160	-209,486	-206,500	-311,619
Education	-680	-3,016	-3,854	-5,228	-7,924	-3,847	-5,889	-9,376	-10,018	-10,106	-12,250	-16,173	-13,532	-15,650	-19,666	-23,843	-24,931	-30,608	-35,788	-32,180	-35,442	-39,795	-40,050	-39,473	-59,556
Administrative & Waste	-375	-1,970	-2,397	-3,223	-4,662	-2,397	-3,520	-5,506	-5,892	-5,914	-7,436	-9,998	-8,907	-10,341	-13,090	-16,131	-15,685	-19,028	-24,537	-19,542	-21,774	-26,140	-26,635	-24,940	-34,713
Management of Companies	0	-85	-75	-94	-80	-76	-75	-92	-101	-93	-188	-298	-402	-476	-625	-831	-538	-596	-1,340	-497	-618	-1,169	-1,268	-882	-512
Professional & Technical	-542	-2,773	-3,401	-4,580	-6,669	-3,401	-5,026	-7,880	-8,431	-8,471	-10,592	-14,205	-12,543	-14,557	-18,404	-22,620	-22,221	-26,993	-34,332	-27,818	-30,941	-36,788	-37,419	-35,288	-49,711
Real Estate & Travel	-1,769	-8,027	-10,205	-13,838	-20,828	-10,193	-15,528	-24,645	-26,343	-26,570	-32,357	-42,835	-36,145	-41,840	-52,607	-63,878	-66,134	-81,008	-95,970	-84,908	-93,650	-106,076	-106,930	-104,638	-156,267
Finance & Insurance	-1,112	-5,293	-6,636	-8,977	-13,332	-6,633	-9,986	-15,769	-16,862	-16,986	-20,900	-27,812	-23,900	-27,698	-34,898	-42,572	-43,150	-52,665	-64,203	-54,833	-60,678	-70,068	-70,889	-68,337	-99,751
Information	-363	-1,684	-2,122	-2,871	-4,297	-2,119	-3,207	-5,081	-5,432	-5,471	-6,699	-8,889	-7,572	-8,767	-11,041	-13,452	-13,772	-16,851	-20,274	-17,602	-19,448	-22,259	-22,484	-21,833	-32,214
Transportation	-310	-1,480	-1,858	-2,515	-3,730	-1,858	-2,798	-4,413	-4,720	-4,758	-5,855	-7,794	-6,700	-7,768	-9,783	-11,925	-12,083	-14,736	-17,966	-15,340	-16,975	-19,603	-19,833	-19,110	-27,889
Retail	-2,297	-10,218	-13,043	-17,692	-26,796	-13,019	-19,918	-31,704	-33,877	-34,166	-41,440	-54,727	-45,838	-53,016	-66,630	-80,814	-84,395	-103,600	-121,343	-108,881	-119,938	-134,829	-135,721	-133,650	-201,382
Wholesale	-638	-2,897	-3,682	-4,993	-7,512	-3,678	-5,602	-8,889	-9,501	-9,583	-11,673	-15,455	-13,047	-15,103	-18,990	-23,061	-23,864	-29,228	-34,648	-30,630	-33,786	-38,286	-38,597	-37,756	-56,357
Manufacturing	-227	-1,074	-1,354	-1,834	-2,724	-1,354	-2,044	-3,223	-3,448	-3,478	-4,273	-5,686	-4,874	-5,652	-7,113	-8,658	-8,801	-10,732	-13,026	-11,183	-12,369	-14,239	-14,397	-13,901	-20,360
Construction	-60	-337	-406	-545	-771	-406	-589	-911	-976	-980	-1,250	-1,694	-1,543	-1,796	-2,276	-2,811	-2,667	-3,212	-4,281	-3,270	-3,659	-4,495	-4,599	-4,226	-5,706
Water	-72	-322	-411	-558	-841	-411	-627	-995	-1,064	-1,074	-1,305	-1,727	-1,453	-1,682	-2,113	-2,561	-2,662	-3,261	-3,843	-3,422	-3,772	-4,257	-4,288	-4,207	-6,310
Natural Gas	-29	-136	-172	-233	-349	-172	-261	-413	-441	-445	-544	-721	-612	-709	-892	-1,084	-1,115	-1,363	-1,630	-1,426	-1,574	-1,794	-1,811	-1,763	-2,615
Electric	-138	-642	-812	-1,101	-1,646	-812	-1,231	-1,947	-2,082	-2,100	-2,569	-3,410	-2,901	-3,361	-4,228	-5,141	-5,272	-6,443	-7,729	-6,734	-7,437	-8,495	-8,576	-8,335	-12,325
Mining	0	-28	-25	-32	-29	-26	-27	-34	-37	-35	-65	-102	-132	-157	-205	-271	-180	-201	-434	-171	-210	-383	-414	-294	-190
Agriculture	-30	-168	-237	-338	-462	-245	-380	-559	-604	-637	-785	-1,071	-928	-1,103	-1,351	-1,557	-1,571	-1,809	-2,180	-1,874	-2,071	-2,365	-2,383	-2,247	-3,284
Annual Total	-18,151	-82,535	-104,755	-141,978	-213,656	-104,615	-159,232	-252,772	-270,166	-272,394	-331,913	-439,440	-371,180	-429,610	-540,349	-656,573	-678,934	-831,787	-987,163	-871,524	-961,449	-1,090,333	-1,099,379	-1,075,010	-1,603,287

Source: Authors' Calculations

²⁴ Annual totals may not tally exactly due to rounding-up.

In 2010, total GSP across all sectors would have been lower by almost \$128.6 billion (2013\$). The top five sectors estimated to decline the most in terms of contribution to GSP in 2010 are: Government (\$26.4 billion), Healthcare (\$22.6 billion), Real Estate & Travel (\$19.5 billion), Retail (\$13.5 billion), and Finance & Insurance (\$8.4 billion).

Table 7 estimates total employment losses by year and sector without the availability of CAP's water supply, 1986-2010.

The table estimates that in 1986 alone, employment across all sectors would have been lower by 18,151 jobs. The top five sectors estimated to experience the most job losses due to the absence of CAP's water exclusively in 1986 are: Healthcare (3,558 jobs), Government (3,503 jobs), Retail (2,297 jobs), Real Estate & Travel (1,769 jobs), and Accommodation & Food (1,165 jobs).

In 1993 - the year that CAP was declared "...substantially complete" - Arizona's employment across all sectors would have been lower by 252,772 jobs. The top five sectors estimated to experience the most job losses due to the absence of CAP's water exclusively in 1993 are: Healthcare (49,052 jobs), Government (48,299 jobs), Retail (31,704 jobs), Real Estate & Travel (24,645 jobs), and Accommodation & Food (16,137 jobs).

In 2010, total employment across all sectors would have been lower by over 1.6 million jobs. The top five sectors estimated to experience the most job losses due to the absence of CAP's water exclusively in 2010 are: Healthcare (311,619 jobs), Government (306,829 jobs), Retail (201,382 jobs), Real Estate & Travel (156,267 jobs), and Accommodation & Food (102,455 jobs).

Tables 6 and 7 also indicate a significant year-on-year change in impacts between 2009 and 2010. This is due to changes in the percentage distribution of CAP water for agricultural, municipal and industrial recipients. For example, 46% of municipal water demand and approximately 18% of agricultural water demand was met by CAP in 2010, compared to 30% and 11% respectively in 2009.

6.3 Annual and Cumulative Statewide Economic Impacts, 1986-2010

Table 8 displays the statewide economic impacts across all sectors by year, based on the assumption that municipal, industrial and agricultural customers would have experienced a shortfall in water availability, 1986-2010, in the absence of CAP.

Table 8 estimates that the State of Arizona would have cumulatively lost approximately \$1,090 billion (2013\$) between 1986 and 2010, if CAP had not been established and the availability of water for municipal, industrial, and agricultural customers had declined accordingly. This accounts for over 23.3% of cumulative statewide GSP for the total study period. The contribution made by CAP to statewide GSP has increased annually from an estimated 27.2% in 2005 to almost half of Arizona's GSP (49.5%) in 2010. A graphical representation of the annual impact of CAP's water supply to statewide GSP is shown in Figure 3.

Table 8 also estimates that the State of Arizona would have lost 18,151 jobs in 1986, 252,772 jobs in 1992, and over 1.6 million jobs in 2010. A cumulative figure for the entire study period is not appropriate as the unit of measurement for employment is job years,²⁵ rather than jobs.

²⁵ A "job year" is defined as one person having a full-time job for exactly one year.

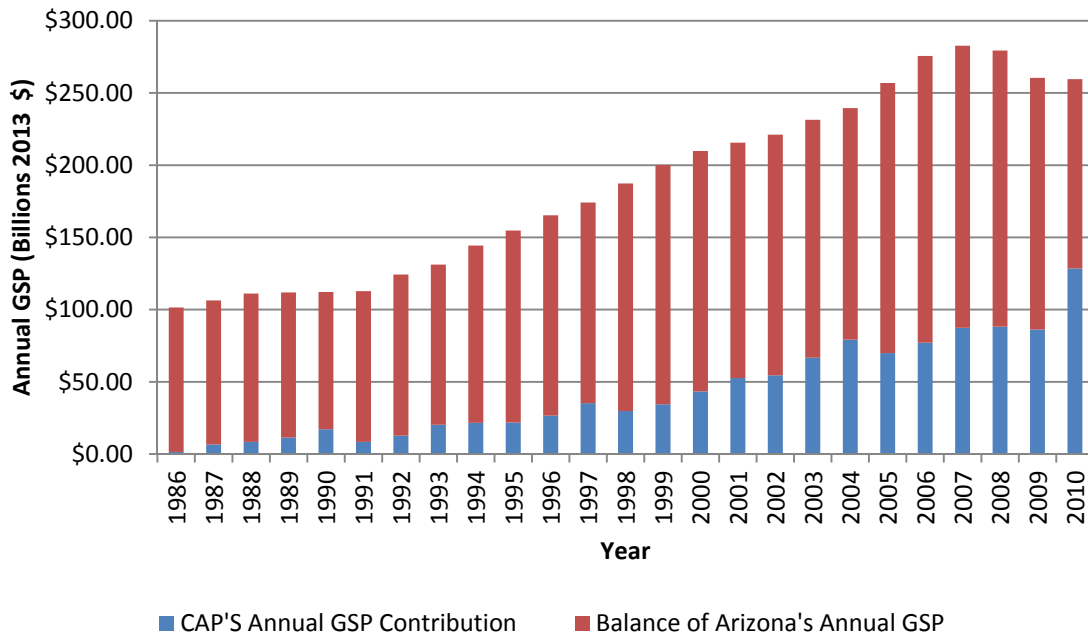
Table 8: Estimated Statewide Economic Impact Losses, 1986-2010²⁶

	GSP (Billions 2013\$)	CAP'S GSP CONTRIBUTION AS A PERCENT OF STATEWIDE GSP	EMPLOYMENT (Job Years)
1986	-\$1.5	1.4%	-18,151
1987	-\$6.6	6.2%	-82,535
1988	-\$8.4	7.6%	-104,755
1989	-\$11.4	10.2%	-141,978
1990	-\$17.1	15.3%	-213,656
1991	-\$8.4	7.4%	-104,615
1992	-\$12.8	10.3%	-159,232
1993	-\$20.3	15.5%	-252,772
1994	-\$21.7	15.0%	-270,166
1995	-\$21.8	14.1%	-272,394
1996	-\$26.6	16.1%	-331,913
1997	-\$35.3	20.2%	-439,440
1998	-\$29.8	15.9%	-371,180
1999	-\$34.5	17.2%	-429,610
2000	-\$43.4	20.7%	-540,349
2001	-\$52.7	24.4%	-656,573
2002	-\$54.5	24.6%	-678,934
2003	-\$66.7	28.8%	-831,787
2004	-\$79.2	33.1%	-987,163
2005	-\$69.9	27.2%	-871,524
2006	-\$77.1	28.0%	-961,449
2007	-\$87.5	30.9%	-1,090,333
2008	-\$88.2	31.6%	-1,099,379
2009	-\$86.2	33.1%	-1,075,010
2010	-\$128.6	49.5%	-1,603,287
Total	-\$1,090.0	23.3%	-

Source: Authors' Calculations

²⁶ Totals may not tally exactly due to rounding-up.

Figure 3: CAP's Contribution to Statewide GSP, 1986-2010



Source: Authors' Calculations

7 CONCLUSIONS

The purpose of this study has been to calculate the economic impact of CAP for the State of Arizona, assessed in terms of gross state product and employment, in two aspects:

- The construction of CAP, 1973-1993; and
- The impact of CAP's water supply delivery operations, 1986-2010.

The total field project costs used in the construction analysis are \$3.3 billion (nominal \$).

Seidman estimates that the construction of CAP cumulatively generates approximately \$2.4 billion GSP between 1973 and 1993 (2013\$). It also estimates annual employment impacts of up to 9,412 job years, dependent on the year in question.

The statewide GSP contribution resulting from the construction of CAP is equivalent to 0.13% of Arizona's cumulative GDP, 1973-1993.

The construction sector is the primary direct beneficiary during the construction of CAP.

Seidman also estimates the impact of the loss of 27.3 million acre-feet of water delivered by CAP to municipal, industrial and agricultural customers in Maricopa, Pima, and Pinal Counties, 1986-2010.

Central to this analysis is an assumption that CAP's annual water deliveries would not have been sourced elsewhere.

The water supply analysis estimates that the State of Arizona's GSP would have been cumulatively lower by approximately \$1,090 billion (2013\$) between 1986 and 2010, if CAP had not been established, and the availability of water for municipal, industrial, and agricultural customers had declined accordingly. This represents approximately 23.3% of cumulative statewide GSP throughout the study period.

Seidman also estimates that the contribution made by CAP to statewide GSP has increased annually from an estimated 27.2% in 2005 to 49.5% of Arizona's GSP in 2010.

The top five sectors estimated to decline the most in terms of contribution to GSP if CAP's water supply had been unavailable to customers during the 1986-2010 study period are: Government (\$221.1 billion), Healthcare (\$189.4 billion), Real Estate & Travel (\$165.2 billion), Retail (\$113 billion), and Finance & Insurance (\$72.9 billion).

Annual employment losses of 18,151 to over 1.6 million jobs, dependent on the year in question, would also have occurred if CAP's water supply had been unavailable during the 1986-2010 study period. Over 60% of these job losses would have occurred in the Government, Healthcare, Retail, and Real Estate & Travel sectors.

Seidman's water supply analysis therefore demonstrates the growing importance of CAP for the State of Arizona economy. CAP's establishment and subsequent delivery of water to municipal, industrial, and agricultural customers has had a crucial impact on the economic development of the state.

Without the availability of water from CAP, the economic development of the State would almost certainly have followed a different trajectory.

It is also important to note that Seidman's operational analysis has not taken into account any leisure benefits associated with CAP, such as the 10,000-acre Lake Pleasant Park, the Reach 11 recreation area in Phoenix, or the TPC golf course and Westworld in Scottsdale. The direct, indirect and induced effects of approximately 475 staff and suppliers to operate and maintain CAP are also excluded from Seidman's operational analysis. The inclusion of either or both of these dimensions to the water supply analysis would in all probability increase the economic impacts of CAP's operations for the State of Arizona economy.

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