Working Toward a Sustainable Water Supply Solution
2019 AEP Conference

PRESENTED BY:
Rosemary Menard, Ron Duncan and Brian Lockwood
Ann Sansevero (Moderator)

March 25, 2019
Overview

01 Rosemary Menard, Water Director, Santa Cruz Water Department

02 Ron Duncan, General Manager, Soquel Creek Water District

03 Brian Lockwood, General Manager Pajaro Valley Water Management Agency
Santa Cruz is located about 75 miles south of San Francisco, with the city water utility serving about 100,000 customers inside and outside the city limits.
According to the 2008 book, “The Leftmost City”

- From the late 1960s until recently, Santa Cruz, California was the most politically progressive medium-sized or large city in the United States.
- A coalition of liberal and progressive interests stopped every major development project they didn't like after 1969 and controlled the City Council from 1981 through the beginning of the 21st century.
- By 2010, the progressive coalition was in decline due to a lack of burning issues and new ideas to energize it.
... And then, the Santa Cruz Water Department proposed building a small desalination plant to address a 40 year old water supply reliability problem.

• Things started to come unglued during the 2011 public review and City Council adoption of the 2010 update to the City’s Urban Water Management Plan;

• And rapidly went down hill from there....
For those of us who have been around awhile, we know that

- Getting a big project done, especially a water supply project, is fraught with pitfalls;

- Some kind of meltdown near the end of the project (and sometimes even earlier) isn’t the exception, it’s the rule.
Beginning in 2011, the desal project became a focal point of community opposition resulting in the project being actively covered by the local newspaper, and its editorial cartoonist...
Santa Cruz anti-desal activists achieved a major strategic victory by successfully amending the City Charter in November 2012 to require a public vote on desal

- “ONLY MEASURE P WILL GUARANTEE THE RIGHT TO VOTE ON DESALINATION because it will place a provision in the City Charter that cannot be changed solely by elected officials.”

<table>
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<th>Election Result</th>
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<td>19,124</td>
<td>72.13%</td>
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<td>7,389</td>
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- And, they followed up this victory by actively attacking the Draft Environmental Impact Report issued for public review and comment in the spring of 2013.
Ultimately, the focus of the desal meltdown was about:

Alternatives and transparency

And the real and/or perceived issues surrounding both
In mid-2013, the Santa Cruz City Council decided to step back and reconsider…

Ultimately deciding to appoint a citizens committee to provide recommendations on how to solve the City’s long-standing water supply reliability problem.
14 citizens appointed by the City Council

Interests represented included: inside and outside city water customers, the Chamber, Coastal Watershed Council, Desal Alts, Sierra Club, Surfrider, Sustainable Water Coalition, the Water Commission and 3 community-at-large members.
The 20-year water demand forecast, including projected growth and consistency with the City’s General Plan, is FLAT.
The projected worst year gap is BIG – peak season shortage with agreed fish flows is 1.2 billion gallons
WSAC’s Problem Statement
July 2015

• Limited Storage
• Need to meet fish flow requirements and prepare for potential climate change impacts
• Resulting peak-season gap: \( \approx 1.2 \) billion gallons worst-year shortage
• Water conservation alone is not enough
Our Water, Our Future: the October 2014 “Santa Cruz Water Supply Convention,” showcased more than 40 water supply solutions and attracted 350 people.
Nearly 100 Alternative Water Supply Solutions Identified and Screened

- Expanded conservation, e.g.,
  - Peak season demand reduction
  - Water neutral development
- Decentralized systems, e.g.,
  - Graywater
  - Rainwater catchments
  - Water from humidity in the air
- Winter flow harvest, e.g.,
  - Passive and active recharge
  - Water transfers and exchanges
- Water reuse
  - Various approaches to non-potable and potable reuse
- Desalination
  - Various locations and technological approaches to seawater desalination
WSAC Supply Augmentation Recommendations

- Implement additional water conservation efforts
- Explore the feasibility of winter water harvest to create drought supply of 3 billion gallons to provide for 2 years of back to back drought
  - In-lieu water transfers/exchange with Soquel Creek Scotts Valley and/or San Lorenzo Valley water districts
  - Aquifer storage and recovery (ASR) in the Santa Margarita and/or Santa Cruz Mid-County Basins
- Explore the feasibility of alternative water supplies to supplement existing sources during droughts
  - Recycled water
  - Desalination
IMPLEMENTING THE WSAC RECOMMENDATIONS
Passive Recharge: In Lieu: Transfers & Exchanges

- **Concept:** Wet season water transfers and/or exchanges with Soquel Creek, Scotts Valley and/or San Lorenzo Valley water districts;
- Groundwater is “passively stored” based on districts not pumping their wells;
- Storage volumes limited by demands of 3 districts, with assumed wet season average demands of:

<table>
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<td>2.3 mgd</td>
<td>1.3 mgd</td>
<td>0.9 mgd</td>
<td>4.5 mgd</td>
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Current Status of In-Lieu

- Pilot transfers initiated with the Soquel Creek Water District on December 3, 2018 and continuing at this time.
- Continuing discussions with other agencies about their ongoing interest in water transfers.
- Continuing to refine groundwater modeling work to determine benefits to the basin(s) and ability to return water to Santa Cruz when needed for drought supply.
Active Recharge: Aquifer Storage and Recovery

- Concept: store wet season available flows in regional aquifers for future use during drought.
Current Status of Aquifer Storage & Recovery

- Completed Phase I technical analyses – No Fatal Flaws;
- Used modeling to confirm water availability to meet drought supply needs and establish preliminary infrastructure sizing;
- Pilot testing of ASR in the western Purisima ongoing at this time.
June 2018 Recycled Water Study

- Looked at about ~40 alternatives for using recycled water.
- Two small projects for non-potable reuse recommended and multiple potable reuse options continue to be evaluated.
Recycled Water Alternatives Analyzed

Surface Water Augmentation

Groundwater Replenishment (Santa Margarita Groundwater Basin)

Direct Potable Reuse Streamflow Augmentation in the San Lorenzo River

Groundwater Replenishment (Purisima Formation)
Seawater Desalination Update

- Following WSAC’s recommendations, the City conducted a feasibility update for desalination with a focus on costs, timeliness and changed conditions since 2013.

- Changed regulatory conditions include a new requirement to evaluate and implement sub-surface intakes for desalination plants, if feasible.

- Completed work in August 2018.

- In November 2018 the City Council approved the Department’s recommendation to de-prioritize desal due to changed regulatory conditions.
Our Water, Our Future
Working Toward a Sustainable Water Supply Solution
AEP March 25, 2019
Long and Winding Road

- 1950s: Water Shortage
- 1960s: Seawater Intrusion
- 1970s
- 1980s
- 1990s
WHY: Seawater Intrusion
Connect - Humanizing the Situation
Process Matters – 30%

Soquel Creek Water District’s
Exploratory Discussions on Water Reduction and Back-Up Water Supply Options

Join the Discussion!
First Tuesday of the month at 7PM at Capitola City Hall
429 Capitola Ave., Capitola

Explore
Meetings are being held once a month to discuss various water supply options and projects.
September 2013 - April 2014

Evaluate
Potential projects will undergo an evaluation and analysis process based on a broad set of objective criteria.
Late Spring 2014

Select
The intent of this process is to shortlist a back-up option (or options) to further evaluate.
~ Summer 2014

Soquel Creek Water District relies entirely on groundwater for its water supply which is overpumped and experiencing seawater intrusion, a condition that allows seawater to enter and contaminate the groundwater supply.

The District has been evaluating a joint seawater desalination project with the City of Santa Cruz since 2007 but is also exploring back-up options.

For more information visit www.squelcreekwater.org/exploratory-discussions or call 831-475-8500 or email melanie@squelcreekwater.org.
PUREWater Soquel

Science-Based & Community Values Driven

- Water Quality
- Environment
- Reliable
- Affordable
- Timely
- Scalable
Created With Our Community, For Our Community

2014 Community Water Plan

COMMUNITY WATER PLAN
Our Path to a Reliable Water Supply
Conservation, Groundwater Management, New Water Supplies

2017 Progress Report

SOQUEL CREEK WATER DISTRICT
PUREWater Soquel
Replenishing Mid-County Groundwater

Source $\text{H}_2\text{O}$

Advanced Treatment Process

Purify $\text{H}_2\text{O}$

Recharge Wells

Replenish Basin

Treated Secondary Effluent Water
Pure Water Soquel Cost

• Project Cost Estimate: $90M

• Grants awarded:
  • $75K - SWRCB Feasibility Study (FS)
  • $150K – US Bureau of Reclamation FS
  • $2M – SWRCB Planning Grant -Prop. 1

• Potential grants:
  • Up to $50M SWRCB Construction Grant
  • Up to $20M US Bureau of Reclamation

• Costs with Grants = $20M ($90 - $70M = $20M)
|---------------------|--------------------------|--------------------------------------|----------------------------------|

(1) CEQA Completed Dec. 2018

Pure Water Soquel Proposed Timeline
Plan vs. Strategy
Outward Looking

scanning the landscape

SEPTEL

• Social, Economic, Political, Technological, Environmental, Legal
Inward Focus
strategy design and strategy delivery

- Both equally important
- Design is headed and delivery is humanistic
- About the right people and team evolution
Identify and Address Critical Success Factors

Example: Water Quality
Disruption – be ready
Thank you

Ron Duncan, GM
Soquel Creek Water District
rond@soquelcreekwater.org
Stakeholder Driven Water Resources Management, Pajaro Valley Groundwater Basin

Association of Environmental Professionals State Conference

March 25, 2019

Presented by:
Brian Lockwood, PG, CHg
General Manager
Presentation
Overview

• Acknowledgements
• Background
• SGMA
• Basin Management Planning
• Summary
Pajaro Valley Water Management Agency

• Formed by the CA State Legislature in 1984

• Our Job: Achieve Sustainable Groundwater Resources

• Multi-jurisdictional: City of Watsonville, parts of Santa Cruz, Monterey and San Benito Counties

• Basin Management Planning, Well Metering, Hydrologic Modeling, Supplemental Water, Conservation
Sustainable Groundwater Management Act
Sustainable Groundwater Management Act

- The Sustainable Groundwater Management Act or SGMA (September 2014) requires that high priority, critically overdrafted groundwater basins such as the Pajaro Valley be brought into balance by 2040.
- **If not, the State Water Resources Control Board may intervene and may impose pumping restrictions.**
Pajaro Valley Water & SGMA

- PV Water Est. 1984
- SGMA Adopted, Fall 2014
- Groundwater Sustainability Agency, Fall 2015
- Basin Boundary Modification, Spring 2016
- Prop. 1 Sustainable Groundwater Planning Grant - $1.5 million, Spring 2018, pending Alternative
State of the Basin
Irrigated agriculture 37%
Non-irrigated agriculture 3%
Native Vegetation / Riparian 43%
Urban (Turf) 17%

Ag-Economy:
- >28,000 Irrig Acres
- Est. Crop Value $1,000,000,000

Pajaro Valley Land Use
Summer 2018

Explanation
- San Andreas Fault Trace
- Pajaro River
- Waterbody
- PV Water Boundary

Land Use Classifications
- Native Vegetation / Riparian
- Turf (Urban)
- Fallow
- Vegetable Row Crops
- Strawberries
- Caneberries
- Vines
- Orchards
- Other

Sources: Esri, HERE, FAO, NPS, NRCAN, Cagi, Japan, METI, Esri China contributors, and the CIA

This is a graphic representation developed and best current available data sources & professional judgement.
2017 Valley-wide Water Use
- Agriculture ~ 85%
- M & I ~ 13%
- Rural Residential ~ 2%

Water Sources
- 96% Groundwater
  - ~850 Ag Wells
  - ~1,200 RR Wells
- 3% Recycled Water
- 1% Surface Water
Pajaro Valley Aquifer System

Six Model Layers:
- Alluvium
- Alluvial Confining Unit
- Upper Aromas
- Aromas Confining Unit
- Lower Aromas
- Purisima

PVHM Report
Hanson, et al, 2014
Seawater Intrusion within the Pajaro Valley

Explanation

- Cities & Towns
- PV Water Boundary
- Extent of SWI as of 1951*
- Extent of SWI as of 1966*
- Extent of SWI as of 1998*
- Extent of SWI as of 2011*
- Extent of SWI as of 2017*

*Extent of SWI area represents chloride concentrations of 100 mg/L or greater

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), swisstopo, © OpenStreetMap contributors, and the GIS User Community

Prepared by PV Water on August 1, 2019. This document is a graphic representation developed using the best currently available data sources & professional judgement.
Existing Water Supply Facilities
Grants to Fund Water Supply Projects

• Approximately half of constructed project costs were funded through grants

• PV Water projects, which focus on water conservation and optimize use of local resources, are competitive for federal and state funding
Existing Water Supply Facilities to Reduce Overdraft & Seawater Intrusion

• Harkins Slough Facility
  – Managed Aquifer Recharge & Recovery
  – Stream flow diversion
  – 8,000 AF recharged since 2002

• Recycled Water Facility
  – 4,000 AFY irrigation season capacity
  – Drought tolerant supply
  – Reduces discharge of secondary effluent to marine sanctuary

• Coastal Distribution System
  – Over 21 miles of water conveyance pipeline

• Blend Supplies
Harkins Slough Managed Aquifer Recharge & Recovery
Recycled Water Facility
Geophysics Illustrates Progress

Delivered Water
Starting in 2002

Delivered Water
Starting in 2009

Goebel, et al, JoH, 2017

Geologic Cross Section: Hanson et al., 2002; Brabb et al., 1997
Increasing groundwater elevations to prevent seawater intrusion

![Graph showing Springfield Terrace Well Water Level, 2005 - 2018]

- Monterey County Water Deliveries Begin in 2009
- Mean Sea Level
Water Supply Facilities
Pajaro Valley Hydrologic Model

- A hydrologic flow model to guide water management decisions
- Designed to reproduce all natural & human components of the hydrologic system, and related climatic factors
- Management & planning tool
- Offset in water budget: **12,100 AFY**
In 2010 the PV Water Board established an Ad Hoc Basin Management Plan Committee to…

“investigate all practical projects and programs that contribute to the efficient and economical management of existing and supplemental water supplies” and “serve as an advisory committee to the PV Water Board so that Board decisions are fully informed and affected and guided by the community’s interests”.
# Ad Hoc BMP Committee Members

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<td>Dave Cavanaugh (Chair)</td>
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<td>Kirk Schmidt (Vice Chair)</td>
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<td>Rosemarie Imazio</td>
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<td>Rich Persoff</td>
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<td>John Ricker</td>
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<td>County of Santa Cruz</td>
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<td>Ryan Kelly</td>
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<td>Steve Palmisano</td>
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<td>City of Watsonville</td>
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<td>Harry Wiggins</td>
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<td>Pajaro Sunny Mesa Community Services District</td>
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<td>John E. Eiskamp</td>
<td>Appointed</td>
<td>Santa Cruz County Farm Bureau</td>
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<td>Dave Kegebein</td>
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<td>John Martinelli</td>
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<td>Chuck Allen</td>
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<td>Community Dialogue Effort</td>
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<td>Vicki Morris</td>
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<td>Thomas Karn</td>
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<td>Bob Culbertson</td>
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<td>Amy Newell</td>
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<td>Skip Fehr</td>
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<td>Frank Capurro</td>
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<td>Tom Rider</td>
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Basin Management Plan Update contains three primary components to achieve 12,100 ac-ft/yr:

- **Develop new water supplies**: 4,100 AFY
- **Conservation**: 5,000 AFY
- **Optimize the use of existing water supplies**: 3,000 AFY
Proposed College Lake Integrated Resources Management Project

- Projected Yield: 1,800 to 2,400 AFY
- Water Storage Area (285 acres, 1764 AF)
- Weir Structure, Screened Intake, and Pump Station
- Water Treatment Plant (~5 acres)
- Pipeline (5.5 miles)
Proposed Pipeline Alignment

• Connects College Lake to CDS and recycled water facilities at Watsonville WWTP.
• Serve agricultural uses along route.
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<th>2019</th>
<th>2020</th>
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*Note: BMP schedule anticipated operational project by 2025*
Phase 1 Implementation Results
Average Water Level Change due to Implementing Selected Alternative

Figure 13: Average Water Level Change Due to Implementing Selected Alternative – Upper Aromas Aquifer
Figure 10: Extent of Simulated Seawater Intrusion – Upper Aromas Aquifer

1. This figure shows simulated location and relative degree of existing seawater intrusion and seawater intrusion after implementation of the selected alternative for one of three different aquifers.
2. The aggregated reduction in seawater intrusion for the three aquifers is 90%.
Summary & Future Work

• Existing water supply projects and conservation programs are working to reduce groundwater overdraft and seawater intrusion, but more are needed to eliminate these problems.

• Stakeholder involvement, through ad hoc committees in particular, has been critical to recent successes.

• Projected climate change impacts will present new challenges.

• Work just getting started includes land subsidence analysis, new streamflow monitoring sites to help answer questions pertaining to groundwater–surface water interactions, hydrologic model improvements, and developing funding for proposed projects.
Thank You...

*By phone: 831-722-9292*

*By email: lockwood@pvwater.org*

*Or visit our website: pvwater.org*