# Turning Water into Wine

## *Using Decision Analysis to Inform Municipal Water Management Decisions*


**Tim Nieman**
**Decision Applications, Inc.**

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Decision Applications

# The Problem: Water

- **California**: Water is *always* an issue.
- **Napa Valley**: Water is critical to wine based economy.
- **St. Helena**: Quality of life depends on adequate water.

  Water issues wrapped up in City growth management.

# Initial Problem Definition

From City Council minutes November 24, 2009:

"Identify and confirm the capacity of the city's infrastructure specific to water… establish clear policy language regarding the ability of the General Plan Update to accommodate any and all growth as proposed."

# Timeline

Initial Phase

Nov. 2009: Committee created by City Council

Jan-Feb, 2010: Framing

Mar-Apr, 2010: Assessment and Modeling

May-Jun, 2010: Review, sensitivities, recommendation

July, 2010: Presentation to Council, Planning Commission

2010-2011: Re-write water sections of General Plan

2011-2012: Developed new water shortage policies

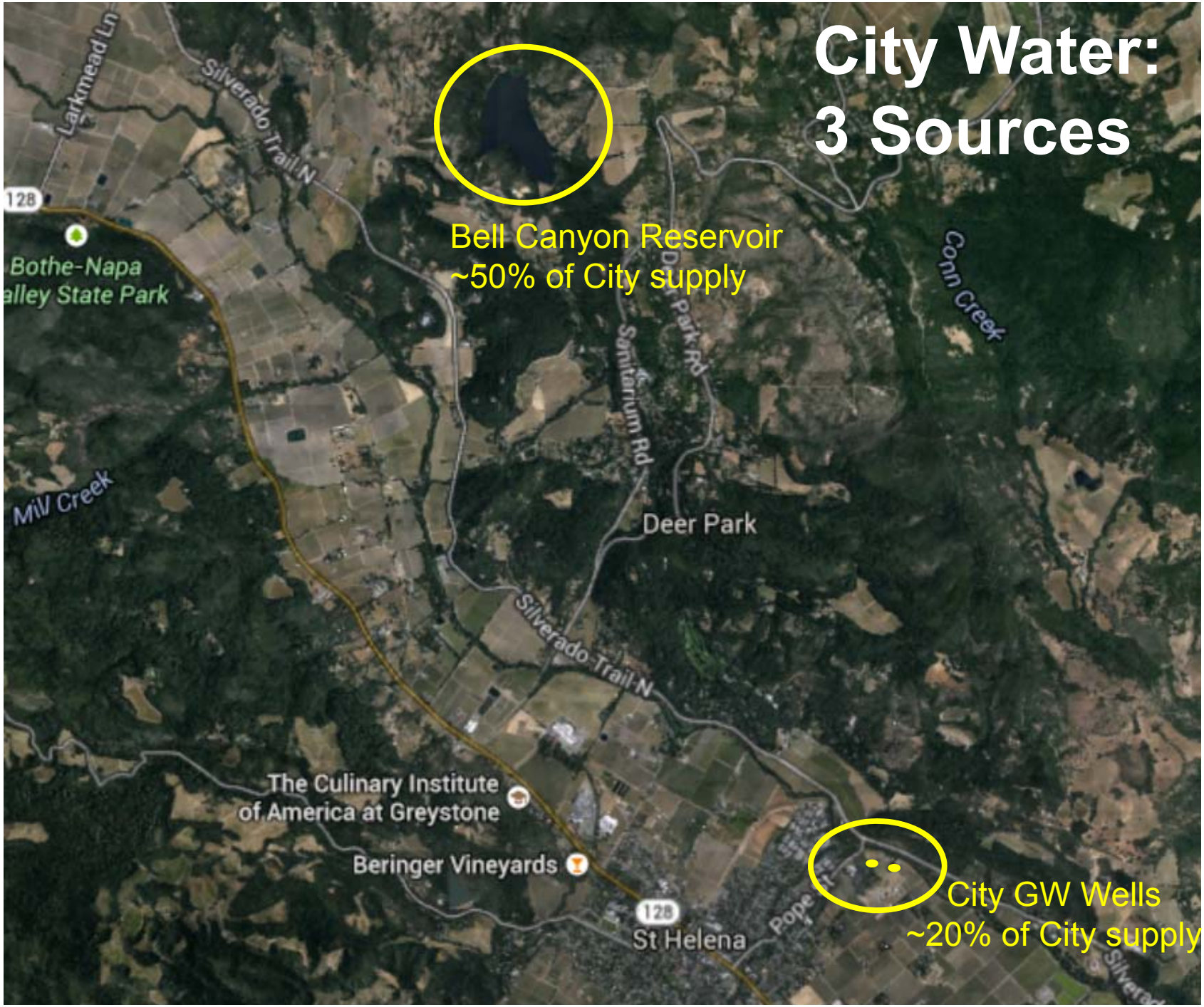
2012: Developed new water allocation process

2013: First application of water allocation process

2014: First application of new water shortage measures

# Some Issues

- No initial intent to do Decision Analysis
- Brown Act restrictions
- Some committee members (and much of the public) believed they “knew” the answer, no more analysis needed
- Need to inform and engage the public


City Water:
3 Sources
Bell Canyon Reservoir
~50% of City supply
Larkmead Ln
Silverado Trail N
128
Bothe-Napa
alley State Park
Mill Creek
Sanitarium Rd
Deer Park Rd
Conn Creek
Deer Park
Silverado Trail N
The Culinary Institute
of America at Greystone
Beringer Vineyards
128
St Helena
Pope St
City GW Wells
~20% of City supply
City of Napa
~30% of City
supply
Napa

**Decision Makers**: City Council acting on behalf of the residents of St. Helena

Decision Makers' **Objectives** for Water:

- Minimize frequency and severity of water shortages

- Minimize costs of water administration to the city, and costs to residents

$


- Minimize impacts to other non-city water users (agriculture)

# More Frame

Decisions

- General Plan Language
  - Growth Policies
  - Conservation Policies
  - Groundwater Usage Policies
- Recycled Water Construction and Operations

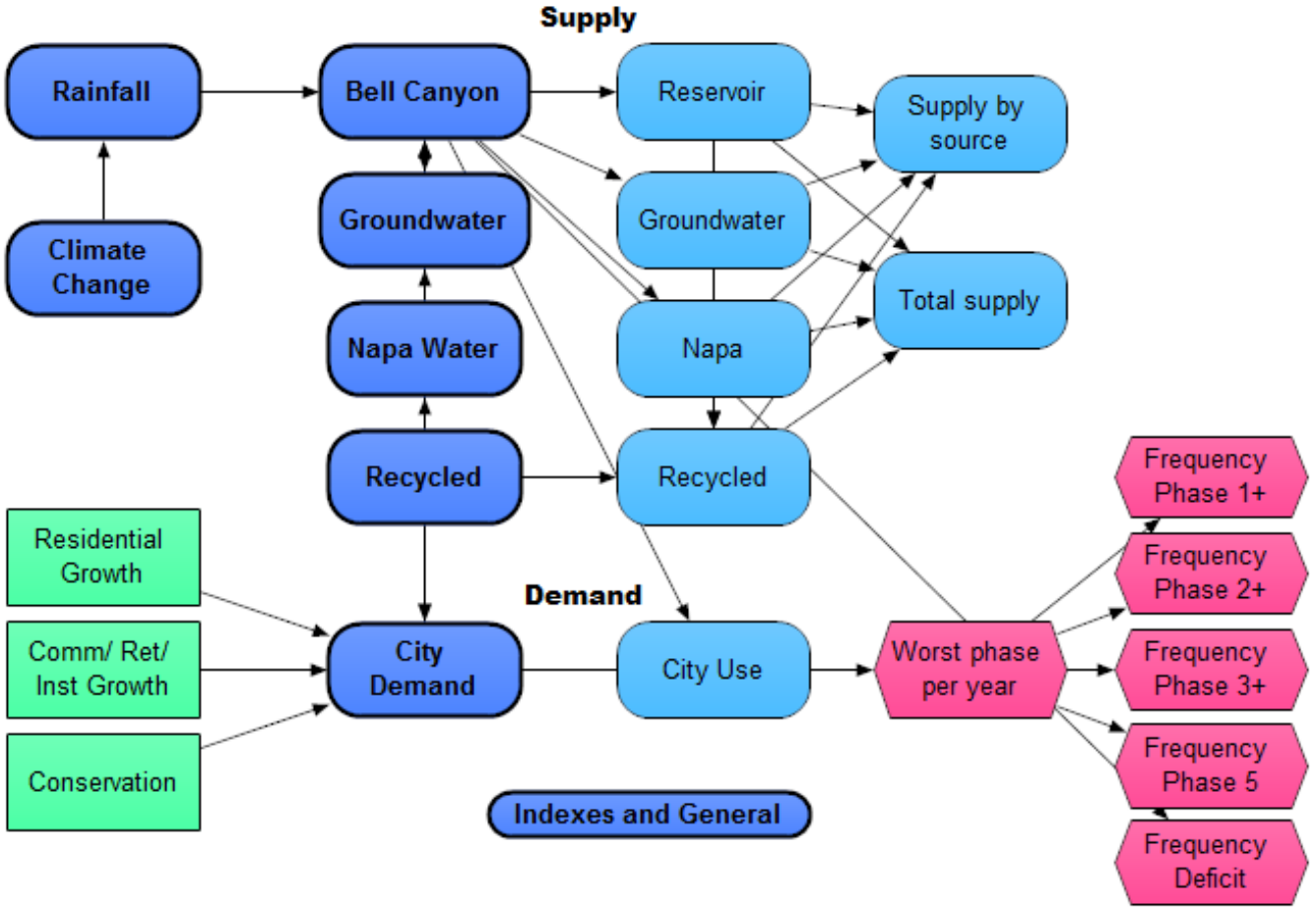
Key Uncertainties

- Climate
- Napa Water
- Groundwater
- Future demand
- Effectiveness of conservation efforts
- Recycled water development

*Models extend to 2036 to incorporate longer term uncertainties*

# Models

- Supply / Demand operational model driven by climate uncertainty
- Monte Carlo simulation to propagate precipitation and other uncertainty (Analytica® software)

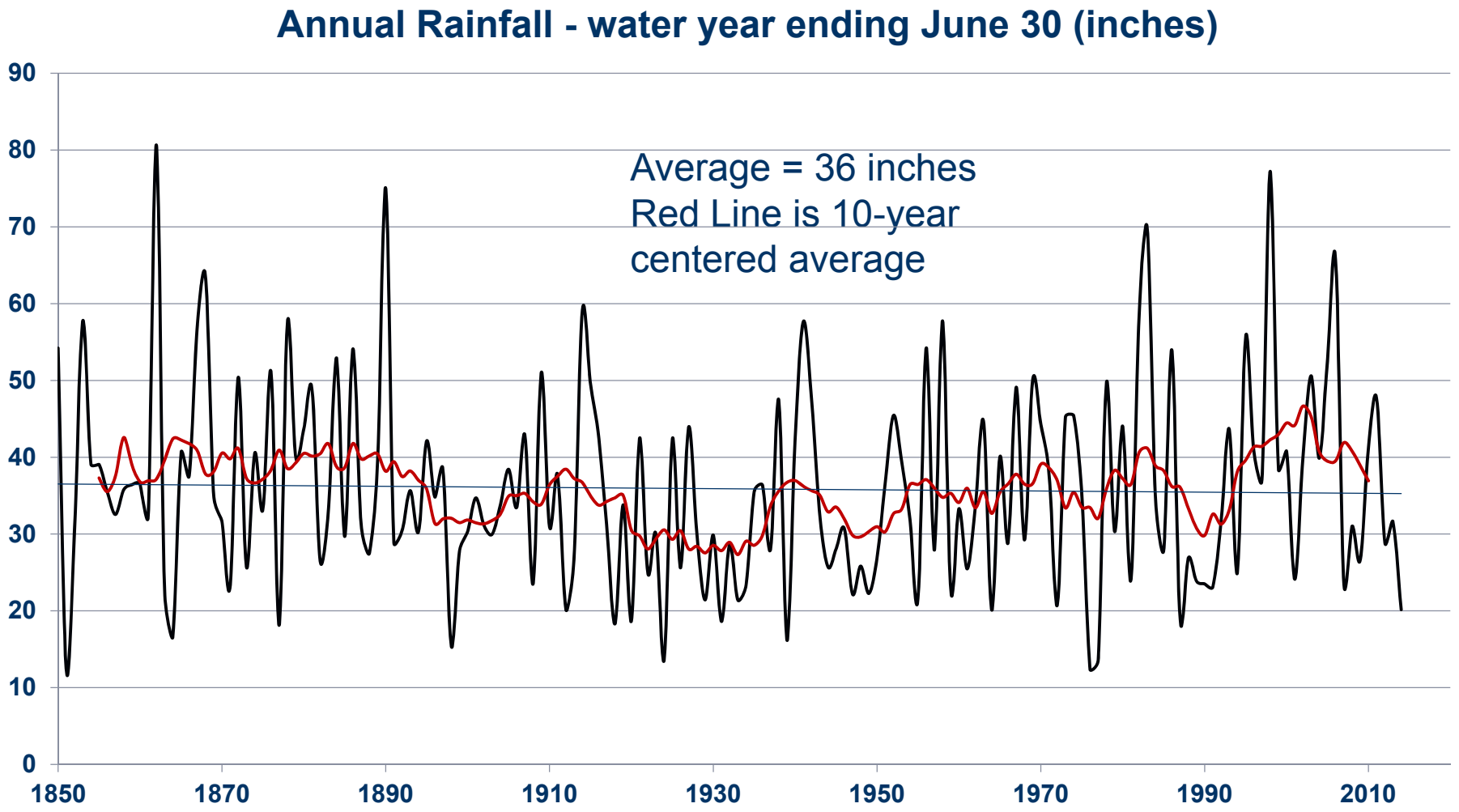


# Models

## Bell Canyon reservoir operational sub-model

# Models

Include precipitation patterns



# Climate Change

## State of the Science

- Downscaling of global climate models to local scales (i.e. the scale of Napa Valley) is an area of active research
- Scientists are becoming more confident in *global temperature* models
- They are not as confident in specific predictions about downscaled *local precipitation*

# Climate Change

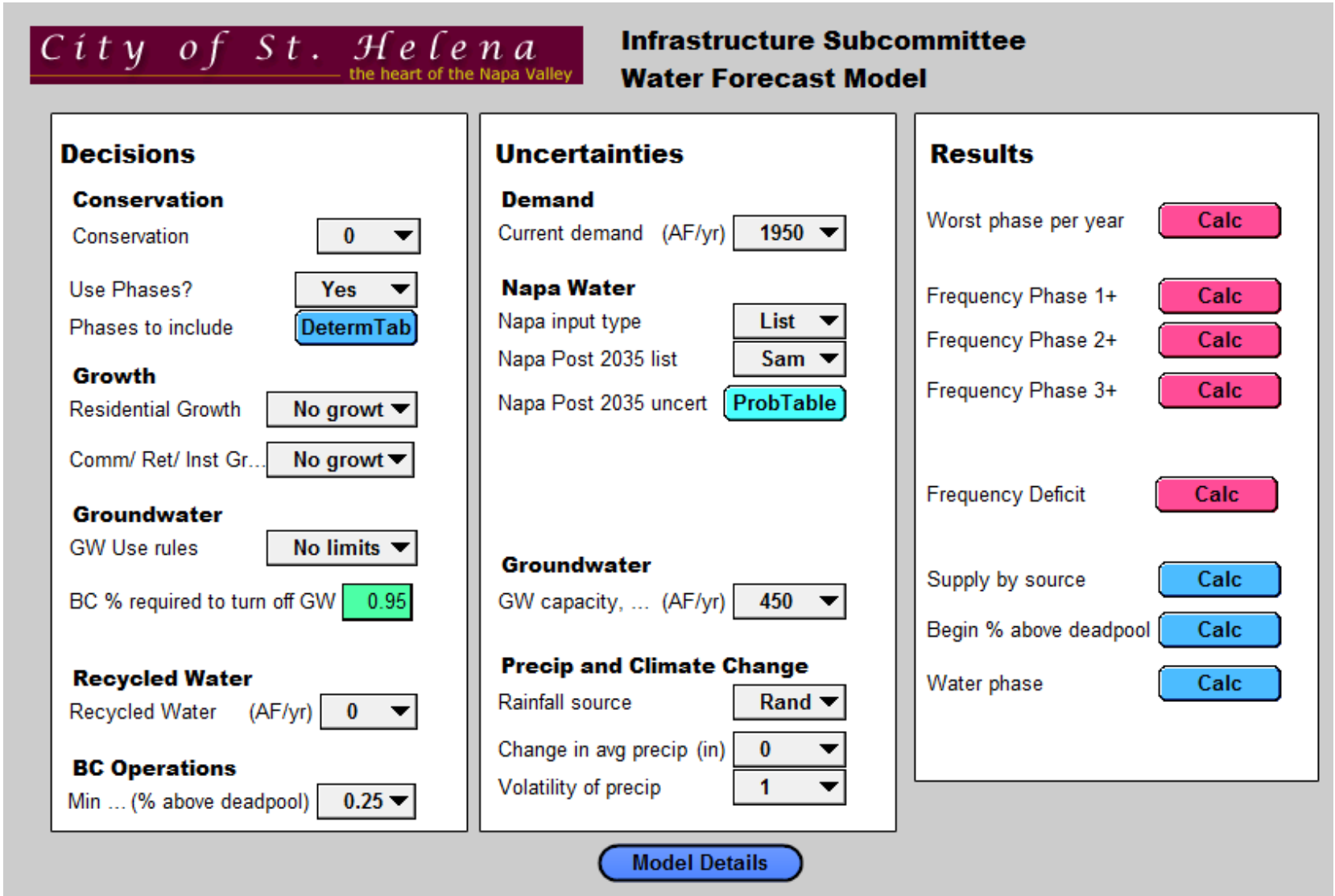
**What climate scientists will say:**

- Volatility in rainfall likely to increase (i.e. more periods of sustained rain and more droughts)
- Possibility of long-term changes to climate are increased (i.e. we could become a wetter climate or a drier climate, but not clear which way)

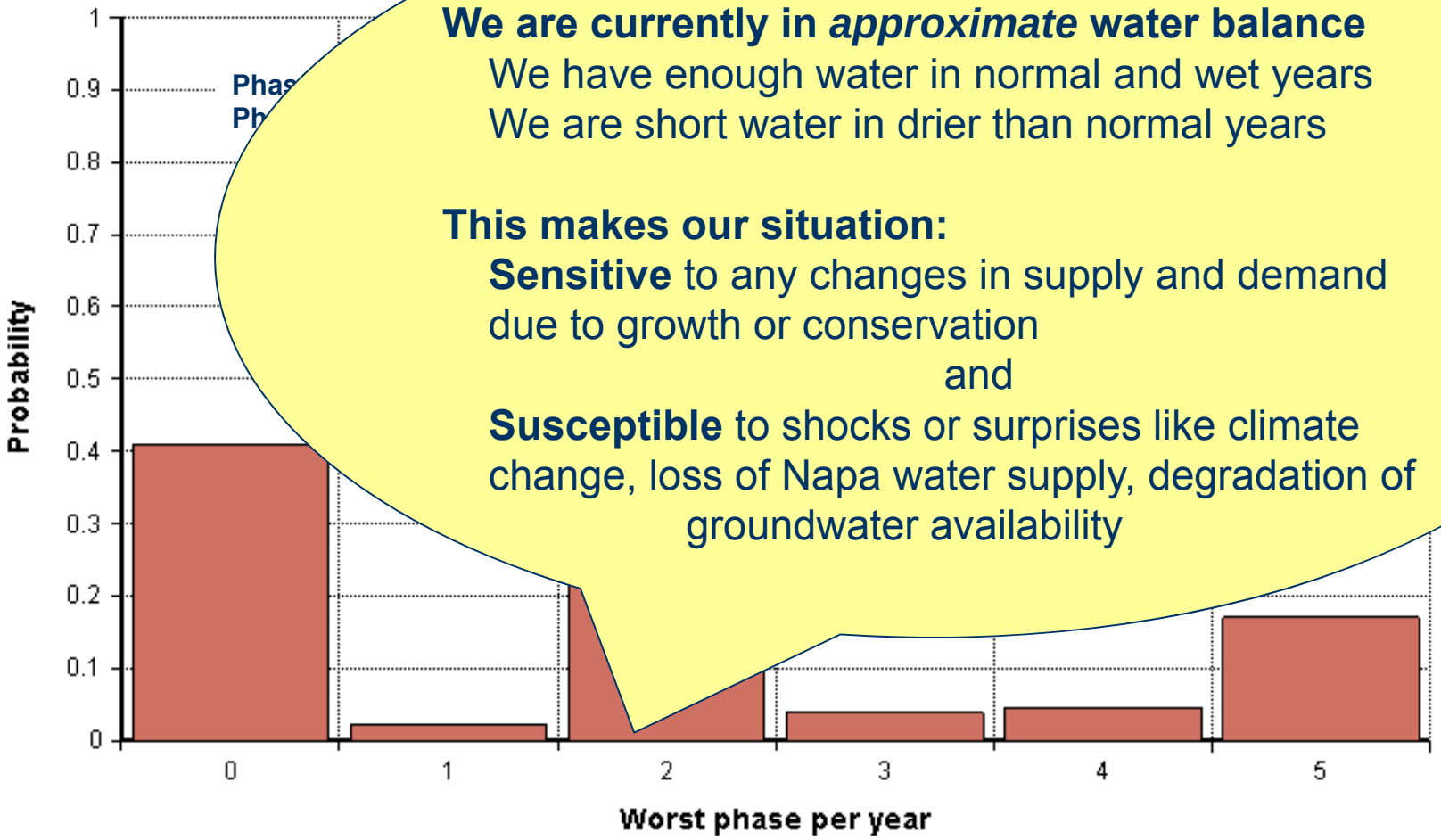
**Models**: Climate changes captured as increase in volatility, but no preference about wetter versus drier

# Models

## Evaluate various decisions available to the city



# Results: Current Situation




**We are currently in *approximate* water balance**

We have enough water in normal and wet years

We are short water in drier than normal years

**This makes our situation:**

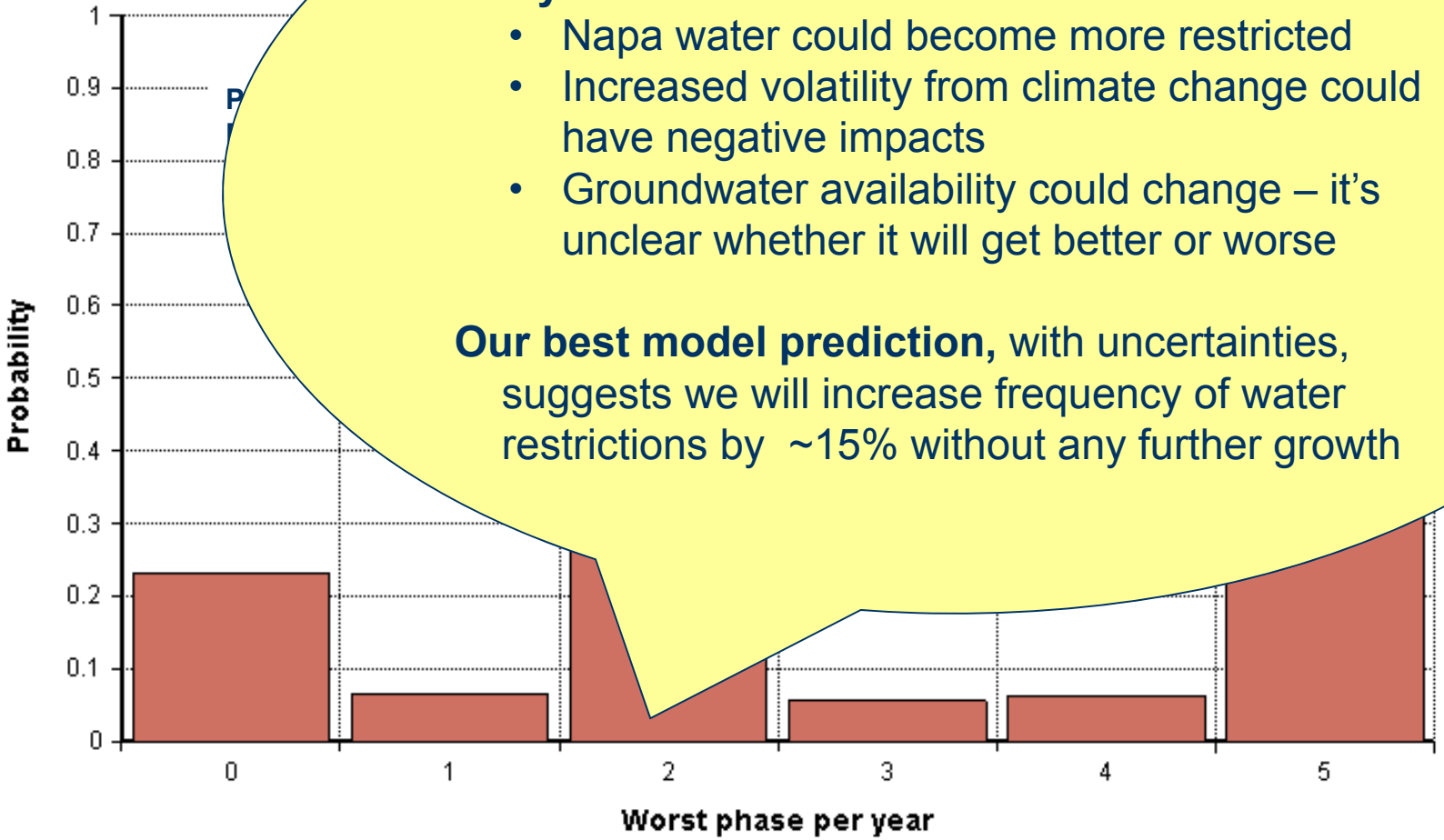
**Sensitive** to any changes in supply and demand due to growth or conservation

and

**Susceptible** to shocks or surprises like climate change, loss of Napa water supply, degradation of groundwater availability

# Results: Future Scenarios (year 2036)

**No growth**: with u… / climate chan…




**Even without further growth, water situation is likely to worsen**

- Napa water could become more restricted
- Increased volatility from climate change could have negative impacts
- Groundwater availability could change – it's unclear whether it will get better or worse

**Our best model prediction,** with uncertainties, suggests we will increase frequency of water restrictions by ~15% without any further growth

# Results: Napa contract scenario

## Scenario: Napa contract not renewed after 2035

Growth versus Conservation & GW: with uncertainty for GW capacity / climate change

| Growth Scenario | Conservation required to maintain current frequency of water restriction | Additional GW (AF) required to maintain current frequency of water restriction |
|---|---|---|
| No growth | 30% | 630 |
| ABAG + ½ non-residential growth | 33% | 730 |
| GP buildout + non-residential growth | 38% | 910 |
| Full buildout + non-residential growth | 43% | 1130 |

# Results: Climate Scenarios

**Scenario: Long-term change to climate: 29 in/yr rather than 36**

Growth versus Conservation & GW: with uncertainty for Napa contract / GW capacity

| Growth Scenario | Conservation required to maintain current frequency of water restriction | Additional GW (AF) required to maintain current frequency of water restriction |
|---|---|---|
| No growth | 35% | 800 |
| ABAG + ½ non-residential growth | 38% | 920 |
| GP buildout + non-residential growth | 42% | 1140 |
| Full buildout + non-residential growth | 47% | 1360 |

# Results: Climate Scenarios

**Scenario: Long-term change to climate: 43 in/yr rather than 36**

Growth versus Conservation & GW: with uncertainty for Napa contract / GW capacity

| Growth Scenario | Conservation required to maintain current frequency of water restriction | Additional GW (AF) required to maintain current frequency of water restriction |
|---|---|---|
| No growth | 0% | 0 |
| ABAG + ½ non-residential growth | 3% | 50 |
| GP buildout + non-residential growth | 9% | 230 |
| Full buildout + non-residential growth | 17% | 440 |

# Impacts on City decision-making

- Clearer picture of water supply / demand
  - For City Council AND residents
  - Changed the perspective and nature of the conversation
    - No more questions of “Do we have enough water?”
      (It’s the wrong question)
- Wrote new language and policies in General Plan for growth and water management
- Re-designed Water Shortage Emergency systems
- Created new water allocation process
- Can provide real-time analysis of situations

# Benefits to City

## Mayor Ann Nevero (2014):

"The work done by the Water Committees for the City of St. Helena completely altered the planning process used by the city staff, Planning Commission and City Council. The previous lack of data-driven decision processes had resulted in long-standing political positioning around future planning, rather than the solid, non-political approach needed to set the appropriate direction for the entire city. The process also united political opponents, assured the public and provided a tool for leading-edge and exceptional governmental decision making now, and into the future".

## Vice-mayor Peter White (2014):

"Your work on the Safe Yield Committee was undoubtedly the most useful information for the City Council to form our policy decisions regarding water usage. Water is one of the City of St. Helena's most valuable resources and scarcest resource. We needed accurate scientific data that we could rely on to make our informed decisions. The professionalism you demonstrated gave us the confidence that we had the data that we could use in this most crucial task. We thank you for your service".

## Vice-mayor Eric Sklar (2010):

"Tim's analysis gave us, for the first time, real insight into the probabilities of different outcomes. He allowed us to plug in what-ifs and ask questions that allow for intelligent policy making in a way we never could with the insufficient data previous consultants had provided".

# Council member Bonnie Schoch (2010):

"The water subcommittee proved to be one of the most successful subcommittees I've ever served on. A group of individuals who came into the committee with different opinions worked together to gather facts and came away with a collaborative proposal… With the hard work of the participants I came out with a different opinion than I went in with".

Henry Gundling, resident (2010):

"Your water committee set a new, high standard for how controversial decisions should be made in Saint Helena and every community".

# Some Takeaways

- Transparency and dialogue are key to community buy-in
  - Supported by data, logic and good analysis!
- Keep it as simple as possible
- Don’t always need to sell decision analysis as Decision Analysis
- The Brown Act – annoyance, or good thing, or both?
- Helping your community is great, but…

# Questions?