JUST ADD WATER…?

All the water that will ever be is, right now.

-- National Geographic, October 1993

INTRODUCTION

San Luis Obispo County (County) is experiencing its most severe drought in more than a century.[1] Consistent with its responsibility to inform the public on matters of local government, the 2013-2014 San Luis Obispo County Grand Jury (Grand Jury) decided it would be appropriate to investigate and report on water supply reliability in the county. Our County Board of Supervisors (Board) declared a drought emergency on March 12, 2014.

The Board's action followed similar declarations by the Governor of California and the U.S. Department of Agriculture. As recently as 2009, the California Department of Water Resources (DWR) warned "California is facing one of the most significant water crises in its history - one that is hitting hard because it has many aspects and consequences."[2] DWR's statement was released three years prior to the beginning of the current drought. Six of the immediate past eight years in the county have been drought years. The effects on ground and surface water supplies in this county have been documented in the media.

Water supply and delivery within the county is the responsibility of many distinct and separate entities (purveyors). There is no centralized authority to access, deliver, regulate or price water.

[1] http://www.ncdc.noaa.gov/sotc/drought/2014/4.
[2] *California Water Plan Update 2009*, Department of Water Resources.

Each of the cities[3] in the county can, within the limits prescribed by the State of California, set its own policy with respect to source, price (rates), and delivery of water. The same is true of the county's Community Service Districts (CSDs). Other public and private entities that source and deliver water in the county include 4 County Service Areas (CSAs) and approximately 140 mutual and private water companies. Additionally there are thousands of residents and property owners whose water supply is sourced from their own wells.[4]

This report provides a brief summary of the water supply reliability issues facing each of the areas within the county. It also provides a summary of activities by both private and public entities to utilize the potential opportunities available for addressing those issues. The report will also describe the water supplies on which residents of the county depend: groundwater, surface water and to a lesser extent recycled and desalinated water. It should be noted these sources are not equally available in all areas of the county.

PROCEDURE

The Grand Jury obtained information for this report from several sources:

1. Presentations and Interviews:
    - A presentation hosted by the Grand Jury on water issues by public works directors of the county's cities on water issues in their jurisdictions. The Grand Jury hosted a similar presentation by county CSDs.
    - Presentations on the county's water supply issues by the following: a County Public Works Department Senior Engineer, a County Planning and Building Department Senior Planner and an independent hydro-geologist familiar with sources of water in the county.
    - An interview with the Director of Public Services, City of Morro Bay, on water issues in that city.

[3] The City of Atascadero is served by the Atascadero Mutual Water Company, owned by its customers.
[4] *The San Luis Obispo County Master Water Report,* 2012.

- An interview on the county's water supply issues with the County's Director of Public Works.

2. Documents included:
   - A letter of inquiry, following the two presentation sessions, to each of the county's cities, the larger CSD's and the County Public Works Department concerning water supply issues.
   - *The San Luis Obispo County Master Water Report*, 2012.
   - *California State Water Resources Board Bulletin 18, Volume 1*, "San Luis Obispo County Investigation", 1958.
   - *California State Water Resources Board Bulletin 118, Update 2003*, "California's Groundwater".
   - *Sustainable Groundwater*, Water in the West, Stanford Woods Institute for the Environment/The Bill Lane Center for the American West, 2013.
   - *Update for the Paso Robles Groundwater Basin: Report to Paso Robles Groundwater Basin Committee*, Todd Engineers, 2007.
   - *Paso Robles Groundwater Basin Water Balance Review and Update*, Fugro West, 2010.
   - *Resource Capacity Study, Water Supply in the Paso Robles Groundwater Basin*, San Luis Obispo County Department of Planning and Building, 2011.
   - *California Water Myths*, www.ppic.org/content/pubs/report/R_1209EHR.pdf, Public Policy Institute of California.

HISTORY

The current drought is the product of three consecutive years of below normal rainfall. Droughts, even severe droughts, are common in California and San Luis Obispo County. The county has experienced serious drought conditions in prior years. The following are examples of past droughts:

- The Drought of 1863-1864: this Civil War Era drought caused the death of most of the state's cattle and the breakup of many of California's great ranchos.[5]
- The Drought of 1976-1977: this drought had two of the five lowest precipitation years in California history prior to the 2013-2014 year.[6]
- The Drought of 1987-1992: described by the University of California as "one of the most widespread and severe droughts in history."[7]
- The Drought of 2007-2009: this drought was not particularly severe compared to the others on this list. However, it ended only two years prior to the current drought and many of its effects on water supply, especially groundwater, have carried forward.[8]
- According to the University of California's Center for Hydrologic Monitoring[9], there were 8 multi-year droughts during the 20th century; taken together they total 29 years.
- Six of the first 14 years of the 21st century have been drought years (2007-2009, 2012-2014).

[5] www.sandiegohistory.org/journal/65january/cattle.htm , *The Journal of San Diego History*, V. 11, Number 1, January 1965, accessed 03/25/2014.
[6] www.weatherwest.com/archives/1038, Weatherwest.com, December 22, 2013.
[7] www.water.ca.gov/waterconditions/docs/2_drought-1987-92.pdf*, California's 1987-1992 Drought*, Department of Water Resources, July 1993.
[8] www.water.ca.gov/waterconditions/drought/docs/DroughtReport2010.pdf, *California's Drought of 2007-2009: An Overview*, California Department of Water Resources, 2010.
[9] www.ucchm.org.

NARRATIVE

When the well is dry, we know the worth of water.

-- Benjamin Franklin, 1746

When is a shortage of water a drought? "Drought is a gradual phenomenon. There is no universal definition of when a drought begins or ends. [The] impacts of drought are typically felt first by those most dependent on annual rainfall – ranchers engaged in dryland grazing, rural residents relying on wells in low-yield rock formations, or small water systems lacking a reliable water source. Drought impacts increase with the length of a drought, as carry-over supplies in reservoirs are depleted and water levels in groundwater basins decline."[10] A glossary of water supply-related terms is located in Appendix A.

TRADITIONAL WATER SOURCES

The two major water sources for county residents are groundwater and surface water. Historically, these sources have been the most readily accessible and economical.

Groundwater

The United States Geological Survey (USGS) definition of groundwater is "water that flows or seeps downward and saturates soil and rock, supplying springs or wells." Deep percolation of precipitation, streambed seepage, irrigation water and discharged wastewater, recharge by leakage from urban water and sewer pipes, and subsurface inflows through the basin boundary contribute to the groundwater basin. Riparian needs and subsurface outflow can reduce the amount of water available for use from the basin. The net accumulated water can then be accessed by pumping from wells.

[10] www.water.ca.gov/waterconditions/drought/docs/DroughtReport2010.pdf, *California's Drought of 2007-2009: An Overview*, California Department of Water Resources, p. 7.

Groundwater comprises 83 percent of the water supply for communities along the Central Coast of California.[11] Statewide, 75 percent of Californians derive at least a part of their water supply from groundwater.[12] Groundwater basins in San Luis Obispo County range in land area from Pico Creek at 62.5 acres to the Paso Robles Groundwater Basin at 505,000 acres.[13] The following are the two largest groundwater basins in the county:

1. The Paso Robles Groundwater Basin (PRGWB) is 505,000 acres, about a third of which is within Monterey County. The PRGWB is a portion of the Salinas Valley Groundwater Basin. The perennial yield of the PRGWB is 89,600 acre-feet per year (AFY).[14]

2. The Santa Maria Valley Groundwater Basin (SMVGB) has a land area of 184,000 acres; approximately 61,000 acres are in San Luis Obispo County, the remainder lies within Santa Barbara County. There are three sub-basins of the SMVGB in the county: Pismo Creek Valley, Arroyo Grande Valley and Nipomo Valley.[15] The SMVGB has been adjudicated, meaning the amount of water allowed to be withdrawn from the basin by the major purveyors has been set by a court decision. This adjudication did not include private wells.

During his February 14, 2014, declaration of drought disaster in California, the Governor addressed those areas with groundwater basins experiencing water supply and demand imbalances. He said, "Local governments and interested parties would be well advised to arrive at their own arrangements to address their groundwater problems or the California State Water Resources Control Board may impose a solution."

A review and map (Figure 1) of the county's other groundwater basins is contained within Appendix D, "Water Resource Sub-regions and Water Planning Areas."

[11] California Department of Water Resources, "Bulletin 118-Update 2003."
[12] *Improving Management of the State's Groundwater Resources*, California Legislative Analyst's Office, 2014.
[13] 640 acres is equivalent to 1 square mile.
[14] Geoscience 2014.
[15] The *San Luis Obispo County Master Water Report*, 2012.

Surface Water Sources Located Within The County

Surface water is water found or stored above ground such as in reservoirs. Surface water also includes sub-surface flows in rivers and creeks. Sub-surface water flows are within the jurisdiction of the state. For the purposes of this report, surface water is defined as water stored in reservoirs. The reservoirs located in the county are:

- Lake Nacimiento
- Santa Margarita Lake (Salinas Reservoir and Dam)
- Whale Rock Reservoir
- Chorro Reservoir
- Lopez Lake
- Twitchell Reservoir

California State Water Resources Board Bulletin 18, "San Luis Obispo County Investigation (1958)," identified 17 sites within the county DWR considered suitable for development of dams and reservoirs. Construction and project completion actually occurred on three of them: Nacimiento Dam and Reservoir, Whale Rock Dam and Reservoir, and Lopez Dam and Reservoir. The remaining 14 were not developed. See The Water Resources Advisory Council section below.

For more information about the reservoirs in the County, see Appendix B1.

Imported Surface Water

There is currently one source of imported surface water for the county, the State Water Project. The State Water Project provides water to several purveyors in the county via the Coastal Branch of the California Aqueduct and associated pipelines.[16] Using the same water supply data on which the Governor's declaration was based, SWP water deliveries were greatly reduced and future deliveries during this drought are questionable.

For more information about the State Water Project reservoir, see Appendix B2.

[16] *The San Luis Obispo County Master Water Report*, 2012.

NON-TRADITIONAL WATER SOURCES

As the demand for water has increased, new sources have been identified and developed. While the following sources, recycled and desalinated water, are currently used in a few locations, they have potential for a larger role in future water reliability.

Recycled Water

The California Water Code provides the following definition for recycled water: "...water which, as a result of treatment of wastewater, is suitable for a direct beneficial use or a controlled use that would not otherwise occur and is therefore considered a valuable resource."[17] Examples of recycled water uses in the county include the irrigation of some parkland and golf courses in the City of San Luis Obispo, Nipomo and Atascadero. Paso Robles' new wastewater treatment facility will include a footprint for an upgrade to provide recycled water for irrigation uses near the city. Recycled wastewater use for groundwater recharge can work well in some circumstances. For example, the Templeton CSD uses treated water from its wastewater treatment plant to recharge its wells in the Salinas River bed.

The use of recycled water involves some significant issues including its cost versus the cost of traditional sources and the public's perception of its suitability. When comparing the cost of developing alternate sources of water, recycled water can be a valuable, cost-effective part of an area's water portfolio.[18] As more recycled water projects have come on line in recent years, the public's perception of recycled water has changed as its successful use has become more commonplace.

There are two successful nearby examples of the large-scale use of recycled water as an alternative source of water supply. The first is the Laguna Wastewater Treatment Plant in Santa

[17] Calif. Water Code § 13050.
[18] www.waterplan.water.ca.gov/docs/cwpu2009/0310final/v2c11_recycmuniwtr_cwp2009.pdf.

Barbara County; the entire output of the plant, 2.4 million gallons per day, is used for agricultural irrigation.[19] The second is the Monterey County Regional Wastewater Facility; the facility output is approximately 20 million gallons per day and irrigates 12,000 acres of farmland in the Salinas Valley thereby reducing groundwater demand and helping prevent salt-water intrusion into the Salinas River Groundwater Basin.[20]

Desalinated Water

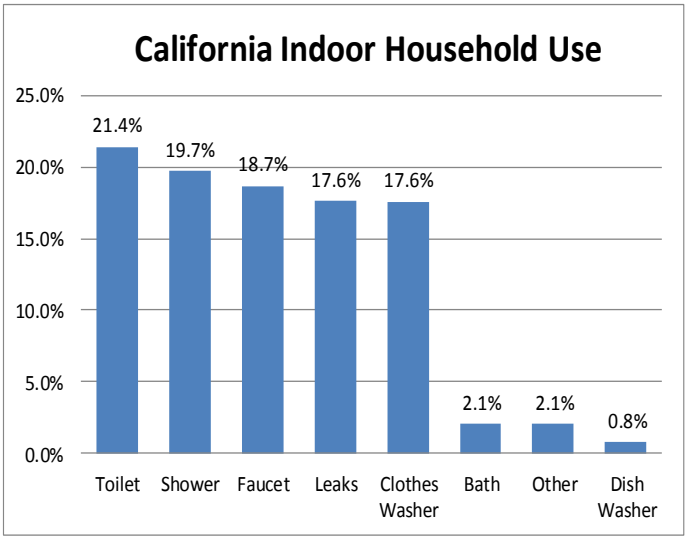
Desalination is the removal of salts from saline water to provide fresh (potable) water using either seawater or brackish water.[21] Desalination is receiving renewed interest as the costs of other water supply sources rise and the drought continues. Morro Bay has a desalination plant (built in 1993) with a 645 acre-foot annual capacity, somewhat over half of that city's existing demand. The plant can be used to augment supply during reduced deliveries from the SWP including the annual shutdown for maintenance. The plant can operate using either seawater or brackish water from wells in the Morro Creek basin. The cost of producing potable water from brackish water ($980 per acre-foot) is considerably less than seawater ($1,540 per acre-foot) according to Morro Bay Department of Public Services. Cambria CSD is in the engineering stage of constructing a facility for desalination of brackish water to relieve stress on its groundwater resources.

The City of Santa Barbara constructed a desalination plant as a secondary source of water during a previous drought. After operating the plant for just three months, the city deactivated it in 1992 upon receiving significant precipitation. Santa Barbara is now considering reactivating its plant though it would not be operational until the year 2016 and the cost is estimated at $20 million.[22] The operating cost of providing water using the plant is now estimated at $1,300 per acre-foot, versus $3,000 when the plant was deactivated.[23]

[19] www.countyofsb.org/pwd/pwrrwm.aspx?id=3250, County of Santa Barbara Department of Public Works, retrieved 04/21/2014.
[20] www.mrwpca.org/recycling, Monterey Regional Water Pollution Control Agency, retrieved 04/21/2014.
[21] Defined by Princeton University as water that has more salinity than fresh, but not as much as seawater.
[22] www.sanluisobispo.com/2014/05/05/3050524/california-city-looks-to-sea-for.html, *The Tribune*, May 5, 2014.
[23] www.santabarbaraca.gov/gov/depts/pw/resources/system/sources/desalination.asp.

CONSERVATION

Contained within the Governor's February 2014 declaration of the state's drought disaster, there was a request that Californians reduce their water use by 20 percent. In making that request, he acknowledged the important role of conservation in addressing the water supply issues caused by the current and previous droughts. What will a 20 percent reduction look like?



Residential Water Conservation

Statewide household water consumption is about 360 gallons per day (indoors and landscape combined); a 20 percent reduction will mean a reduction of 72 gallons per day per household. A 2011 study of residential water consumption found plumbing leaks accounted for 18 percent of use. Repairing leaks is an effective way to conserve water. See chart.[24]

Residential water conservation programs in California are a success story. Water conservation measures put in place during and after the droughts of the past 25 years have worked. Domestic water consumption per person in California is now half what it was in 1967.[25] Most of the decline in consumption has taken place since 1990, a drought year, when many water purveyors adopted conservation ordinances, including building codes, and rate structures designed to reduce consumption. Similarly, federal efficiency standards for water-consuming appliances were enacted during the same period and became more stringent over time. As these measures have helped reduce per household water consumption successfully, they have begun to approach the upper limits of savings potential.[26] Therefore, further conservation efforts should primarily focus on outdoor water usage, particularly landscaping and agriculture irrigation.

[24] *California Single Family Water Use Efficiency Study*, Department of Water Resources, 2011.
[25] www.ppic.org/content/pubs/report/R_114EH2R.pdf, Public Policy Institute of California, January 2014.
[26] Ibid.

Landscape Irrigation

Landscape irrigation is the single largest end use of urban and suburban water, accounting for approximately 50 percent of total residential water use statewide.[27] DWR estimates landscape irrigation use in California at nearly four million acre-feet per year, more than enough water to fill Lake Oroville once, or Lake Nacimiento10 times. "That leaves a lot of room for water use efficiency. This is a place where we need to come together to make water conservation and water use efficiency a priority."[28]

Legislation such as Assembly Bill 325, The Water Conservation in Landscape Act of 1990, and Assembly Bill 1881, The Water Conservation in Landscape Act of 2006, seeks to improve landscape water efficiency through requiring public water purveyors to adopt ordinances establishing conservation programs for landscape irrigation. Programs for lessening outdoor use include replacing lawns with native vegetation and drought tolerant landscaping, drip irrigation, soil moisture monitors and gray-water systems.

Agricultural Conservation

Agriculture and rural-residential housing in the county has changed significantly over the past 30 years. Acreage has been converted from grazing lands and dry farming to crops requiring irrigation. The following table[29] highlights changes within the Paso Robles Groundwater Basin:

Land Use Changes in the Paso Robles Groundwater Basin
(in acres)

	Irrigated Agriculture		Residential		
Year	**Alfalfa**	**Vineyard**	**Low-Density**	**Medium-Density**	**High-Density**
1985	10,945	6,032	3,761	0	0
1997	4,702	13,706	19,461	0	0
2007	2,726	38,864	145,537	2,481	1,074

[27] *California Single Family Water Use Efficiency Study*, Department of Water Resources, 2011.
[28] DWR via http://capitolweekly.net/lawn-water-answer-drought, Capitol Weekly, 05/19/2014.
[29] Data obtained from the Draft Approach and Methodology for Water Balance Estimation - Paso Robles Groundwater Basin Model Update, 2013.

Approximately 67 percent of all water consumed from the PRGWB is used for agricultural purposes.[30] As with landscape irrigation, there is a large opportunity for conservation. There are several public and private entities in the county whose mission includes promoting water conservation in agriculture:

- The Central Coast Vineyard Team promotes best-practice agriculture including conservation of water resources. For example, water sensors in soil, dry farming, and drip irrigation.
- The Upper Salinas-Las Tablas Resource Conservation District provides conservation education for agriculture regarding soil, water and wildlife.
- The Cachuma Resource Conservation District provides irrigation water quality and efficiency evaluations.
- The Coastal San Luis Resource Conservation District is a participant in water quality and conservation projects for agriculture and wildlife habitat.

Water Rates As Conservation Incentives

The 2010-2011 San Luis Obispo County Grand Jury investigated and reported on water rates and conservation. The Grand Jury found that each of the county's major public water purveyors (six cities, the AMWC and eight CSDs) had rates intended to reduce water usage. Several of the purveyors also had sewer rates intended to promote conservation. Morro Bay has not changed its water rate structure since the 1990s and currently is in the process of revising its rates.

The measures adopted by the purveyors to encourage water conservation include tiered rate structures in which the last unit billed is more expensive than the first. Therefore the more units of water used, the more expensive it becomes. Cash rebates provide an added incentive for residents to replace high water use appliances and fixtures with more water efficient models. Rebates are also offered to help customers offset the cost of replacing lawns or turf with drought-tolerant landscaping.

[30] *Paso Robles Groundwater Basin Management Plan*, 2011.

Conservation is still the most immediately available opportunity to affect the county's water supply security. All other water sources, from groundwater to recycled water will require a considerable investment and time for permitting, engineering and construction. Information about conserving water is available from many sources. Water conservation references are located in Appendix E.

GOVERNMENT ACTIVITIES RELATED TO WATER SUPPLY RELIABILITY

Water supply reliability can be defined as the following: when a faucet is opened or a water well pump switched on, it is with the expectation there will be a sufficient supply of acceptable, accessible and consistently available water for the purpose the user intends.

County

The County's lead agency for matters related to water supply reliability is the San Luis Obispo County Flood Control and Water Conservation District (District). The County Board of Supervisors is the governing board of directors for the District, although San Luis Obispo County and the District are separate entities. The District was instrumental in constructing the Lopez Dam and Reservoir Project and the Nacimiento Pipeline.

The District gathers water level data from approximately 320 wells, most of which are private wells.[31] The District shares data with other governmental agencies, including the USGS, which also monitors groundwater well levels. Well logs created during water well drilling operations provide another valuable source of information about water supply conditions. Well logs contain a record of the geology encountered during drilling and an informed estimate of the well's capability to produce water reliably.

The District participates in a network of stream flow gauges, which aid in providing data for water resource assessment within the county's creeks and rivers and the groundwater basins that adjoin them. Data from the stream flow gauges are also used for reservoir operations and flood control activities especially along the coastal creeks. There are some streams in the county

[31] San Luis Obispo County Department of Public Works.

currently without flow gauges in place though the District is considering adding gauges to those streams. These are Arroyo De La Cruz, San Carpoforo Creek, Villa Creek, Cayucos Creek, Old Creek, Toro Creek and Pismo Creek.

The District coordinates the gathering and analysis of precipitation data from its own rain gauges, a large group of volunteer "weather watchers," and the rain gauges of several other governmental agencies. Here again, the District is considering adding to its data gathering network to enhance its ability to predict water resource availability from groundwater basins and reservoirs.

The District produced the county's Master Water Report (MWR) in 2012. The report provides a comprehensive view of the county's water resources as they existed at that time and outlines additional water sources to be used to enhance water supply reliability.

The MWR divides the county into 3 water-supply sub-regions, and further divides the sub-regions into 16 Water Planning Areas (WPAs). The boundaries of the WPAs reflect the different geologic and water supply features in each WPA. A map of the sub-regions and WPAs can be found in Appendix D, along with water supply sources and water security issues for each WPA.

Other county departments involved in water policy and regulatory activities:

- Public Works is the water purveyor for several small community water systems in the county. Public Works operates the Lopez and Salinas Dams and Reservoirs.
- Planning and Building (Planning) produces studies that measure estimated water supply versus current and anticipated demand as related to proposed development. An example is Planning's Resource Capacity Study of the Paso Robles Groundwater Basin of 2011.
- The Health Agency (Public Health) monitors the water quality (safety) of many groundwater wells in the county including private and small mutual water systems.

The Water Resources Advisory Committee (WRAC)

The WRAC was formed by the County Board of Supervisors and consists of representatives of all the interested parties including the county's seven cities, eight CSDs, agricultural, developer and environmental organizations, institutions (California Men's Colony, Cuesta College, etc.) and a member from each supervisorial district.

WRAC advises the County Board of Supervisors concerning all policy decisions relating to the water resources of the SLO County Flood Control & Water Conservation District. It recommends to the Board specific water resource programs and the methods for financing them. One of the major tasks completed by the WRAC was ranking the desirability of water resource supply and management strategies the county could use to raise water supply reliability.

Water resource supply and management strategies identified by WRAC are listed in the MWR by order of preference:

1. Conservation
2. Optimize the Nacimiento Project (use the remainder of the county's allocation)
3. Land Use Management
4. Recycled Water
5. Optimize State Water (use the remainder of the county's allocation)
6. Groundwater Banking and Recharge
7. Groundwater Supply Sources
8. Salinas Reservoir Expansion/Exchanges
9. Desalination
10. Lopez Lake Expansion/Exchanges
11. New Off-Stream Storage
12. Nipomo Water Project optimization
13. Precipitation Enhancement (cloud seeding)
14. New On-Stream Storage

The WRAC evaluated these strategies using several criteria:

- Reliability
- Optimize existing supplies and infrastructure
- Reduce dependency on imported supplies/promote local control consistent with existing county goals and policies
- Least environmental impact
- Identifiable costs and benefits

Cities

As water purveyors, cities must integrate conservation, rate structure and land use policies with new supplies to achieve water supply reliability. The MWR recommended water purveyors establish and maintain a water reliability supply and a secondary water supply. When combined, these would equal 15-20% of the estimated demand at build-out.[32]

For example, the City of San Luis Obispo began working to achieve that goal during the Drought of 1987-1992, when the city was within 18 months of running out of water from its two major sources, Salinas and Whale Rock Reservoirs. Stringent water use restrictions were in place to reduce demand; per-person demand was reduced more than 50% through conservation. Forward thinking on the part of the city and its residents resulted in the city having a 20-25% combined reserve and secondary supply.

Land Use Policy

Land use policy is a critical element of water supply reliability; it directly affects water demand. The county's land use policy, with the exception of land within city corporate limits, is set by the Board of Supervisors on advice of staff and consistent with state regulations. The "Urgency Ordinance" passed by the Board in 2013 and extended for two years is based on the Board's authority to regulate land use. The Urgency Ordinance applies only to the unincorporated part of the PRGWB with the exception of Templeton and San Miguel CSDs.

Cities are also able to establish their own land use policy subject to limits set by the California Government Code. CSDs set their own water policy but do not have the power to regulate land use. The Local Agency Formation Commission (LAFCO) regulates annexations to the cities and additions to the service areas of CSDs.

[32] The state of maximum development as permitted by a plan or regulation. (www.google.com)

CONCLUSIONS

Water links us to our neighbor in a way more profound and complex than any other.

-- John Thorson (Administrative Law Judge, California Public Utilities Commission)

Has there been progress made to assure the water supply reliability for county residents since DWR issued its 2009 Water Plan Update? Yes, the county's portion of the Nacimiento Pipeline Project was completed in 2010. Also, the pipeline to transport water from Santa Maria to the Nipomo area is under construction. Both projects are planned to offer their participants greater flexibility of water supply. Projects in several areas of the county are underway to increase water availability and reduce groundwater demand using sources such as desalination and recycled water. Conservation programs for agricultural and residential consumers put in place during droughts of the past are playing the same vital role: acting to reduce the demand for water. But is this enough?

The Tragedy of the Commons is an economic theory arising from "the situation in which people, acting independently and rationally consulting their own self-interest, will ultimately deplete a shared limited resource, even when it is clear that it is not in anyone's long-term interest for this to happen." [33]

A current example was featured in *The Tribune* article entitled "Central Valley Farmers Locked in a Desperate Drilling Race" published March 30, 2014. Faced with zero or near-zero deliveries of water from the State Water and Central Valley Projects, farmers in the Valley are filing for and receiving permits to drill water wells at 2 to 3 times the rate of 2013, also a drought year. The article describes the situation as "pitting neighbor against neighbor in a perverse race to the bottom." The rate of groundwater use is twice the rate of recharge. Alongside the loss of reserves, there is the problem of subsidence, which in some areas of the Valley is nearly a foot per year. Subsidence of the ground surface reflects a loss of groundwater storage capacity within the aquifers underlying the Valley.

[33] Princeton.edu/~achanhey/tmve/wiki100k/docs/Tragedy_of_the_Commons.html.

In 1958, the California Department of Water Resources identified 17 sites within the county as suitable for development of surface water resources - three reservoirs were built. If more were built, our water reliability would be greater.

Droughts are a part of our history. Residents should not be lulled by periodic years of high rainfall - "El Niños" - into believing we can continue land development and thus increase water usage without regard to where our water is sourced. Definitive plans and financial commitments to improve the reliability of the water supply should begin now and continue regardless of how much rainfall is received. Any year could be the start of another drought cycle. The State Water Project has reduced or eliminated deliveries of water just when the need is greatest due to the drought. We cannot rely on the state for solutions to our water supply problems. We should develop additional, reliable local supplies coupled with strategies for their management.

Fortunately, we have a list of supply opportunities and management strategies developed by the WRAC. Some, such as conservation and recycled water have already begun. Others, such as a Paso Robles ground water management district, resource-based land use management, and water sharing agreements are more complicated and could take years of legal action to settle and implement. Still others, such as off-stream surface water storage, may appear costly and take years to complete but could supply years of water and ultimately may prove to be more economical.

Our Board of Supervisors should fulfill their obligation to ensure water supply reliability by implementing further water supply initiatives and management strategies in cooperation with the cities, CSDs and all other water purveyors in San Luis Obispo County.

COMMENDATIONS

The Grand Jury commends the San Luis Obispo *Tribune* for its concurrent series, "Parched Earth" and "Wine and Water."

REQUIRED RESPONSES

This is an informational report. No responses are required.

Appendix A: Glossary of Water Terminology

Acre-foot (AC-FT, Acre-ft): The quantity of water required to cover 1 acre to a depth of 1 foot and is equivalent to 46,560 cubic feet or about 326,000 gallons. A common water industry unit of measurement, an acre-foot serves annual needs of two typical California families.

Aquifer: An underground geologic formation of rock, soil or sediment that is naturally saturated.

Conservation: A careful preservation and protection of something; especially planned management of a natural resource to prevent exploitation, destruction, or neglect.

Consumptive Use: A use of water resulting in a large proportion lost to the atmosphere by evaporation and transpiration from plants. Irrigation is a consumptive use.

Domestic Consumption: Water used for household purposes such as washing, food preparation, and bathing.

Drawdown: A lowering of the water level of an aquifer caused by pumping of groundwater from wells.

Driller's Log: Description by the driller of the geologic materials penetrated from the land surface to the greatest depth of the well.

Evaporation: The process by which water changes from the liquid into the vapor state.

Gauging Station: A particular site on a stream, canal, lake, or reservoir where systematic observations of hydrologic data are obtained.

Grey Water: Waste water that has not come in contact with human feces, such as that from bathroom and kitchen sinks, showers, tubs and washing machines.

Groundwater: Water beneath the Earth's surface in a layer of rock called the saturated zone because all openings are filled with water; this is the water that supplies wells and springs.

Groundwater Recharge or Replenishment: Pumping or percolating storm water runoff or imported water into an aquifer to replenish its supplies.

Irrigation: Supplying water to agriculture by artificial means, such as pumping water onto crops in an area where rainfall is insufficient.

Non-potable: Water not suitable for drinking.

Potable: Water considered safe for domestic consumption; drinkable.

Reservoir: A body of water used to collect and store water, or a tank or cistern used to store potable water.

Retrofit: Refers to the modification of something for more efficiency. In the case of water conservation, retrofit refers to modifications to plumbing fixtures to increase efficiency.

Riparian: Situated or taking place along or near the bank of a river.

Appendix B1: Surface Water Resources (within SLO County)[34]

- ***Lake Nacimiento:***

  Owned and operated by the Monterey County Water Resources Agency. The water stored in the lake is used by Monterey County for the purposes of flood control, wildlife habitat maintenance, irrigation, groundwater recharge, and saltwater intrusion prevention at the mouth of the Salinas River. The lake has a capacity of 377,900 acre-feet. San Luis Obispo County has an entitlement to 17,500 acre-feet (about five percent of the lake's storage capacity) per year. 1,750 acre-feet of the entitlement is reserved for use in the vicinity of the lake. Delivery of water for use by the participants is via the Nacimiento Pipeline, a project of the San Luis Obispo County Flood Control and Water Conservation District. The agencies contracted for Nacimiento Lake water are the cities of Paso Robles and San Luis Obispo, Templeton CSD, Atascadero Mutual Water Company and County Service Area 10-A (A portion of Cayucos) through an exchange with the City of San Luis Obispo of Whale Rock Reservoir water.

- ***Santa Margarita Lake (Salinas Reservoir and Dam):***

  Owned by the Army Corps of Engineers, the reservoir is operated by the District to supply water to the City of San Luis Obispo, and for habitat maintenance. The lake has a capacity of 28,843 acre-feet. An expansion of the reservoir's capacity to 45,000 acre-feet, which would require the installation of spillway gates has been proposed but is not currently being implemented.

- ***Whale Rock Reservoir***

  Whale Rock Reservoir is owned by the three entities comprising the Whale Rock Commission, i.e., the City of San Luis Obispo, California Men's Colony and Cal Poly. The reservoir's designed capacity is 40,662 acre-feet. The reservoir and dam are

[34] *San Luis Obispo County Master Water Report*, 2012.

operated by the City of San Luis Obispo for the benefit of the above commission, several local water purveyors and landowners downstream of the dam.

- ***Chorro Reservoir*:**

  The Chorro Reservoir is located less than a mile from the California Men's Colony in the Chorro Creek watershed. The reservoir was built in 1940 as part of the water supply for Camp San Luis Obispo. It had originally had a capacity of 140 acre-feet; its capacity is now estimated at 90 acre-feet due to silt build up. It still serves as a source of water supply for Camp San Luis Obispo.

- ***Lopez Lake:***

  Lopez Lake: Owned and operated by the District, Lopez Dam and Lake were constructed for flood control and to provide a reliable source of water to the cities of Arroyo Grande, Pismo Beach and Grover Beach, along with the Oceano CSD and County Service Area 12 (the Avila Beach area). Lopez Lake water is used to provide water for domestic purposes, groundwater recharge, habitat maintenance and agricultural use in the Arroyo Grande Valley. The lake has a capacity of 49,388 acre-feet.

- ***Twitchell Reservoir:***

  Twitchell Reservoir is partially located in San Luis Obispo County, owned by the U.S Bureau of Reclamation, and operated by the Santa Maria Valley Water Conservation District. The reservoir, built for flood control and groundwater recharge purposes, has a capacity of 224,300 acre-feet and is often empty. Some of the recharge benefits agriculture located in San Luis Obispo County.

Appendix B2: Imported Surface Water Resource[35]

State Water Project (including San Luis Reservoir):

The District has contracted with the California Department of Water Resources (DWR) for 25,000 acre-feet of State Water Project (SWP) water. San Luis Reservoir near Santa Nella, California stores SWP water and has a capacity of 2,041,000 acre-feet. At the time of construction to deliver SWP water to the county, 4,830 acre-feet had been contracted for by 11 agencies (contractors) within the county and the current infrastructure (pipes, etc.) is sized to deliver that amount. Additional deliveries to the county of SWP water from the District's 25,000 acre-foot allocation would require the construction of new infrastructure. SWP water delivered to contractors in this county receives treatment at the Polonio Pass Water Treatment Plant near the county's northeastern boundary. The water then arrives in potable form ready for delivery to the contractor's customers.

Some of the 11 agencies contracted for an additional allocation called a "Drought Buffer," others did not. Drought buffer gives the agencies that purchased it an increased likelihood of receiving a greater delivery of SWP water during drought periods. San Luis Reservoir, a very large example of off-stream storage near Los Baños, California is used to store SWP water including drought buffer water and the District's unallocated water, has a capacity of 2,041,000 acre-feet.

[35] *San Luis Obispo County Master Water Report,* 2012.

Appendix C: Levels of Severity[36]

The County Planning Department produces "Resource Capacity Studies" for resources that may be or soon will be in demand/supply imbalance; the study results indicate the status of the resource using "Levels of Severity." Board of Supervisors action may confirm the study and declare a level of severity for a resource.

Levels of severity are shown in Appendix D for several areas of the county. The following are definitions from the MWR of increasing Levels of Severity (LOS):

LOS I - Level of Severity I is reached for a water resource when increasing water demand projected over nine years equals or exceeds the estimated dependable supply.

LOS II - Level of Severity II for a water resource occurs when water demand projected over seven years (or other lead time determined by a resource capacity study) equals or exceeds the estimated dependable supply.

LOS III - Level of Severity III exists when water demand equals the available resource; the amount of consumption has reached the dependable supply of the resource.

[36] *San Luis Obispo County Master Water Report*, 2012.

Appendix D: Water Resource Sub-Regions & Water Planning Areas[37]

[See map at the end of this Appendix]

SOURCES OF WATER AND RELATED WATER SUPPLY RELIABILTY ISSUES IN THE WATER PLANNING AREAS.

The North Coast Sub-Region:

1. San Simeon WPA 1:
   - Sources are groundwater from several small coastal groundwater basins and groundwater from fractured rock.
   - Issues are saltwater intrusion and limited groundwater basin yield. The water supply status for the San Simeon CSD is at Level of Severity III.

2. Cambria WPA 2:
   - Sources are groundwater from the San Simeon, Santa Rosa and Villa Creek groundwater basins. Cambria CSD utilizes water from the first two of those basins only.
   - Issues are potential seawater intrusion, drought-caused reduction in groundwater supplies and limited groundwater basin yields. The Cambria CSDs water supply status is at Level of Severity III.

3. Cayucos WPA 3:
   - Sources are groundwater from the Cayucos Creek, Old Valley, and Toro Creek groundwater basins; in Cayucos proper, groundwater, an entitlement to Whale Rock Reservoir water and Nacimiento Reservoir water through an exchange with the City of San Luis Obispo.
   - Issues are drought-caused reductions in groundwater supplies. No LOS assigned.

[37] *San Luis Obispo County Master Water Report*, 2012.

4. Morro Bay WPA 4:
    - Sources are groundwater, surface water and desalinated water. In the City of Morro Bay sources include groundwater from the Morro and Chorro Valley groundwater basins, State Water Project Water and water from its desalination plant. The various public entities located in the Chorro Valley (California Men's Colony, Cuesta College, etc.) have and utilize allocations from the State Water Project, Whale Rock Reservoir, and Chorro Reservoir.
    - Issues are a drought-caused reduction in groundwater supplies, groundwater quality (a problem with nitrate content), state regulated access to groundwater in the Chorro Creek Basin and the reliability of State Water. No LOS assigned.

5. Los Osos WPA 5:
    - Sources are groundwater from an upper and lower aquifer in Los Osos and private wells in rural areas. Three water purveyors serve the community of Los Osos.
    - Issues are drought-caused reduction in groundwater supply and quality (nitrate content) and documented seawater intrusion. The Los Osos Valley Groundwater Basin is at Level of Severity III.

The South Coast Sub-Region:

6. San Luis Obispo/Avila WPA 6:
    - Sources are groundwater from the San Luis and Avila Valley sub-basins. In the City of San Luis Obispo, Salinas Reservoir, Whale Rock Reservoir, and Nacimiento Reservoir water and a small amount of groundwater are used. San Luis Obispo also uses recycled water from its wastewater treatment plant for irrigation purposes. In the Avila Beach and Port San Luis area there are several purveyors with allocations of either SWP water or Lopez Reservoir water or both.
    - Issues are limited groundwater supply in rural areas and declining quality of groundwater. No LOS assigned.

7. South Coast WPA 7:
    - Sources are groundwater from the Pismo and Arroyo Grande Creek groundwater sub-basins, both of which are part of the Santa Maria Groundwater Basin. In the Edna Valley, groundwater from the Edna Valley Sub-basin of the San Luis Obispo Groundwater Basin is used. Pismo Beach and Oceano have allocations of State Water Project and Lopez Reservoir water. Arroyo Grande has an allocation of Lopez Reservoir water, as does Grover Beach. The Nipomo area uses groundwater from the Santa Maria Basin. Nipomo will access supplemental water in 2015 through a purchase agreement with the City of Santa Maria.
    - Issues are limited groundwater supply, groundwater quality and adjudicated groundwater basins managed to maintain the *status quo.* The Nipomo Mesa has a Level of Severity III.

8. Huasna Valley WPA 8:
    - Source is groundwater from the Huasna Valley Groundwater Basin.
    - Issue is limited data on groundwater supply's safe yield. No LOS assigned.

9. Cuyama Valley WPA 9:
    - Source is groundwater from the Cuyama Valley Groundwater Basin.
    - Issue is a critical overdraft of the groundwater basin; it lies within four counties which makes resolving water issues within the basin complicated. No LOS assigned.

The Inland Sub-Region:

10. Carrizo Plain WPA 10:
    - Source is groundwater from the Carrizo Plain Groundwater Basin (CPGB). No municipal purveyors are located in WPA 10. The two solar-farm projects located within the WPA both access their water supply from the CPGB.

- Issues are water quality (nitrate level in the groundwater exceeds drinking water standard), limited groundwater supply and a safe annual yield is not known. No LOS assigned.

11. Rafael/Big Spring WPA 11:
    - Sources are groundwater from the Rafael Valley and Big Spring Groundwater Basins. No municipal purveyors are located in WPA 11.
    - Issue is limited water supply data including safe yield. No LOS assigned.

12. Santa Margarita WPA 12:
    - Sources are groundwater from the Santa Margarita Valley, Rinconada Valley and Pozo Valley Groundwater Basins. The community of Santa Margarita receives its water supply and service from CSA Number 23, an enterprise owned by the County and managed by Public Works.
    - Issues are limited water supply data including safe yield, limited groundwater supply. No LOS assigned.

13. Atascadero/Templeton WPA 13:
    - Sources are groundwater from the Atascadero Sub-basin of the Paso Robles Groundwater Basin, surface water from Nacimiento Reservoir and additional groundwater from rock aquifers that are not part of any defined groundwater basin. AMWC and Templeton CSD have allocations of NWP water.
    - Issues are limited groundwater basin yields and State-managed water rights to the Salinas River underflow. The Atascadero groundwater sub-basin is at Level of Severity I.

14. Salinas/Estrella WPA 14 (Paso Robles and East):
    - Sources are groundwater from the Atascadero Sub-basin and the Paso Robles Groundwater Basin and surface water. There are at least 8,000 active groundwater wells in the Basin area. The City of Paso Robles has an allocation of Nacimiento Reservoir water. The other municipal water providers in WPA 14 are the San Miguel CSD and Shandon CSA.

- Issues are declining water quality as wells get deeper, State-managed Salinas River underflow state regulation of pumping from rapidly declining groundwater levels and litigation. No LOS assigned.

15. Cholame WPA 15:
    - Source is groundwater from the Cholame Valley Groundwater Basin. There are no municipal water providers within WPA 15.
    - Issues are groundwater quality and an unknown safe yield of the groundwater basin. No LOS assigned.

16. Nacimiento WPA 16:
    - Source is Nacimiento Reservoir water in the developed areas of the WPA, groundwater in other areas. No defined groundwater basins are located in WPA 16.
    - Issue is water supply reliability. When there is no water release from Lake Nacimiento, some developed areas near the lake do not have a water supply. No LOS assigned.

Figure 1.1
San Luis Obispo County
Sub-Regions and Water Planning Areas
Master Water Report
San Luis Obispo County Flood Control
and Water Conservation District

APPENDIX E: Of General Interest to Residents

QUESTIONS TO ASK YOUR LOCAL WATER PURVEYOR:

1. Does the current rate structure (the amount charged per unit of water usage) promote conservation?
2. Does the current rate structure sufficiently fund maintenance of the purveyor's infrastructure?
3. Do the current rates provide the purveyor with reserves for use against unanticipated loss of infrastructure or water source(s)?
4. Does the current rate structure adequately fund, or are reserves being set aside for, anticipated future water supply requirements?
5. Is the purveyor seeking additional sources of water supply?

CONSERVATION REFERENCES:

1. www.slowaterwiselandscaping.com/
2. www.water.ca.gov/wateruseefficiency/leak/
3. www.water.ca.gov/wateruseefficiency/agricultural/

SUGGESTED READING:

1. *California Water Myths*, Public Policy Institute of California, 2009, http://www.ppic.org/content/pubs/report/R_1209EHR.pdf.
2. Fishman, Charles, *The Big Thirst: The Secret Life and Turbulent Future of Water*, 2011.