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Tucson Outlook



George Hammond
Director and Research Professor
Economic and Business Research Center



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75 Years of Excellence



Eller Economic and Business Research Center

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Key Topics

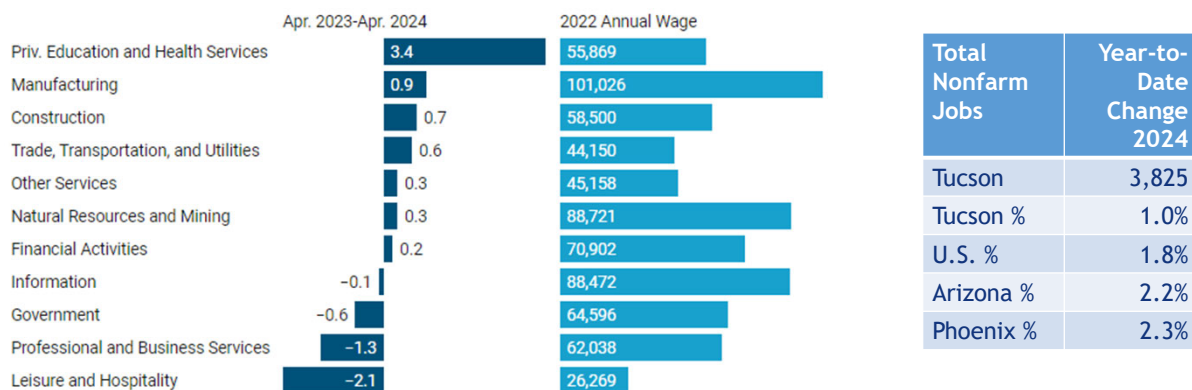
- ▶ **Tucson’s labor market remains in solid shape**
 - ▶ With steady job growth and very low unemployment
- ▶ **Phoenix inflation is well below the U.S.**
 - ▶ Primarily because shelter inflation has moderated more in Phoenix
- ▶ **Housing permits fell last year, but are poised to recover in 2024**
 - ▶ Single-family permits drive the rebound
- ▶ **Housing affordability remains low**
- ▶ **Arizona per capita personal income growth outpaced the U.S. last year**
- ▶ **Arizona, Phoenix, and Tucson are forecast to continue to grow**
 - ▶ But demographic pressures eventually weigh on gains

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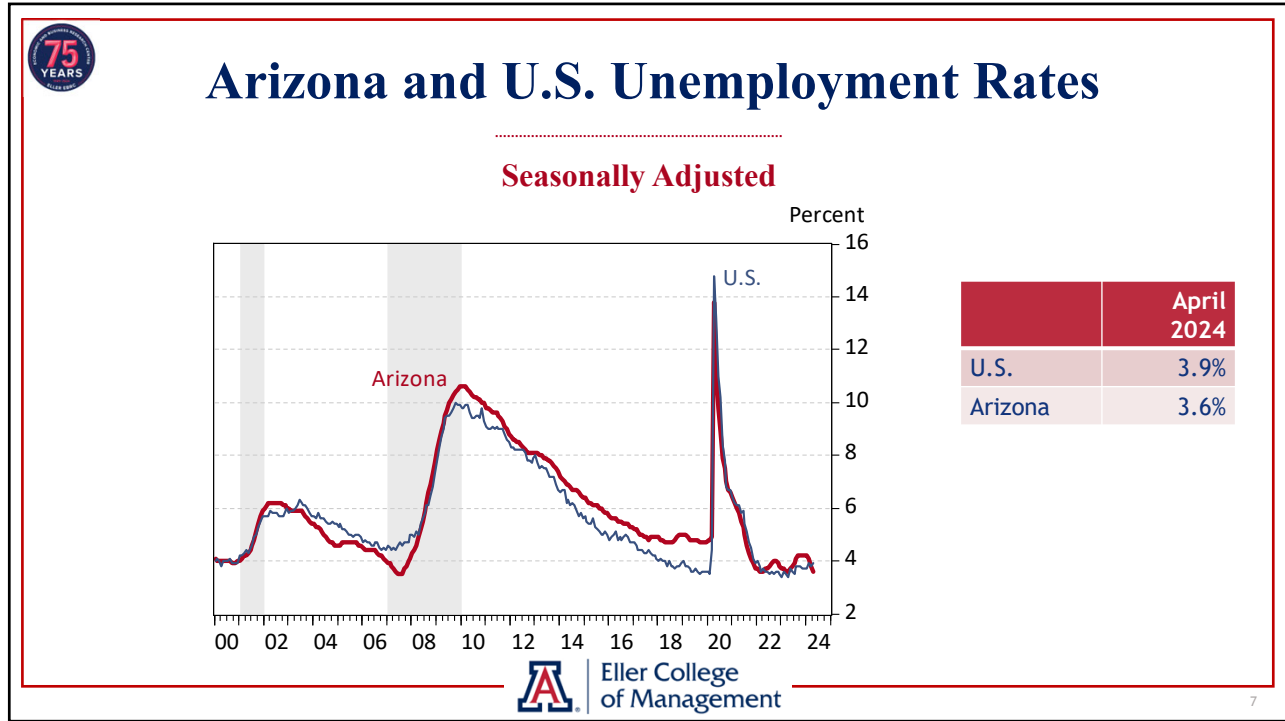


Tucson MSA Jobs and Wages by Industry

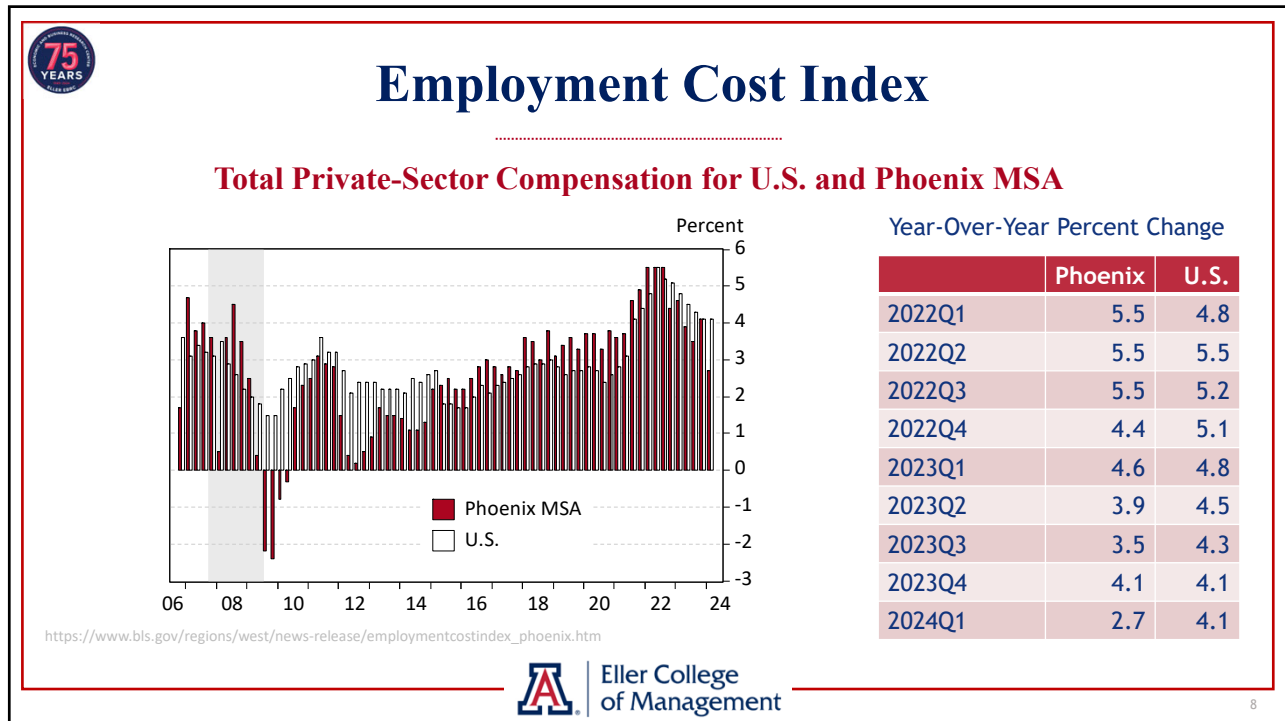
Thousands of Jobs, Dollars per Worker



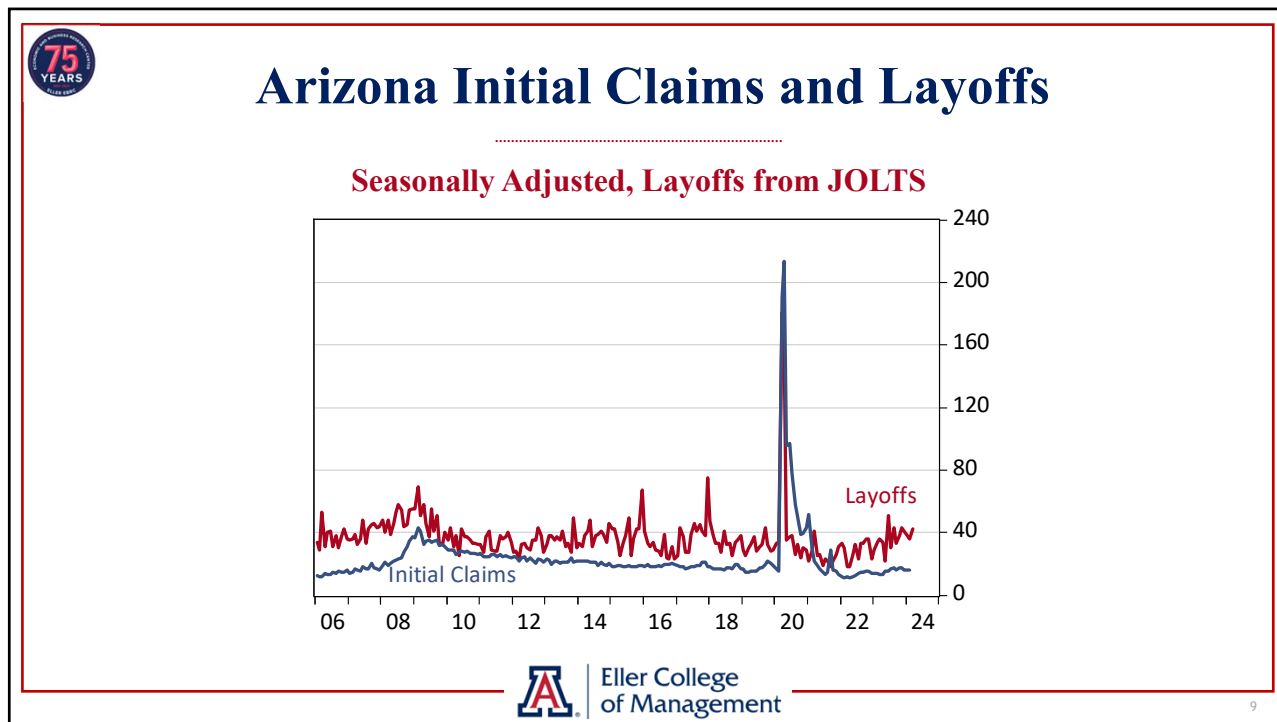
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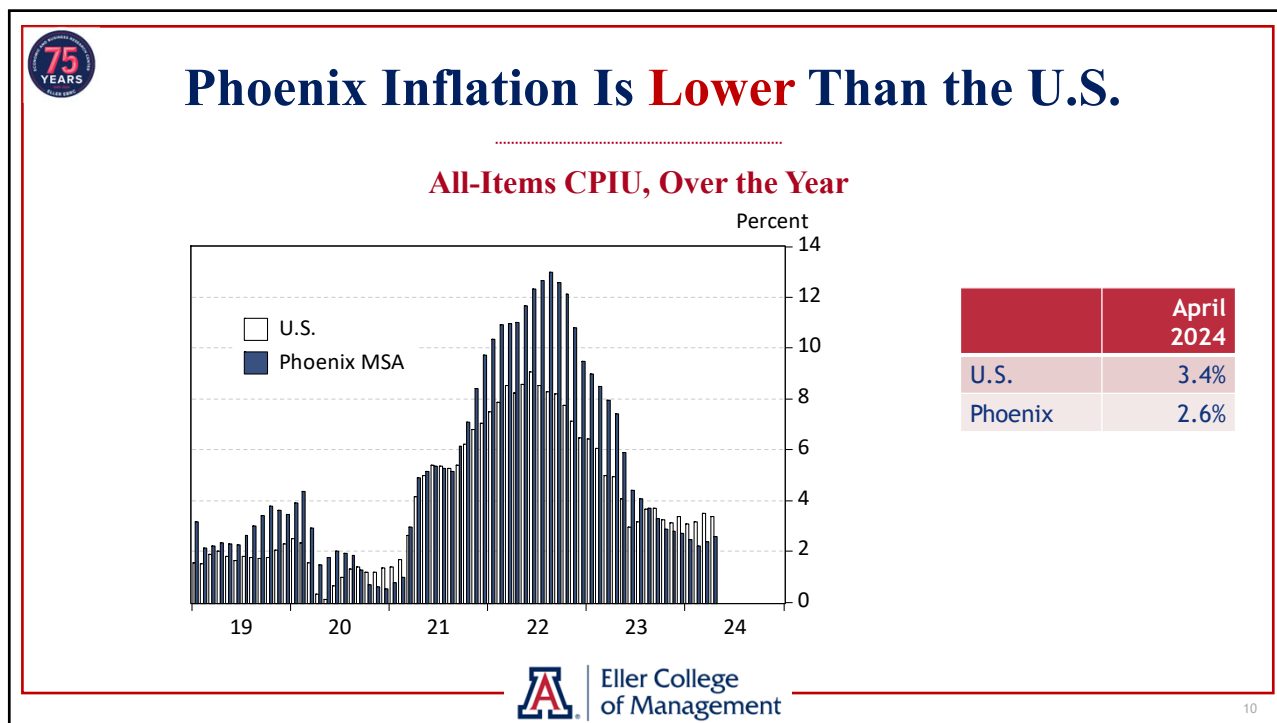
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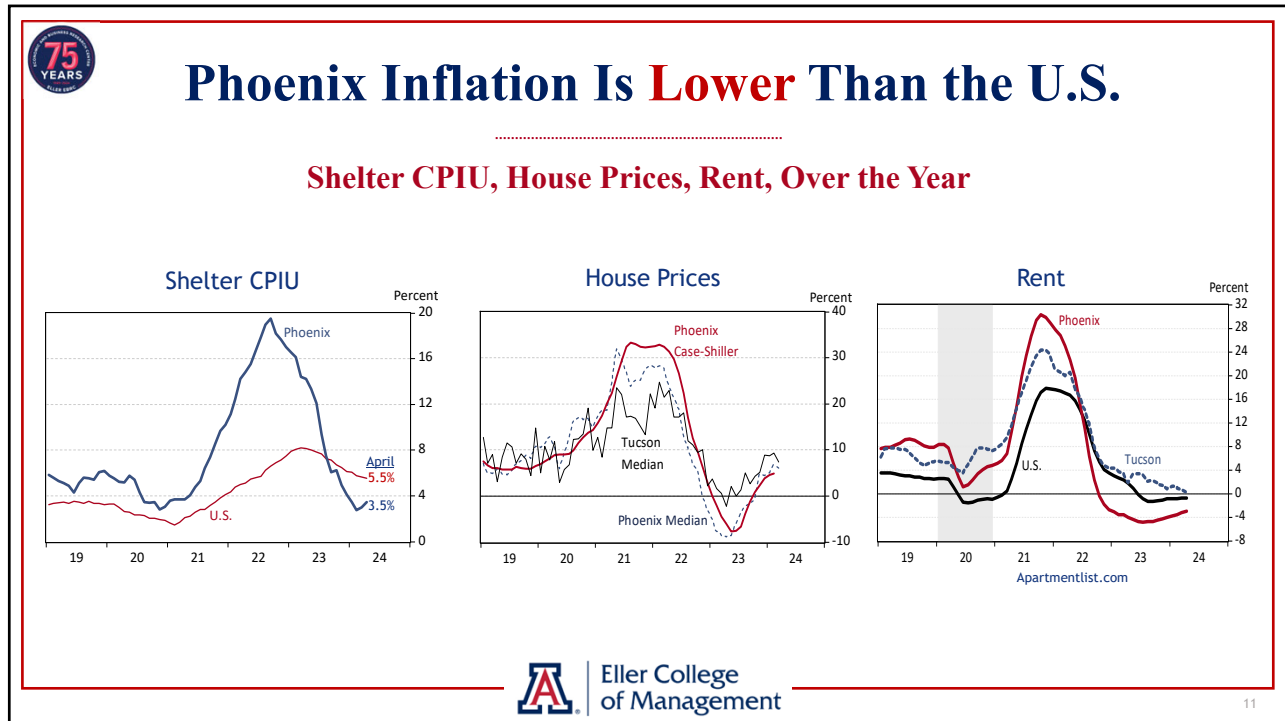
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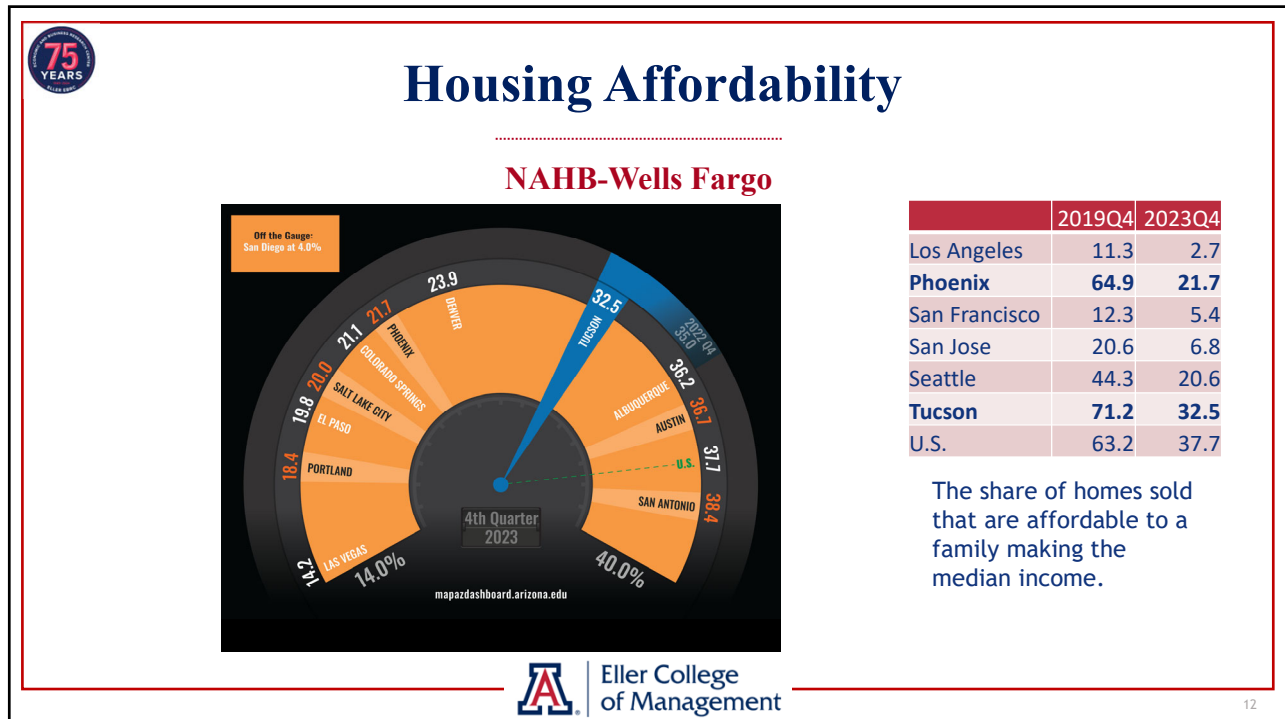
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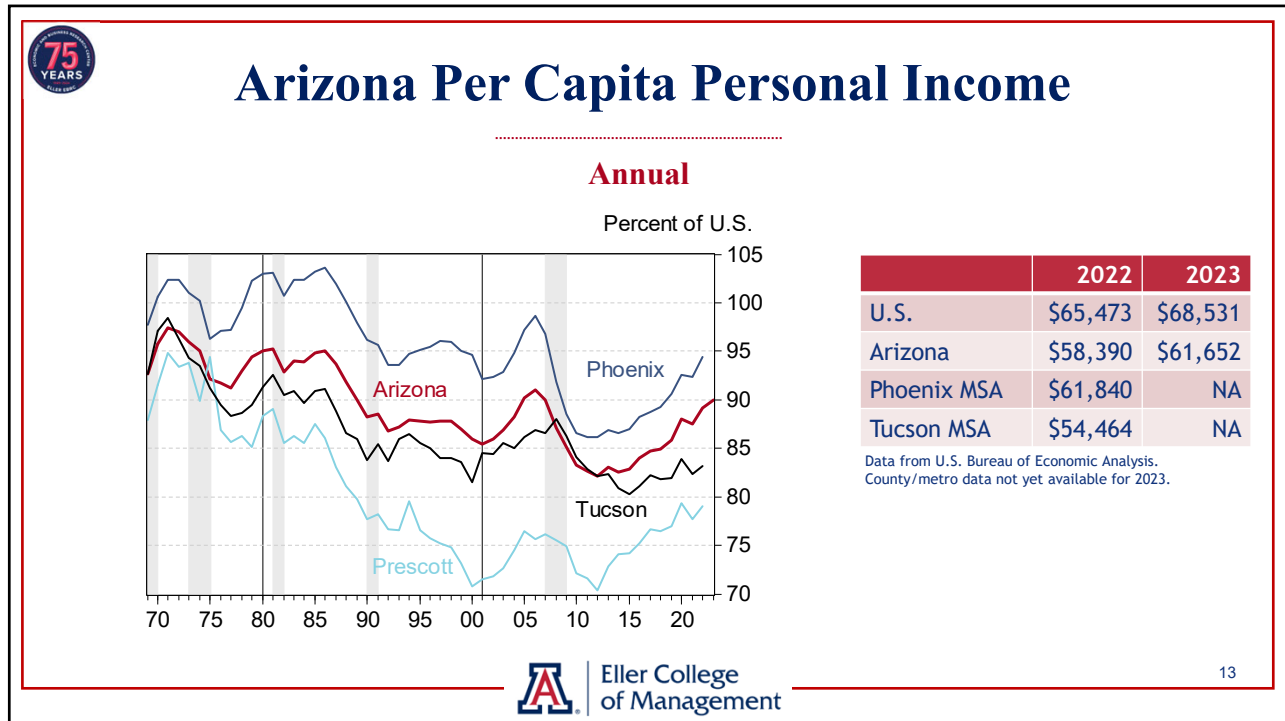
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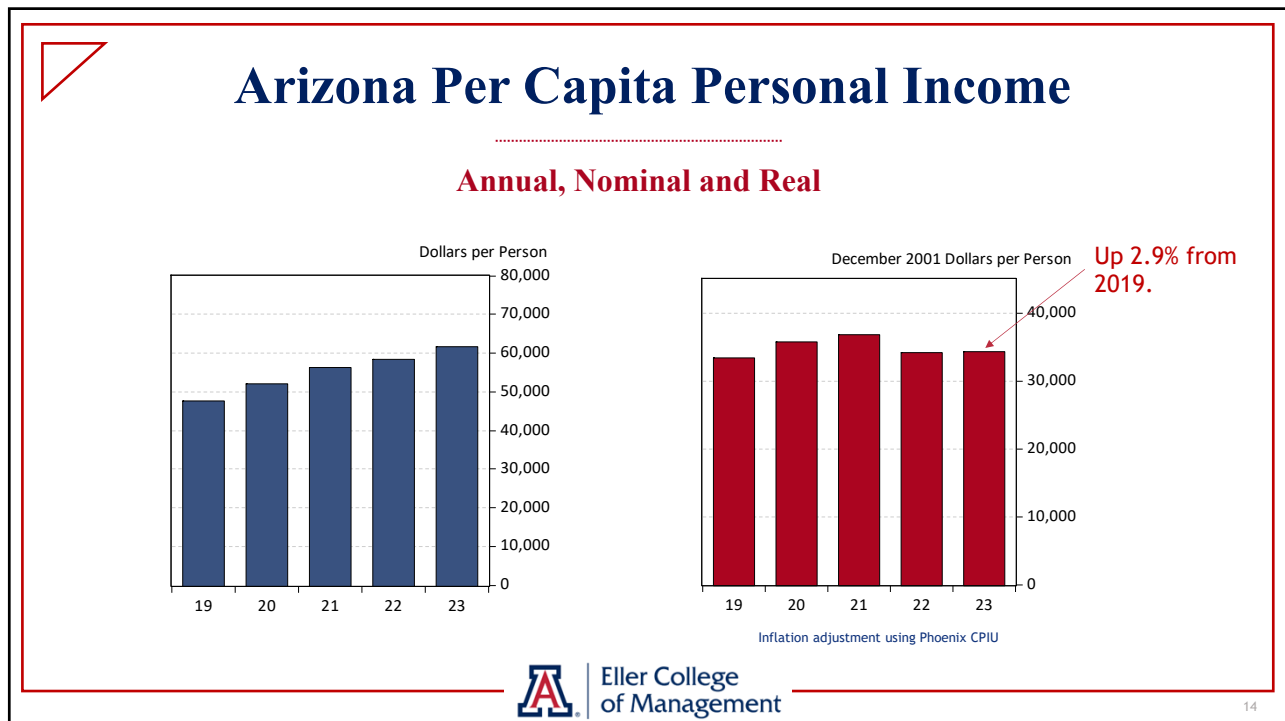
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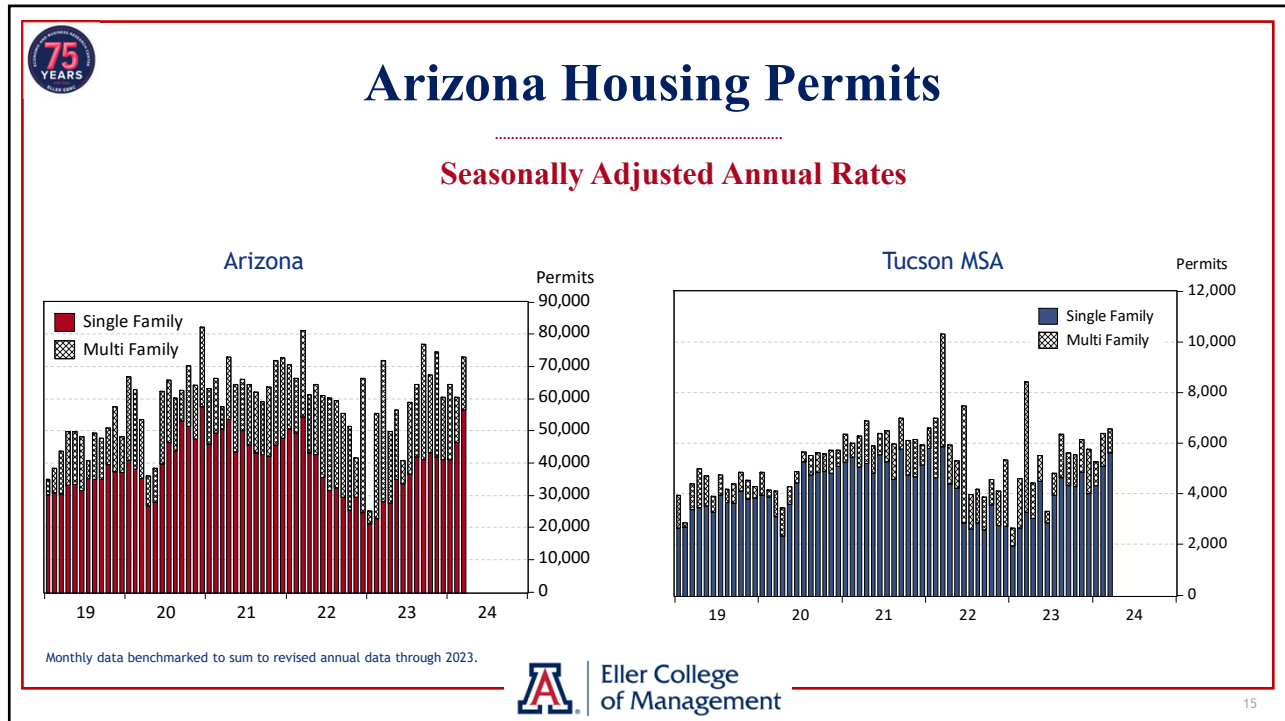
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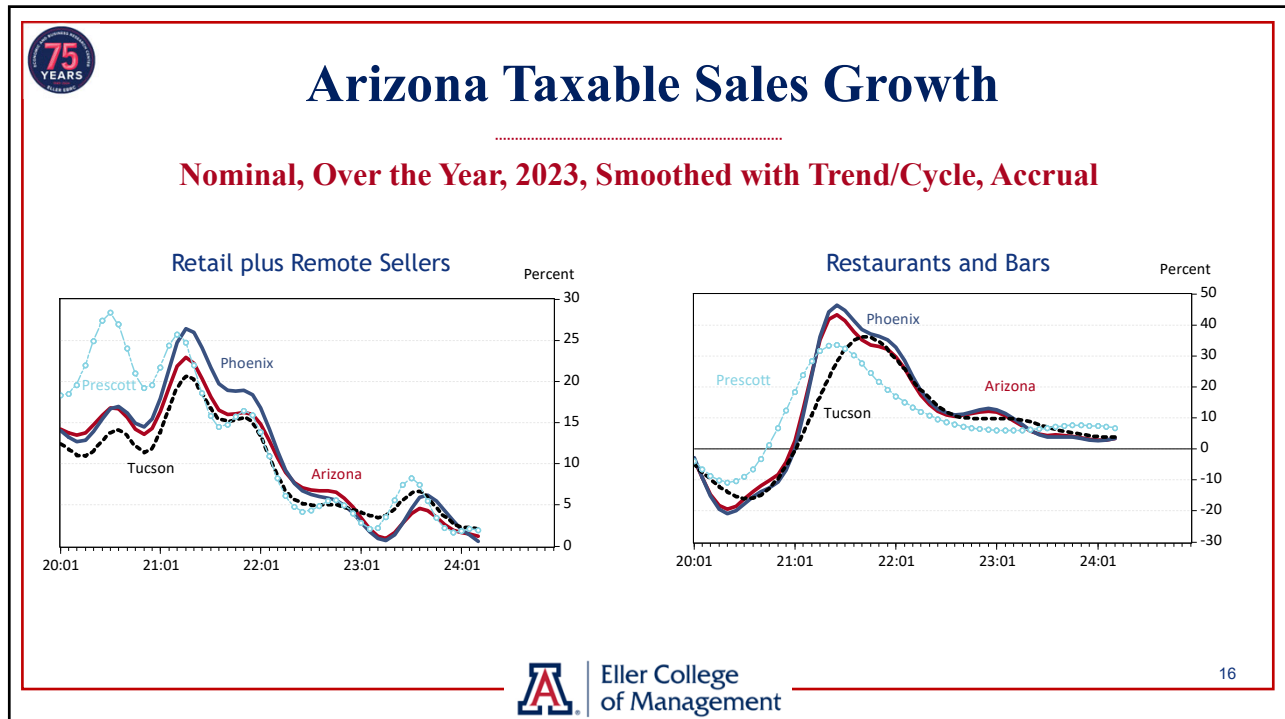
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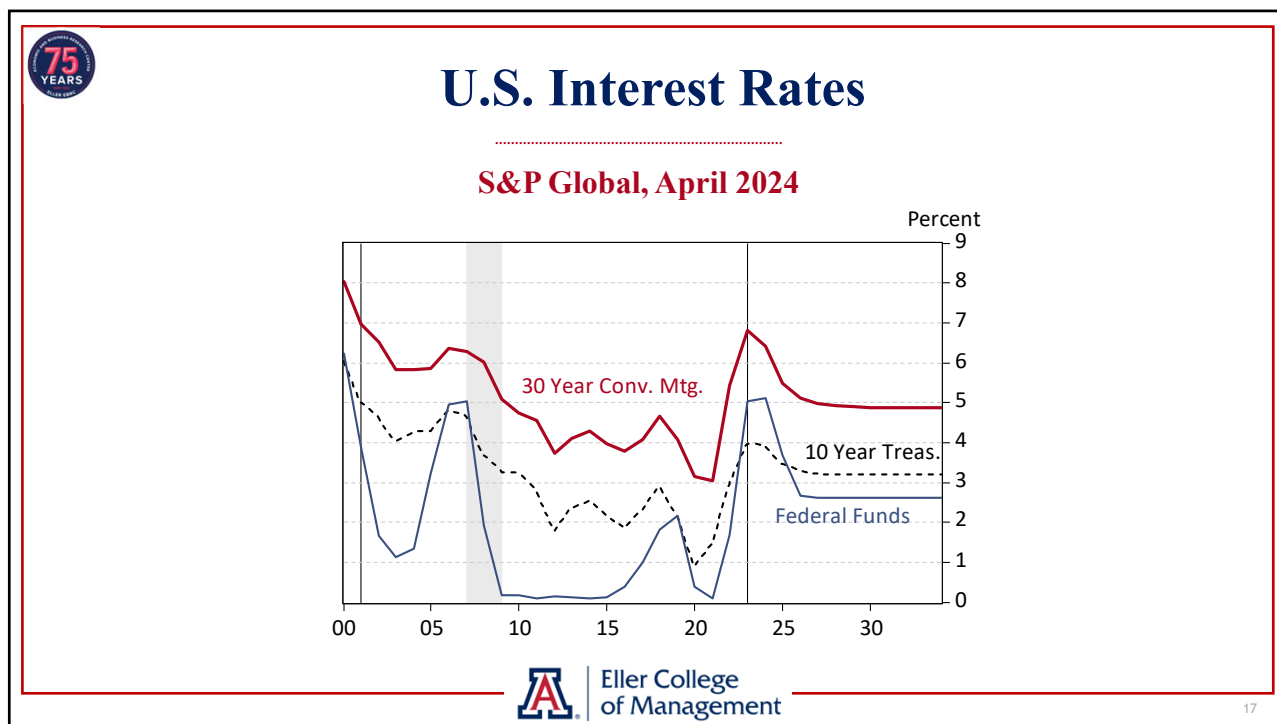
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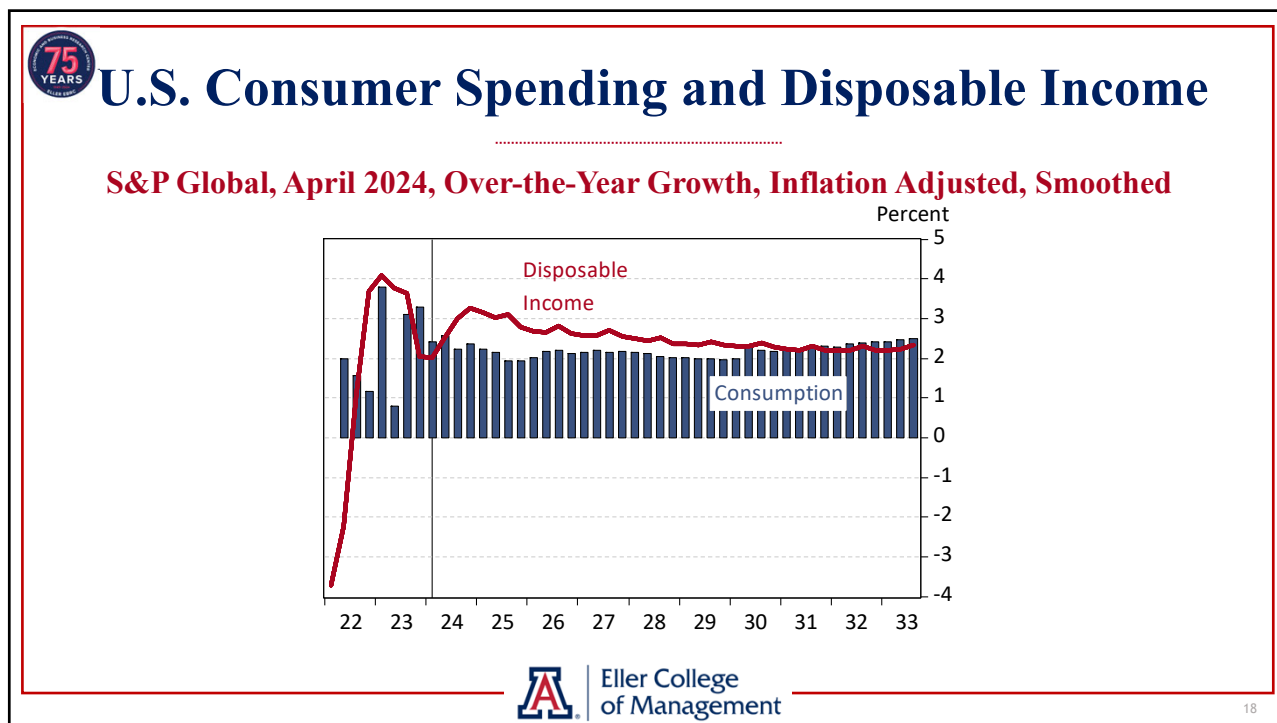
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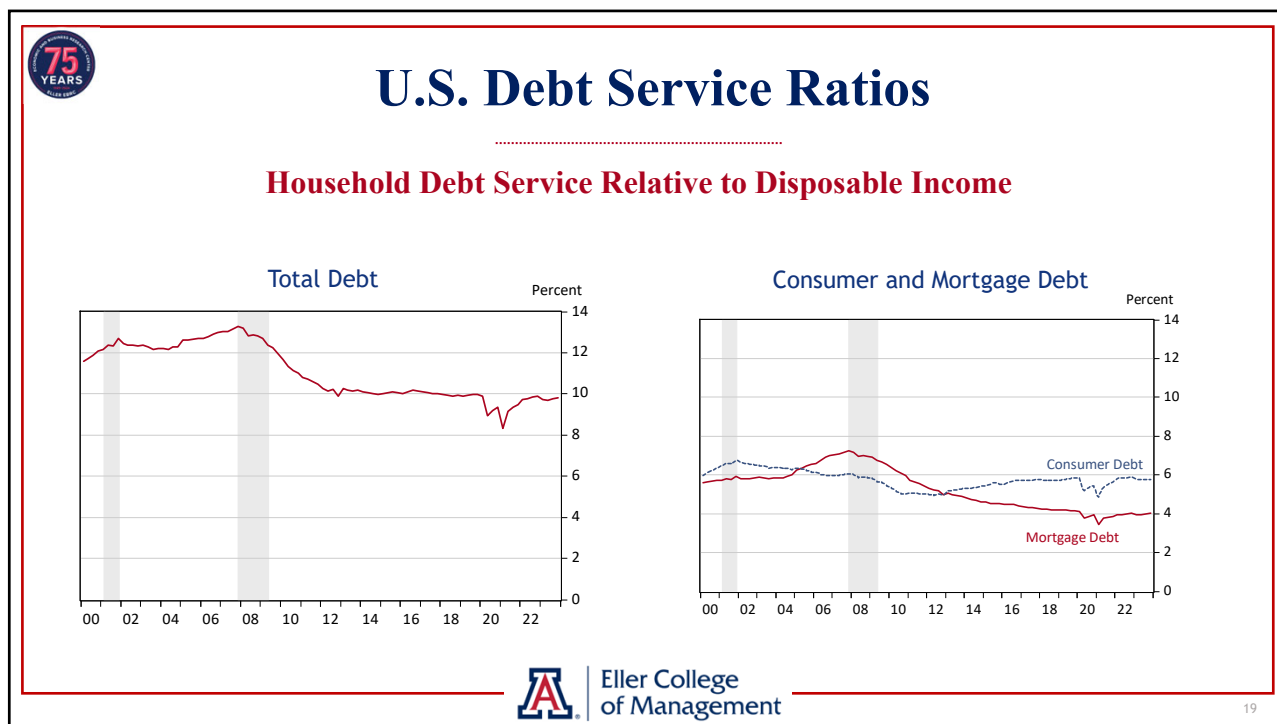
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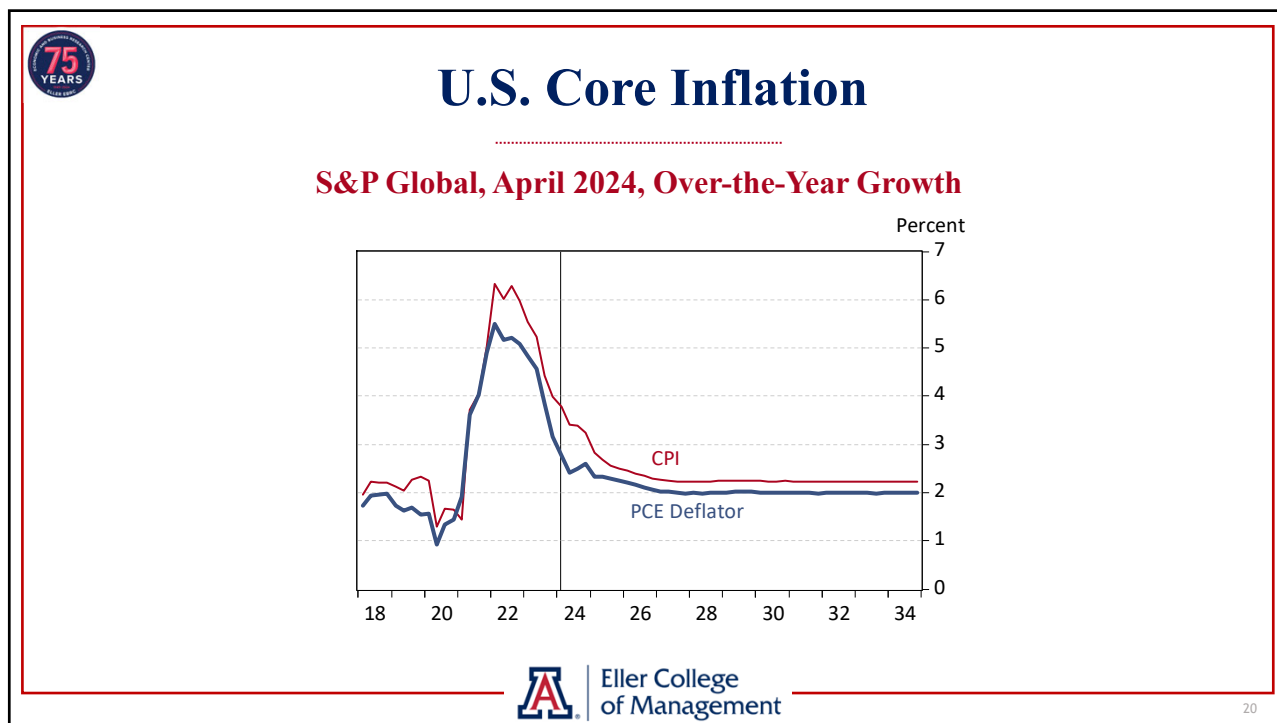
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Tucson MSA Outlook Summary

Annual Growth Rates

	Actual	Forecast		
	2023	2024	2025	2026
Growth Rate				
Nonfarm Jobs	1.6	1.2	1.2	1.0
Personal Income*	5.2	5.3	5.9	5.8
Retail Plus Remote Sales	3.8	2.6	3.7	3.6
Population	0.7	0.6	0.6	0.6
Level				
Housing Permits	5,255	5,383	4,868	4,495


*Personal income data are forecast in 2023.



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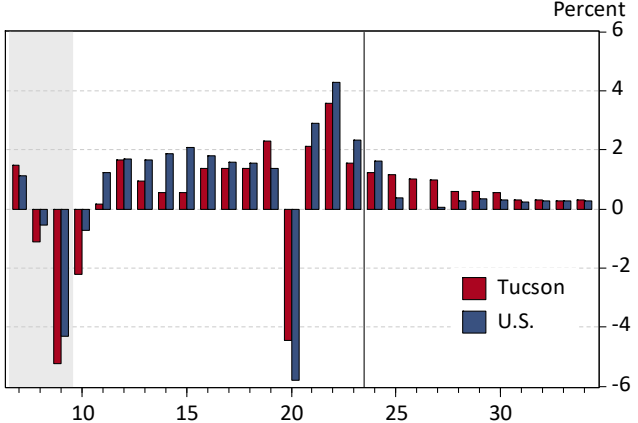
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Tucson MSA and U.S. Job Growth

Annual Growth Rates

Percent

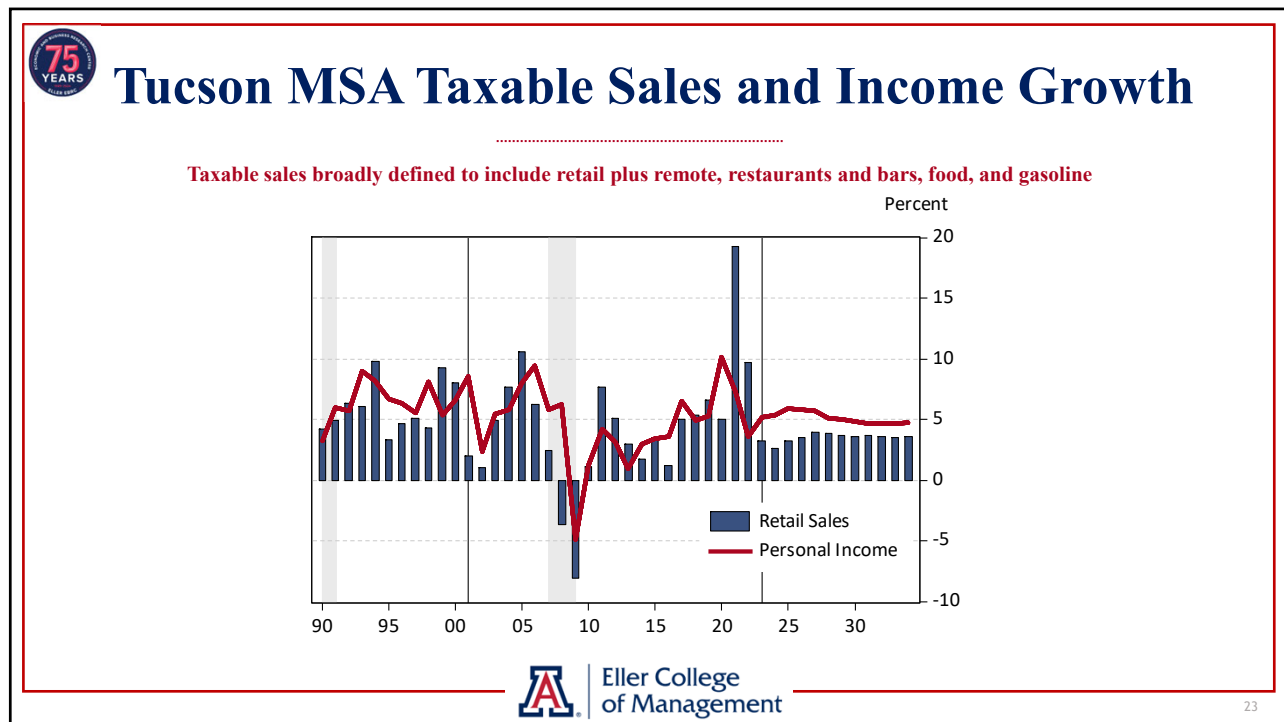




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Main Takeaways


- ▶ **Tucson's labor market remains tight**
 - ▶ Although compensation growth has moderated somewhat and layoffs are trending up
- ▶ **Phoenix shelter inflation has moderated significantly**
 - ▶ Contributing to reduced inflation in the all-items index
- ▶ **Housing permits are on pace to increase in 2024**
 - ▶ Driven by single-family activity
- ▶ **Arizona per capita personal income was 90.0% of the U.S. last year**
- ▶ **Arizona, Phoenix, and Tucson are on track to grow**
 - ▶ U.S. recession risks are still an important consideration

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Arizona Water



Dr. Sharon Megdal
Director and Professor
UA Water Resources Research Center



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**“Is Arizona Running Out of Water? Find out at the
Breakfast with the Economists”**

Arizona Water Resources: What to Expect
Sharon B. Megdal, Ph.D.
Breakfast with the Economists
June 5, 2024



smegdal@arizona.edu wrrc.arizona.edu

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How an applied microeconomist focused on the economics of government tax and expenditures and econometrics fell into water...

Reflections: Relevance Today of Comments on Arizona's Future from 1987

By Sherman B. Magpali
09/04/2020

I have lived in Arizona for close to 22 years. When I moved to Arizona from New Jersey, where I grew up and was educated, I had no idea I would become a water professional. I studied economics as an undergraduate at Rutgers University and as a graduate student at Princeton University. My fields of specialization were Public Sector Economics (the economics of government tax and expenditure policy), Econometrics (using statistical methods and models to characterize economic behavior), and International Economics. Note the absence of anything sounding like water, agriculture, or environmental economics.

Some interesting twists and turns in my professional career led me, since the early 1990s, to focus almost exclusively on water. The most pivotal event occurred in September 1985, when Governor Bruce Babbitt appointed me to fill a vacancy on the Arizona Conservation Commission (ACC), the body responsible for managing publicly owned utilities. I was the author of several professional publications.

Recently, when examining proceedings of the 20th to meet to Robert Throck to focus on economic development in 1999 was a distinguished senior and my cousin, Professor at Northern Arizona University.

As I reviewed the transcript address will be in a state to reflect upon observed comments relevant to a and conclude, and I did, I in late 1987, we were in looking at the state for the telecommunication asked the question: "Can the market to coordinate

... I had totally forgotten the alignment at the symposium was transportation issues." I was asked (June 12, 1978 - November 27, 1978). I had been a professor of ACC, a part-time Visiting Associate Professor.

... action today and our quest to stand to the ACC, would like today. Perhaps you will find my identity pathways to solutions.

... en, just a few years after the in it. There were uncertain times -ship, we added a lot of power. I the economic interest, and state fashion? There are some

Said in 1987 at an Arizona Futures Symposium on the topic of transportation:

When looking toward the future, I asked: "What will make things change so that a farsighted public policy replaces the crisis management spirit that pervades so much of government's – and the private sector's – operations? We are talking about things that require a long lead time. Shorter run problems require more immediate attention and resources. How can a community that cannot determine its carrying capacity in the short run (or does so only by default) ever find the resources to devote to longer term problem solving?" I noted the need to "...educate the public – including decision makers – on the questions and also on the future implications of current decisions...."

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WRRC bridges academia and the real-world of water management

- Mission: We tackle key water policy and management issues, empower informed decision-making, and enrich understanding through engagement, education, and applied research.
- Webinars, annual conference, publications, county water factsheets, etc.
- Partnerships, engagement, and respectful dialogues are essential to our work.



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WRRC 2024 Annual Conference held March 12-13, 2024 Implementing Water Solutions Through Partnerships

Session recordings available!

<https://wrrc.arizona.edu/news-events/2024-conference/wrrc-2024-conference-agenda>

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WRRC resources include County Water Factsheets and annual Arroyo publication




We even have a webpage with our QR codes:
<https://wrrc.arizona.edu/resources/qr-code-repository>

Four-page and six-page versions available

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From my graduate course, Water Policy in Arizona and Semi-arid Regions

Water policy and management reflect many determining factors

- Resource Availability
- Location of water demands and supplies
- Economics
- Historic and Current Legal/Institutional Framework
- The nature of involvement of multiple governmental and non-governmental entities, including the extent of centralized versus decentralized decision making
- Politics of Area
- Public values and socio-cultural factors
- Technology
- Historical context
- Information
- Etc...

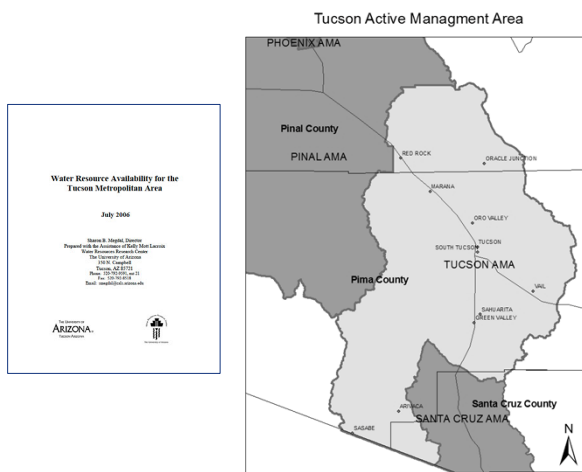
Importance of Context

Megdal, Graduate class, Water Policy in Arizona and Semi-arid Regions, Updated May 2024

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Arizona Water Resources: What to Expect



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Water is not like other goods and services...

- In terms of how people view water and the different ways it is used
- How it is priced and how people think it should be priced
- What people think about the role of the private sector, including public-private partnerships
- Etc.

January - February 2004

Arizona Water Resource



Public Policy Review

by Sharon Magdal

AZ Public-Private Water Utility Ownership, A Changing Landscape



Is there a trend toward municipal ownership of water systems in Arizona? If so, what are the reasons for it? Starting with the hypothesis that the trend in Arizona is toward governmental ownership — or municipalization — of water provision, my colleague Jackie Minzey and I have begun investigating these questions. We started by asking: How many water providers in Arizona have switched from public to private versus private to public in the past 20 or 30 years? Answering this question is not as straightforward as we hoped it would be.

Water Company and Arizona Water Company are the seventh and eighth largest privately owned water companies in the state. Like Arizona Water Company, Arizona-American's customers are spread over several divisions. Because of difficulties in tracking ownership data statewide, we have first focused on tracking information for the Tucson region over a period of time. Upon examination of ADEQ and ADWR data, we concluded that between 1985 and 2001, there were some trends. First, we saw a general trend toward consolidation of smaller systems into larger systems. There was an 11 percent decrease in the number of providers serving the Tucson area, even though the Active Management Area population increased 34 percent. In this period, six large providers (serving more than 250 acre feet of water annually) were acquired by public water providers. Interestingly, among the small providers, all but one of the eight new service areas are served by private companies. This suggests that private water companies have a significant role in developing areas where an established water provider, be it public or private, is not nearby.



Spring 2011

Arizona Water Resource



Public Policy Review

Sharon Magdal

Back to Fundamentals—On Economics and Water Pricing

Some readers of my column may not know that I am an economist by training. As a graduate student and at the start of my professional career, I focused on government tax and expenditure policy as well as applied statistical/econometric work. The closest I came to the study of water resources was taking an undergraduate class in environmental economics. I started out my professional career as a member of the Economics faculty at the University of Arizona. It was not until I was appointed to fill a vacancy on the Arizona Corporation Commission (ACC) in 1985 that I was introduced to water matters as a regulator of private water companies. For those unfamiliar with the ACC, it is Arizona's statewide public utilities commission. It is a constitutionally established and elected body. I was appointed to fill a vacancy on an interim basis, until the next general election.

In late 1991, in what was another interesting development in my career path, I became the Executive Director of the regional water

able to agriculture did not translate into its use. The relative costs associated with alternative and available water supplies mattered. Weather conditions mattered, too: 1993 was a particularly wet year.

Some of my recent work connects water pricing with another topic in which I have been interested since my days at the ACC: public versus private ownership of water systems serving Arizona communities. The Arizona Water Infrastructure Financing Authority (WIFA) releases annually a rate survey of water systems throughout Arizona. Information on system connections, water deliveries, pricing structure and ownership is included, making it possible to look at differences associated



January - February 2005

Arizona Water Resource



Public Policy Review

by Sharon Magdal

Water Pricing Has Potential to Promote Water Conservation



The pricing of water is an interesting and important topic. The rates water utilities charge are designed to recover the cost of delivering water to customers. That means water prices generally cover the costs of the construction, maintenance and operation of the water delivery infrastructure, from pipelines to dams and canals. Also included are costs of all administrative functions, from meter readers to outside consultants and lawyers. Yet, no cost is associated with the water molecules themselves. This is true for groundwater, surface water and effluent. For most goods and services, the price system usually is viewed as a mechanism for allocating scarce resources. Water stands out as an exception, its pricing not generally incorporating a scarcity value of water, despite a general awareness that water is in fact scarce. Water is not sold at a market-clearing price for several reasons.

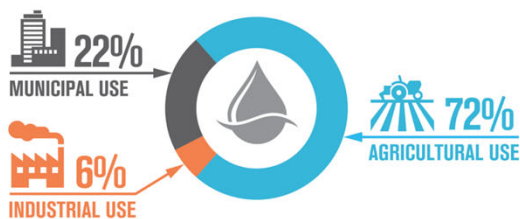
Statutory change diverted the first component to the general fund. A large portion of the second component funds banking of Colorado River water. Challenging a groundwater withdrawal fee to discourage groundwater use, however, has not been generally embraced. Governor Hall's Water Management Commission raised the issue but recognized that a significant tax on water would adversely affect certain industries, especially agriculture. Yet, even if it did not apply to all industries, a pump tax could further the goal of reducing water consumption. Designed carefully — for example, it would have to address concerns regarding low-income water ratepayers — a groundwater use surcharge could effectively reduce water consumption, as well as help fund much-needed infrastructure investments or other programs, such as the Arizona Water Protection Fund.

More is at issue, however, than discouraging only groundwater use. Even communities with ample renewable water resources are concerned about a future demand and supply imbalance. In employ

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Arizona water uses and sources (Source: Arizona Dept. of Water Resources)

ARIZONA'S WATER USE BY SECTOR (2019)



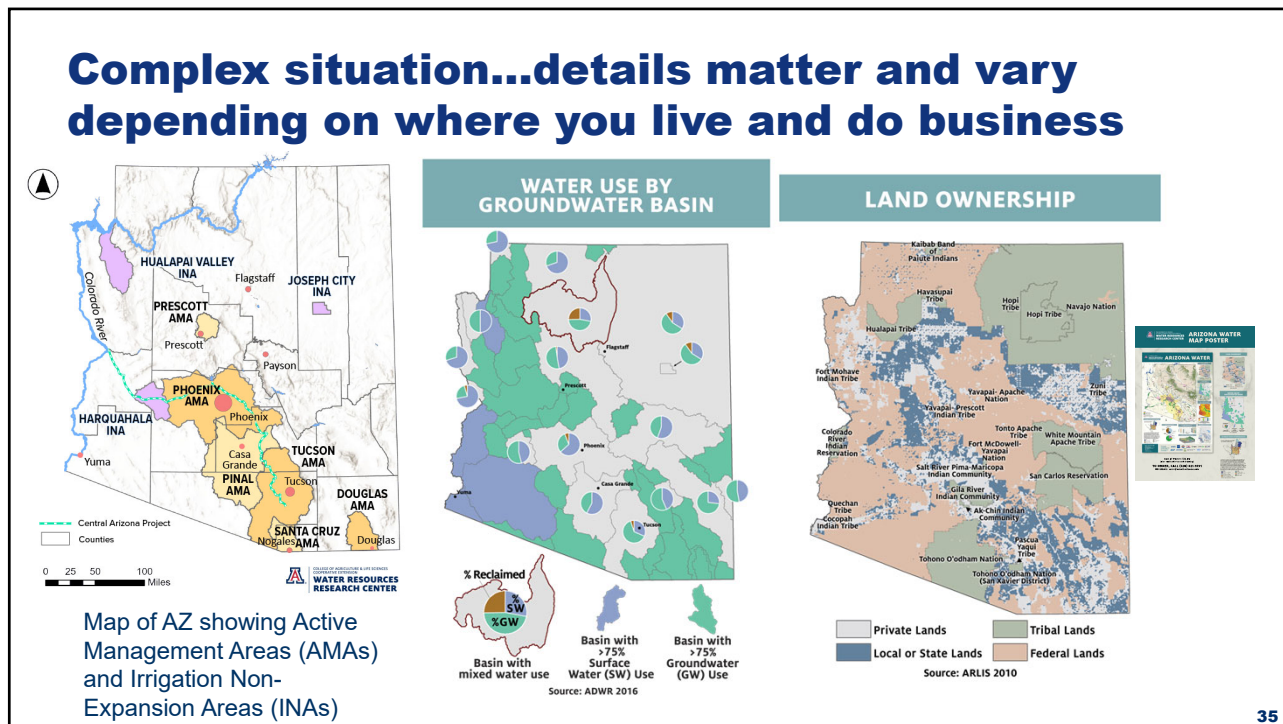
SOURCE: ADWR, 2020

ARIZONA'S WATER SUPPLY



SOURCE: ADWR, 2020

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Wicked Water Problems Context

- Wicked Water Problems are big problems that do not have a simple pathway to resolving them.
- Some reasons
 - incomplete or contradictory knowledge
 - the number of people and opinions involved
 - the large economic burden
 - the interconnected nature of these problems with other problems [e.g., geopolitics, poverty]
- Collaboration and interdisciplinary work are necessary for addressing Wicked Water Problems.
- Process is important for identifying solutions pathways.

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Wicked problem: Colorado River Basin supply-demand imbalance



Photo: SB Megdal-Dec.2022
 Taken from Hoover Dam

Lake Mead behind Hoover Dam



Photo: SB Megdal-Dec.2022

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Central Arizona Project customers are particularly vulnerable to cutbacks in Colorado River water deliveries

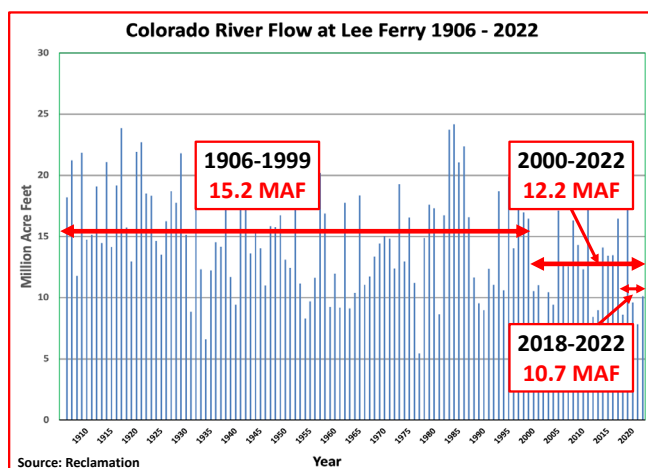
Colorado River (CR) Basin (outlined below)

About 250,000 square miles (647,000 km²)

7 states in the USA; 2 states in Mexico

30 Native Nations

40 million people rely on CR water



Source: Reclamation

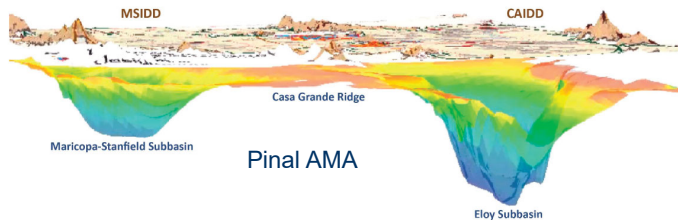


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Wicked problem: Groundwater depletion

Groundwater invisibility
 Figure from Arizona Department of Water Resources Model



5x vertical exaggeration of aquifer extending below land surface
 (vertical scale of aquifer is exaggerated 5x greater than the horizontal scale)

Figure 8. 3-D Representation of the Pinal AMA Aquifer from 2019 ADWR model, extended to 3000 feet below land surface, based on ADWR's 2014 geology update (Seasholes 2020) - Note: the aquifer bottom is modeled to 3000 feet and is deeper in certain areas

The Washington Post
 Democracy Dies at Dawn

Phoenix area can't meet groundwater demands over next century, threatening growth

A state report released Thursday amounts to a chilling warning for a region that has been a development hotspot for new residents and high-tech businesses

By Joshua Partlow, Yvonne Winnett Sanchez and Isaac Stanley-Becker
 Updated June 1, 2023 at 6:50 a.m. EDT | Published June 1, 2023 at 4:31 p.m. EDT

The Washington Post
 Democracy Dies at Dawn

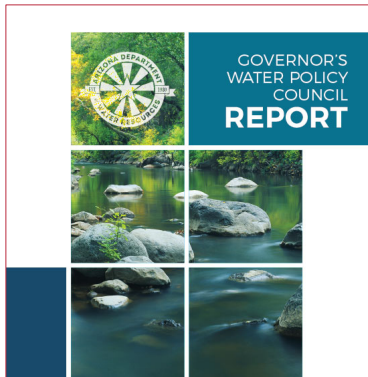
Politics Biden administration The 2020s Polling Democracy in America Election 2024

How a Saudi firm tapped a gusher of water in drought-stricken Arizona

Lax rules let the foreign-owned company pump water from state land to grow alfalfa for the kingdom's cattle. After almost a decade, the deal is in jeopardy.

By Isaac Stanley-Becker, Joshua Partlow and Yvonne Winnett Sanchez
 July 26, 2023 at 5:00 a.m. EDT

Groundwater issues remain in the Active Management Areas and exist outside the AMAs



<https://www.azwater.gov/gwpc>
 Issued January 2024

ASSURED WATER SUPPLY COMMITTEE

OBJECTIVE

The Assured Water Supply Committee was established to review and make recommendations for changes to Assured Water Supply policies - legislatively, administratively, or by executive action - to address the challenges revealed by Assured Water Supply modeling projections, while continuing to:

- Strengthen the integrity of the Assured Water Supply program
- Protect consumers and aquifers
- Ensure future growth is not reliant on mined groundwater.

RURAL GROUNDWATER MANAGEMENT COMMITTEE

GOAL

The Rural Groundwater Management Committee was established to develop policy, legislative, or other actionable recommendations for a water management framework to assist rural Arizona communities to manage their local groundwater resources, protect water users, and sustainably manage aquifers.

OBJECTIVES

- These recommendations will assist rural communities outside the state's Active Management Areas (AMAs) and Irrigation Non-Expansion Areas (INAs) in managing local groundwater resources and mitigating further aquifer depletion.
- These recommendations should be broad enough to apply to any groundwater basin's management needs and customizable to be tailored to a basin's unique characteristics.

Many water bills introduced this legislative session, many of which are still pending.

- Not always agreement on the statement of or the severity of the issue
- Lack of agreement on how to address the issue
- Policy analysis can identify trade-offs associated with alternative policy approaches
- Efforts to come to agreement, particularly on groundwater regulation and management outside the Active Management Areas

And there is much else going on, most notably **renegotiating the guidelines for sharing cutbacks in Colorado River deliveries!**

Water policy and management reflect many determining factors

- Resource Availability
- Location of water demands and supplies
- Economics
- Historic and Current Legal/Institutional Framework
- The nature of involvement of multiple governmental and non-governmental entities, including the extent of centralized versus decentralized decision making
- Politics of Area
- Public values and socio-cultural factors
- Technology
- Historical context
- Information
- Etc...

Importance of Context

Megall, Graduate class, Water Policy in Arizona and Semi-arid Regions, Updated May 2024

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Are we running out of water?

The answer depends on the context.

- Where are you located?
- What water source do you rely on?
- Are you asking about those already in the area or those not yet there?
- At what point in time?
- What assumptions are you making?

Even if the current water source is running low, does that mean there will not be enough water to meet the needs/demands?

Is this the right question? Should the question be whether we are or will be prepared for changing water availability and water quality challenges?

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Categories of solution options to address imbalance of supply and demand

- Conservation
- Greater efficiency
- Water reuse
- Water storage/banking/managed aquifer recharge (MAR)
- Desalination (augmentation example)
- Moving water
- Marketing and other mutually agreed-upon transactions
- Rainwater and stormwater capture
- How we design our buildings, communities, and landscapes



Sweetwater Wetlands

The Tucson region has adapted to changing water conditions through innovation, partnerships, and other actions

sources and supply

SHARON B. MEDCAL AND ALAN FORREST

How a Drought-Resilient Water Delivery System Rose Out of the Desert: The Case of Tucson Water

TUCSON JARVIS WATERS
COMPLEX JURISDICTIONAL
EXPERIENCES HAVE
REINFORCED THE
IMPORTANCE OF AN OPEN
AND COLLABORATIVE
DECISION-MAKING
PROCESS—AND
DEMONSTRATED THE
BENEFITS OF
COLLABORATION WITH
OTHER UTILITIES AND
JURISDICTIONS AND THE
VALUE OF SHARED
LESSONS LEARNED.

TUCSON'S INTRICATE WATER AUTHORITIES

There is a complex jurisdictional interweaving of water responsibilities in Tucson. Other water providers, both public and privately owned and operated, serve parts of the Tucson metropolitan region. Tucson Water does not collect and treat wastewater from its customers, instead, Pima County provides wastewater collection and treatment services to most Tucson Water customers. Through an intergovernmental agreement, in 2012 Tucson Water had control over about 41% of the 76 × 10⁶ m³ of treated wastewater produced by

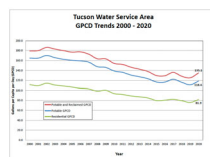
SEPTEMBER 2014 | JOURNAL OF BUSINESS | 2014 | MEDCAL & FORREST
 2014 © American Water Works Association

ONE WATER 2100 PLAN

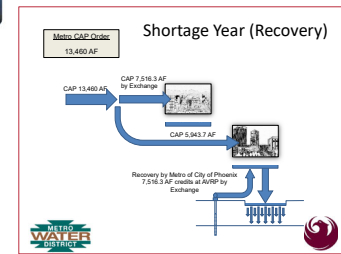
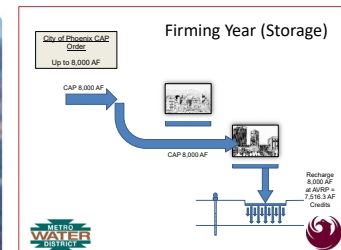
Recycled Water
 Surface Water
 Stormwater
 Groundwater

CITY OF TUCSON

One Water 2100 Plan Announcement
<https://www.youtube.com/watch?v=UnWqUbrS5Tg>



Cooperation with Phoenix area



Source: Metro GM Joe Olsen

Arizona faces both surface water and groundwater challenges! What we can expect depends on all of us.

- Be informed
 - Know where your water comes from
 - Don't take water for granted
 - Understand the trade-offs associated with different policy options and actions in terms of cost, timing, scale, sustainability, etc.
- Be good water stewards in your personal and professional lives
- Be ready to discuss water matters with decision makers and state, regional, and local agencies and utilities, including the Arizona Dept. of Water Resource, the Arizona Dept of Environmental Quality, Central Arizona Project, and the Water Infrastructure Financing Authority (WIFA).

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In closing, I am optimistic that we can adapt to changing circumstances because we have been adapting - and because failure is not an option. BUT we must stay informed and engaged, be vigilant, and be prepared to incur the associated costs.

Thank you!!

Connect with us!

Sharon B Megdal, Ph.D.

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wrrc.arizona.edu

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Arizona's Economy



azeconomy.org



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Explore data for border economies.
Arizona-Mexico Economic Indicators



azmex.eller.arizona.edu



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George Hammond, director
Economic and Business Research Center
gghammond@eller.arizona.edu

New features now available!
The Arizona's Economy App
Real-time data at your fingertips.



The image shows the Arizona's Economy App interface on a laptop, tablet, and smartphone. The laptop screen displays a dashboard with a line graph titled 'ARIZONA AT A GLANCE' showing 'AZ Nonfarm Emp 54 (K)' with a value of 2512.1 as of Aug 13. The graph shows a steady increase from 2003 to 2013. The tablet and smartphone screens show similar data visualizations.

Free at the Apple App Store and Google Play.

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A special thank you to
JPMORGAN CHASE & Co.
for presenting today's event.

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