

# Results of Economic Analysis for SAWS Water Supply Projects

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## Presented to:

*San Antonio Water System  
Citizens Advisory Panel*

## Presented by:

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## Where we left off in April ...

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- Revised scope of economic analysis to respond to CAP issues
- Preliminary scenario definitions
- Overview of HydroSolve model
- Preliminary information on supply costs and shortages under different scenarios



## What we've done since April...

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- Refined supply scenarios and added LCRA
- Refined estimates of shortage costs
- Incorporated new demand projections
- Re-ran the HydroSolve model
- Calculated economic benefits and costs
- Examined economic impacts
- Identified other benefits and costs



## Key questions examined in this presentation

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1. What will happen if SAWS does not add water supplies?
2. Are economic benefits of adding supplies worth the cost?
3. Which water supplies are best from an economic perspective?
4. What are the economic impacts of supply options?
5. Are there benefits and costs BBC has not quantified?
6. How confident is BBC in these conclusions?



# 1. What if SAWS does not add water supplies?

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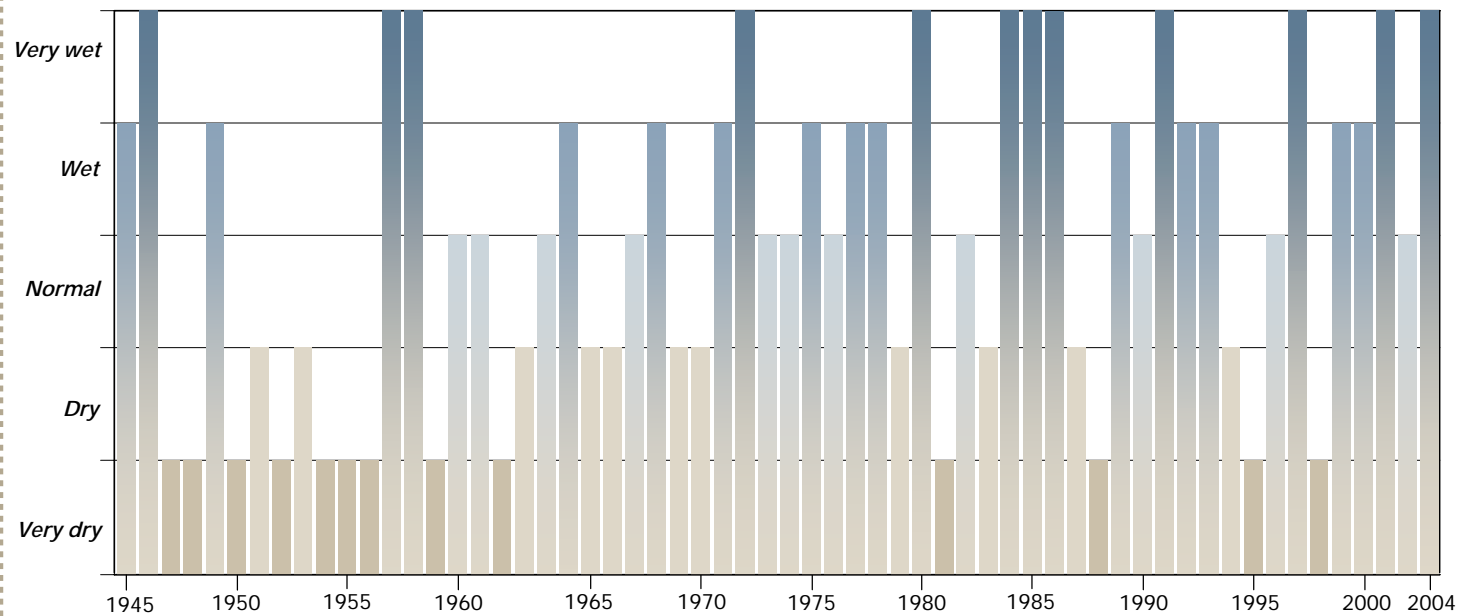
If SAWS does not increase its supplies, there will be water shortages in the future due to:

- Drought (small impact)
- Population growth (large impact)



# How much water is needed to supply current customers in drought?

*Historic San Antonio Area Weather*





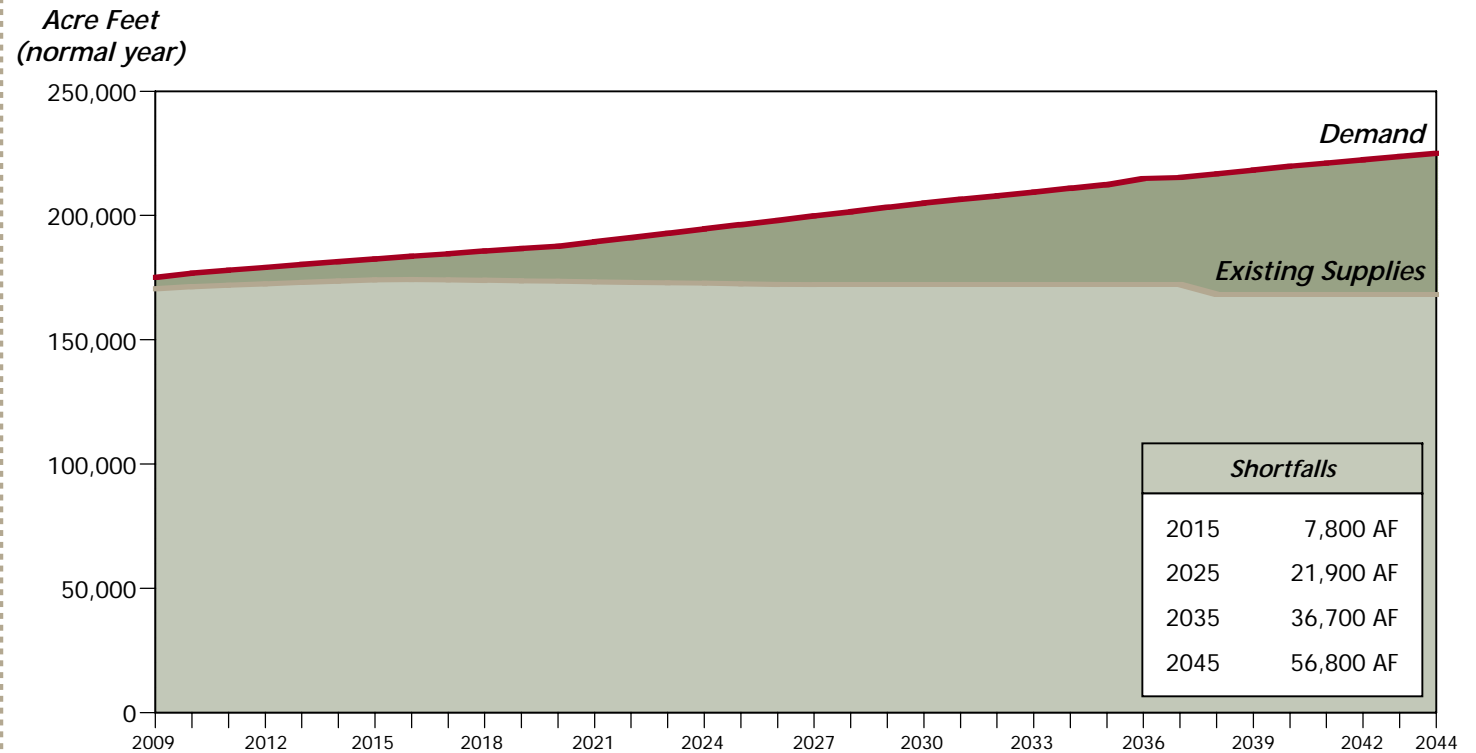
# What if the Drought of Record happened again and SAWS had only its current supplies?

|   | <u>2008</u> | <u>2009</u> | <u>2010</u> | <u>2011</u> | <u>2012</u> | <u>2013</u> | <u>2014</u> |
|---|-------------|-------------|-------------|-------------|-------------|-------------|-------------|
| <b>Hydrology</b>                        |             |             |             |             |             |             |             |
| Precipitation                           | Very Dry    | Dry         | Very Dry    | Dry         | Very Dry    | Very Dry    | Very Dry    |
| Simulated year                          | 1950        | 1951        | 1952        | 1953        | 1954        | 1955        | 1956        |
| Worst CPM Stage                         | 1           | 2           | 2           | 4           | 4           | 4           | 4           |
| <b><i>Demands (AF)<sup>1</sup></i></b>  | 159,900     | 163,600     | 164,600     | 165,900     | 167,300     | 167,600     | 166,100     |
| <b><i>GPCD</i></b>                      | 119         | 122         | 122         | 123         | 124         | 125         | 125         |
| <b><i>Supplies (AF)<sup>2</sup></i></b> |             |             |             |             |             |             |             |
| Edwards Aquifer                         | 140,600     | 144,500     | 145,700     | 139,900     | 131,100     | 126,600     | 138,600     |
| ASR recovery                            | 0           | 0           | 0           | 7,300       | 15,200      | 0           | 0           |
| Other <sup>3</sup>                      | 19,300      | 19,100      | 18,900      | 18,700      | 18,500      | 18,300      | 18,100      |
| <b><i>Total supplies</i></b>            | 159,900     | 163,600     | 164,600     | 165,900     | 164,800     | 144,900     | 156,700     |
| <b><i>Shortage amount</i></b>           | 0           | 0           | 0           | 0           | 2,500       | 22,700      | 9,400       |

1. Demands are adjusted for emergency conservation and fixed at 2005 levels for this analysis.
2. Supplies used. These may differ from annually available supplies due to EAA quarterly budget rules.
3. Trinity, Western Canyon and Local Carrizo production.



# How much water is needed for future population growth?





## 2. Are benefits of adding supplies worth the cost?

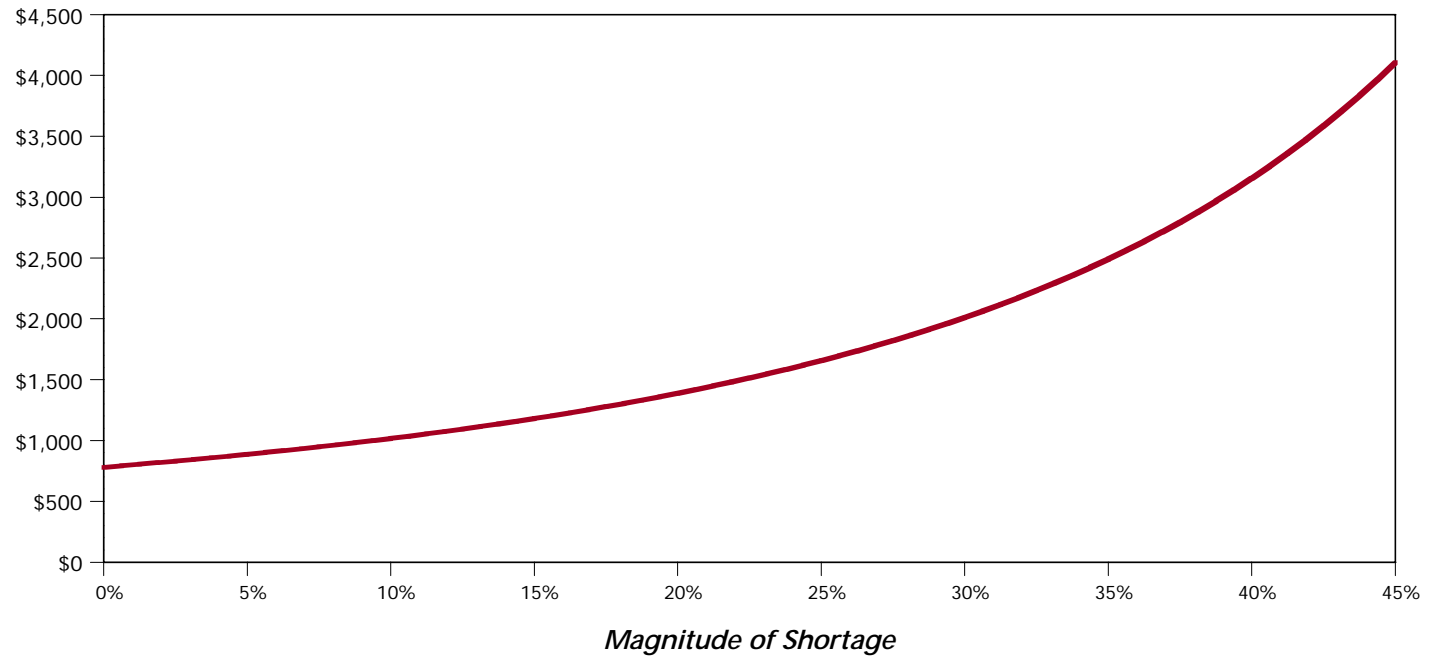
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- Minor cutbacks in water use do not create much economic loss (low value per AF)
- Major cutbacks create substantial economic loss (high value per AF)
- Cutbacks BBC analyzed are in addition to planned water conservation



# Economic cost of SAWS water shortages for water users

*Average Cost  
(per AF)*





## Estimated costs of shortage are comparable to other areas

|                               | <i>Average Cost per AF</i> |                     |
|-------------------------------|----------------------------|---------------------|
|                               | <i>15% Shortage</i>        | <i>35% Shortage</i> |
| San Antonio (2005)            | \$1,180                    | \$2,490             |
| Atlanta (2003)                | \$1,577                    | \$4,500             |
| California Urban Areas (1999) | \$2,250                    | \$3,600             |



### 3. Which water supplies are best?

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- Moderate Edwards acquisitions
- Aggressive Edwards acquisitions
- Regional Carrizo
- Composite Carrizo/Moderate Edwards
- Simsboro
- LCRA



## Special issues with additional Edwards acquisitions

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We know:

- Rights will rarely (never?) be used by irrigators
- Transferring rights will increase total pumping from the Edwards

We think:

- This will lower aquifer levels and increase frequency of critical periods
- Yield of SAWS' current Edwards rights will be reduced

How we modeled uncertainty:

- BBC tested sensitivity by looking at two extremes:  
(a) no effect; and (b) 50% yield of new Edwards supplies



## Present value benefits and costs, 2005-2044 (in \$ millions)

| <i>Scenario</i>                         | <i>Benefits</i>       | <i>Costs</i>          | <i>Net Benefit/<br/>(Cost)</i> |
|---|-----------------------|-----------------------|--------------------------------|
| Moderate Edwards                        | \$200-360             | \$50-60               | \$140-310                      |
| <b><i>Aggressive Edwards</i></b>        | <b><i>360-540</i></b> | <b><i>80-110</i></b>  | <b><i>250-460</i></b>          |
| <i>Regional Carrizo</i>                 | <i>650</i>            | <i>300</i>            | <i>350</i>                     |
| <b><i>Composite Carrizo/Edwards</i></b> | <b><i>610-650</i></b> | <b><i>210-300</i></b> | <b><i>350-400</i></b>          |
| Simsboro                                | 530                   | 460                   | 70                             |
| <b>LCRA</b>                             | <b>500</b>            | <b>1,700</b>          | <b>(1,200)</b>                 |



## Near-term and long-term effects

|                                  | <i>No<br/>Action</i> | <i>Aggressive<br/>Edwards</i> | <i>Regional<br/>Carrizo</i> | <i>Composite<br/>Carrizo/<br/>Edwards</i> |
|----------------------------------|----------------------|-------------------------------|-----------------------------|---|
| <i>2005-2024</i>                 |                      |                               |                             |   |
| Annual cost per household        | \$0                  | \$2-5                         | \$17                        | \$5-17                                    |
| Years of shortage<br>(out of 20) | 14                   | 4-10                          | 1                           | 1-9                                       |
| Average shortage*                | 7%                   | 1-3%                          | 6%                          | 3-6%                                      |
| <i>2025-2044</i>                 |                      |                               |                             |   |
| Annual cost per household        | \$0                  | \$1-5                         | \$15                        | \$16-19                                   |
| Years of shortage<br>(out of 20) | 19                   | 16-18                         | 2                           | 2   |
| Average shortage*                | 19%                  | 7-12%                         | 4%                          | 4%  |



## 4. What are economic impacts of supply options?

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### *In San Antonio – from reduced shortages*

- Residential/Commercial – landscaping industry
- Industrial – increased output/jobs

### *In San Antonio – from rate increases*

- Reduced disposable income – effects on output/jobs

### *In Areas of Origin*

- Increased pumping costs
- Benefits from SAWS payments



## San Antonio industries at greatest risk from shortages

|                    |   |                                      |
|--------------------|---|--------------------------------------|
| Chemicals          | } | <i>\$2.5 billion in output</i>       |
| Petroleum Products |   | <i>7,000 jobs</i>                    |
| Paper Products     |   | <i>\$400 million in labor income</i> |
| Primary Metals     |   |                                      |
| Food Products      |   |                                      |
| Landscaping        | } | <i>\$100 million in output</i>       |
|                    |   | <i>3,000 jobs</i>                    |
|                    |   | <i>\$50 million in labor income</i>  |



## Potential economic impacts from shortages in San Antonio\*

|                    | Annual Average (2005–2044) |                       |                     |
|--------------------|----------------------------|-----------------------|---------------------|
|                    | <i>Output</i>              | <i>Number of Jobs</i> | <i>Labor Income</i> |
| No Action          | \$94 million               | 1,700                 | \$34 million        |
| Aggressive Edwards | \$18-41 million            | 500-1,000             | \$9-19 million      |
| Regional Carrizo   | \$2 million                | 60                    | \$1 million         |
| Composite          | \$1.5 million              | 50                    | \$0.8 million       |
|                    | Worst Year (2005–2044)     |                       |                     |
|                    | <i>Output</i>              | <i>Number of Jobs</i> | <i>Labor Income</i> |
| No Action          | \$525 million              | 4,000                 | \$123 million       |
| Aggressive Edwards | \$125-320 million          | 2,900-3,500           | \$55-88 million     |
| Regional Carrizo   | \$25 million               | 700                   | \$13 million        |
| Composite          | \$16-25 million            | 500-700               | \$8-13 million      |



## Potential economic impacts from rate increases in San Antonio

|                    | Annual Average (2005–2044) |                       |                 |
|--------------------|----------------------------|-----------------------|-----------------|
|                    | <i>Output</i>              | <i>Number of Jobs</i> | <i>Income*</i>  |
| No Action          | \$0                        | 0                     | \$0             |
| Aggressive Edwards | \$10-14 million            | 55-75                 | \$5-7 million   |
| Regional Carrizo   | \$40 million               | 200                   | \$20 million    |
| Composite          | \$34-40 million            | 170-200               | \$17-20 million |



## Summary of potential impacts in San Antonio

*Compared to an ideal world of no shortages  
and no cost increases:*

*Annual Average Job Losses (2005–2044)*

|                    | <u>Shortages</u> | <u>Rate Increases</u> | <u>Total</u> |
|--------------------|------------------|-----------------------|--------------|
| No Action          | 1,700            | 0                     | 1,700        |
| Aggressive Edwards | 500-1,000        | 55-75                 | 555-1,075    |
| Regional Carrizo   | 60               | 200                   | 260          |
| Composite          | 50               | 170-200               | 220-250      |



## Potential impacts on areas of origin

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- Aggressive Edwards:
  - Little or no impact on water needed for agriculture
  - \$50 - \$75 million wealth transfer to farmers
  
- Regional Carrizo:
  - Modest impact on pumping costs for Gonzales/Wilson County water users
  - Financial benefit to groundwater lessors and construction contractors
  
- Composite:
  - Mix of Edwards and Carrizo project effects



## 5. Are there benefits and costs not quantified?

Other advantages of Carrizo over additional Edwards supplies:

- Diversification in supplies
- More protection against entering critical periods for those who rely on Edwards
- Better relations with downstream interests
- Other political benefits
- However, could be affected by future groundwater district rules



## 6. How confident is BBC in these conclusions?

Conclusions that are relatively certain:

- SAWS will be short of water under No Action
- Benefits of adding certain supplies exceed costs
- Carrizo is economically preferable to other imported supply projects
- Impacts of Edwards and Carrizo options are relatively mild
- Compared with Edwards acquisitions, Carrizo costs are more up-front
- There are other advantages of the Carrizo project over Edwards acquisitions



## 6. How confident is BBC in these conclusions?

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Key uncertainties:

- Magnitude of drought  
(may be more severe than BBC analyzed)
- Impact of additional Edwards pumping and future Edwards rules
- Acquisition costs of Edwards rights



## Summary

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- Best alternatives are Edwards acquisitions and Carrizo
- Carrizo has fewer risks and supplies more water
- Rate impacts will be larger and quicker with Carrizo
- Will current customers be willing to invest in a long-term benefit for the region?