Adopting County Policies which Limit Public Water System Sprawl and Promote Small System Consolidation

UCLA Luskin School *of* Public Affairs

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Disclaimer

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Executive Summary

The state of California currently contains more than 3,000 active community water systems, and more than 7,000 publicly-regulated drinking water systems overall. Drinking water systems serving small disadvantaged communities often lack the technical, financial, and managerial capacity to adequately provide clean and safe drinking water to their customers. Common problems faced by these small water systems include poor water quality, rising retail water rates, and an over-reliance on a single source of ground or surface water supply. Water system regulators increasingly view consolidation of these failing systems with nearby water systems that have better water quality and greater capacity as an effective institutional response to address the issue. In 2015, the California state legislature authorized the State Water Resources Control Board (the Board), via Senate Bill 88, to facilitate the consolidation of severely underperforming water systems. Despite the clear benefits, a statutory directive, and financial inducements, many small, disadvantaged communities (SDACs) have felt that consolidation is infeasible and chose not to be consolidated even while failing to effectively serve their low-income customers. Consequently, this study identified and explained the often poorly understood policies that the 58 California counties may adopt to encourage small system consolidation.

Findings of this research report are divided into two parts. The first section summarized past cases of water systems consolidation in California. Funding from past state ballot propositions has historically been the only means by which the state has subsidized the costs of consolidation for both receiving and subsumed water systems. The second part of the analysis consisted of reviewing existing county level policy tools and assessing current consolidation evaluation decisions to limit community water system sprawl and encourage small system consolidation in California. Policy tools evaluated include county General Plan guidance, the roles of Local Agency Formation Commissions (LAFCOs), the roles of Local Primacy Agencies, and the roles of county Boards of Supervisors.

I found that specific General Plan guidance for drinking water system consolidation is not available in every county, and counties appear to have adopted more specific guidance based on past water system sprawl. The involvement of LAFCOs, LPAs, and County Boards of Supervisors is critical to the success of efforts to consolidate water systems. LAFCOs are the most impactful actor at the county level because of their authority in approving and modifying the Sphere of Influence (SOI) for municipalities. Boards of Supervisors' participation in the consolidation of water systems could be integral to the success of the efforts by putting pressure on and/or encouraging the actors above and the cities within their remit. Without the support from the Boards of Supervisors, the roles of the LPAs are limited by their jurisdiction over only small water systems and other more influential actors in the consolidation process. The supervisors' role is likely to have a more general impact on annexation trends and not on specific consolidation efforts. Problems with funding support are a hindrance to the success of consolidation projects. Decreasing transaction costs for consolidation could be essential to actualizing a sizable number of consolidations in the near future.

1. Introduction

Within California, the consolidation of drinking water systems, particularly those serving small disadvantaged communities (SDACs), has never been more urgent. The state has more than 3,000 active community water systems and more than 7,000 drinking water systems in general. Water system regulators see consolidation as an effective institutional response that addresses common issues which many systems face: poor water quality, rising retail water rates, and an over-reliance on a single source of ground or surface water supply. In 2015, the California state legislature authorized the State Water Resources Control Board (the Board), via Senate Bill 88 (SB 88)[1], to facilitate the consolidation of severely underperforming water systems. Funding from Proposition 1, among many past Propositions, also reduces the costs of consolidation for both receiving and subsumed water systems. Despite the stated benefits, a statutory directive, and financial inducements, many SDACs thought consolidation was unfeasible and chose not to voluntarily consolidate with nearby water systems even while failing to effectively serve their low-income customers.

Thus far, the evidence base for transparent and unbiased consolidation evaluation decisions has not systematically been produced across the state. Moreover, despite the clear need for consolidation and the new authority granted the Board via SB 88, it remains difficult to convince local officials and residents of the benefits of consolidation in specific instances. This report will help show the constructive roles, historically under-utilized, which county officials and agencies can play in this process.

Countywide policies that encourage small system consolidation can improve customer affordability and system resiliency, enable responsible economic growth and reduce the risk of adverse health outcomes for customers. This research report identified and explained the often poorly understood policies that counties may adopt to limit community water system expansion and encourage small system consolidation in California. The report highlighted the role which county i) General Plans, ii) Local Agency Formation Commissions (LAFCOs), iii) Local Primacy Agencies (LPAs), and iv) Boards of Supervisors play in limiting water system sprawl and encouraging existing small system consolidation. Many of these planning tools are already available but are currently under-utilized by counties. Several examples of successful county policy leadership were illustrated. In particular, Tuolumne County and Placer County utilized their revision of the General Plan to restrict formation of new public water systems and encourage consolidation amongst existing water systems.

1 California Senate Bill 88, see: http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0051-0100/sb_88_bill_20150624_chaptered.htm

2. Background

Public water systems (PWS) are water services providers which supply drinking water to residents and developments in California. Beginning with the U.S. EPA, standard across the U.S. defined a PWS as "a system for the provision of water for human consumption through pipes or other constructed conveyances that has 15 or more service connections[2] or regularly serves at least 25 individuals daily at least 60 days out of the year".[3] Amongst the public water systems, a community water system (CWS) is the fundamental block of the water supply network which provides drinking water to households. A CWS delivers water through its water conveyance network to at least 15 households (or service connections) or at least 25 residents all year long.[4] The definition of water system types is critical because of the regulatory significance associated with each type of water system. Since residents rely on CWS to provide their drinking water, the water quality of a CWS has important implications regarding the health and safety of the state's residents. An estimate from the Safe Drinking Water Information System (SDWIS) showed that 94 to 96 percent of California's population relies on CWS, while the remaining population depends on private domestic wells (Johnson & Belitz, 2015).

2.1 California Drinking Water System Governance

The Safe Drinking Water Act was enacted by the United States Congress in 1974 to protect the public health of the nation by regulating the public drinking water supply. It was then amended and reauthorized in 1986 and 1996 to require additional monitoring actions to protect drinking water and its sources. Prior to July 2014, California Department of Public Health (CDPH) administered the Drinking Water Program. As of July 1, 2014, the administration of the Drinking Water Program (DWP) has transitioned from the California Department of Public Health (CDPH) to the Board. The Division of Drinking Water (DDW) within the Board is currently responsible for the enforcement of the federal and California Safe Drinking Water Acts (SDWAs) and the water quality oversight of all PWSs in California. In addition, DDW oversees water recycling projects, permits water treatment devices, supports and promotes water system security (SWRCB, 2017a). DDW cooperates with the Board's Division of Financial Assistance (DFA) to develop and provide funding for PWSs. On the local level, county's Local Primacy Agencies (LPAs) regulate all the PWS that have less than 200 service connections to ensure these small water systems are delivering safe drinking water.[5] LPAs are each county's environmental health departments and they are the small water systems' main point of contact to water regulators in California. Not all 58 counties in California have LPA -- only 30 of the 58 county have LPA to regulate their small water systems. The DDW field operation branches offices work with LPAs by assisting with regulatory oversight, technical assistance, and training (SWRCB, 2017a).[6]

2 Service connection means the point of connection between the customer's piping or constructed conveyance, and the water system's meter, service pipe, or constructed conveyance.

3 See section 116275 of the California Safe Drinking Water Act which is contained in Part 12, Chapter 4 of the California Health and Safety Code.

4 See section 116275 of the California Safe Drinking Water Act which is contained in Part 12, Chapter 4 of the California Health and Safety Code.

5 These local environmental health departments received primacy delegation pursuant to Health and Safety Code Section 116330, See California Health and Safety Code Section 116330.

6 The LPA primacy counties are as follows: Alpine, Amador, Butte, Calaveras, Contra Costa, El Dorado, Imperial, Inyo, Kings, Los Angeles, Madera, Mono, Monterey, Napa, Nevada, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Diego, San Joaquin, San Luis Obispo, Santa Barbara, Santa Cruz, Shasta, Stanislaus, Tehama, Yolo, and Yuba.

2.2 State Level Consolidation Tools and Policies

In 2012, California became the first state in the nation to recognize the human right to water through CA Assembly Bill 685 (AB 685). AB 685 was established to ensure every resident's right "to safe, clean, affordable, and accessible water adequate for human consumption, cooking and sanitary purposes".[7] The bill also mandated that state agencies within California to consider the mechanisms of implementing the human right to water in all future policies or funding decisions (Pierce & DeShazo, 2016). The Board has subsequently amended its Water Code to formalize implementation of the components for the human right to water. Efforts to consolidate small and disadvantaged water systems are part of the Board's commitment to ensure the human right to water for all residents. The Board recognizes the consolidation of CWSs as a key means to extend and improve services to communities that are relying on water sources with severely underperforming water quality and inadequate supply reliability (SWRCB, 2016a).

Although the Board recommends consolidation as a potential solution to small CWS with non-compliances[8], mandatory consolidation is not usually the initial policy solution from the Board. CWSs that are consistently failing to meet the safe water quality standards and have unreliable water supplies are first provided with technical assistance from the Board to address the problem. The resulting analysis from the Board's technical assistance will outline the issue and recommend an appropriate course of action that is necessary to best achieve compliance with the water quality standards. If the CWS still lacks progress to achieve compliance after the technical assistance, the Board may initiate discussions[9] regarding potential consolidation[10] with neighboring water systems (SWRCB, 2016a). The Board may commence direct mandatory consolidation (pursuant to Health & Safety Code section 116682) if no voluntary consolidation decisions can be reached within a reasonable time period. The Board will notify (via consolidation letters) the consistently underperforming CWS and the receiving system that they have six months to develop a plan for voluntary consolidation (SWRCB, 2016a). The systems will be ordered to consolidate if voluntary consolidation is not completed within six months (Health & Safety Code sections 116650 for citations and 116655 for compliance order).

In 2015, Senate Bill 88 (SB 88) added sections to the California Health and Safety Code to allow the Board to execute mandatory consolidation of PWS that are consistently in noncompliance with water quality standards.[11] The bill essentially expedited permanent solutions for the failing CWS and those that have inadequate water supply due to the drought. The goal of SB 88 was to greatly reduce or eliminate systems that are not complying with safe water quality standards or have inadequate, contaminated, or unreliable water sources (SWRCB, 2016b). The Board has found approximately two percent of PWS that are severely underperforming and thus appropriate for mandatory consolidation with nearby water systems (SWRCB, 2016a). The new authority from SB 88 gave the Board an additional tool to ensure the safety and reliability of drinking water for all California residents (SWRCB, 2016b).

7 Assembly Bill 685, see: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201120120AB685

8 Non-compliances indicate that the system is currently in violation of one or more federal primary drinking water standard (i.e. Maximum Contamination Levels and Treatment Technique requirements) (SWRCB, 2017a).

9 These discussions will examine many factors such as: the capacity of a neighboring system to supply water to the affected community; the geographical separation of the two systems; the cost of required infrastructure improvements; the costs and benefits to both systems; and access to financing for the consolidated entity.

10 Consolidation may involve the actual physical consolidation of the participating water systems (physical consolidation), just the management of the participating water system (managerial consolidation), or both.

11 Senate Bill 88, see: http://www.leginfo.ca.gov/pub/15-16/bill/sen/sb_0051-0100/sb_88_bill_20150624_chaptered.htm

The 2015 consolidation project of the Pratt Mutual Water Company into the City of Tulare's water system was the first ever mandatory consolidation completed by the Board under SB 88. Pratt Mutual Water Company served the Matheny Tract community of about 300 homes and 1,200 people (predominantly Latino population), where approximately half the homes are rentals and 30 percent of the residents earn less than the federal poverty line (Griswold, 2016). The Board has found the arsenic level at the Pratt Mutual Water Company to be consistently above the safe level for drinking water (maximum contaminant level, MCL) since 2010 (Carlucci, 2015). A voluntary consolidation could not be reached as the original agreement between the two parties from 2011 ended in litigation (SWRCB, 2016c). Under the authority from SB 88, the Board sent consolidation order in August 2015 to both parties to initiate the six-month voluntary consolidation development plan. In March 2016, the Board commenced with mandatory consolidation of the systems and required the City of Tulare to complete consolidation by June 2016 and begin serving Matheny Tract residents (SWRCB, 2016c). The merger between Pratt Mutual Water Company and the City of Tulare was successful in providing residents in Matheny Tract community with access to safe drinking water from their tap at home. The mandatory consolidation also served as the legal action settlement for the Matheny Tract water use lawsuit filed in 2015 (Hernandez, 2016).

Similar to the conditions in Matheny Tract, communities in Southeast Los Angeles County also experienced substandard drinking water quality from their water service providers. These small, diverse, and fragmented water systems in Southeast Los Angeles often lack the technical, financial, and managerial capacity to provide safe and clean drinking water to their customers. In 2017, Assembly Bill 272 (AB 272), also known as the Southeast Los Angeles County Drinking Water Relief Act, was proposed. The bill aimed to authorize the Department of Water Resources and the Board to provide financial assistance (through the Davis-Grunsky Act[12]) for consolidation projects.[13] CWS that fail to comply with the water quality standards could consult with the Board to determine if consolidation with other in-compliance CWS is appropriate. This bill is not yet passed. Nevertheless, AB 272 is an illustration that the problems with failing small water systems exist in both urban and rural areas.

In addition to SB 88 and AB 272, Senate Bill 552 (SB 552) was also established to authorize the Board to provide assistance to failing water systems through consolidation or extension of services (as interim services in preparation for consolidation). SB 552 allows the Board to order consolidation of failing water systems that are serving (instead of within) disadvantaged communities.[14] Prior to SB 552, the Board's mandatory order to extend services or to consolidate systems only applied to a disadvantaged community that is in an unincorporated area or is served by a mutual water company. This bill allowed a mobile home park to be included in the purview of mandatory orders for extension of services and system consolidation. In addition, SB 552 gives the Board the authority to appoint a third-party administrator with the expertise to help provide customers of these failing water systems with safe and affordable drinking water while trying to consolidate it. The contracted third-party administrator is allowed to assume full management and control of these failing CWS (Times-Herald, 2016). At present, there is no funding source for the third-party administrators and therefore this provision in the law is not being utilized.

12 The Davis-Grunsky Act provides for state financial assistance, in the form of grants and loans, to public agencies for, among other things, distribution of water for domestic purposes. The act authorizes the Department of Water Resources, in making loans or grants pursuant to the act, to impose terms and conditions that are designed to protect the state's investment and that are necessary to carry out the purposes of the act.

13 Assembly Bill 272, see: http://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB272

14 Senate Bill 552, see: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB552

Furthermore, Senate Bill 1263 (SB 1263) was established in 2016 to require better oversight of small, unsustainable public water systems. This bill aimed to help improve the delivery of safe drinking water to communities served by small water systems, which are often disadvantaged communities. SB 1263 requires the applications for the establishment of new PWSs to include a technical report that compares the costs associated with the construction, operation and maintenance, and long-term sustainability of the proposed new public water system to the costs associated with providing water through annexation, consolidation, or connection to an existing public water system.[15] The Board is given the authority to deny the application if the Board has determined that the new service area can be feasibly served by existing PWS. SB 1263 could effectively limit new unsustainable small CWS from being created, thereby reducing future needs for consolidation.

Investor-owned (privately-owned) public water utilities fall under the jurisdiction of the California Public Utilities Commission (CPUC). The CPUC regulates the privately-owned utilities, including electric, natural gas, telecommunications, railroad, rail transit, passenger transportation and water services. Approximately 16 percent of the residents in California are served by CPUC-regulated water utilities (CPUC, 2017). The CPUC is authorized with the responsibilities to regulate the rates, terms of service and operations for these utilities. In addition, the CPUC shares water quality regulatory authority (include compliance with the SDWA) with the Board for these privately-owned utilities (SWRCB, 2017a). The CPUC are advanced in its involvement with water system consolidation efforts. Because of CPUC's authority in setting and approving water rates, it has great impact over the financial consolidation of water systems in a multi-systems utility company. In the 2014 Report on Balanced Rulemaking, CPUC evaluated the 1992 guidelines for consolidation in order to better achieve their policy objective of balancing investment, conservation, and affordability for multi-systems water utilities. Methods for consolidation in multi-system utilities include rate consolidation, cost consolidation, rate base consolidation, and operational consolidation.[16] The 2014 report recognized the benefits of different consolidation methods for multi-systems utilities and provided CPUC with different options for consolidation guideline revisions.

2.3 Funding for Consolidation Efforts

Funding for consolidation and extension of service projects are available from a variety of funding sources such as California Propositions and the Drinking Water State Revolving Fund (DWSRF). Chapter 5, Section 79724(a) of Proposition 1 (Assembly Bill 1471) allocates $260 million for drinking water grants and loans for "public water system infrastructure improvements and related actions to meet safe drinking water standards ensure affordable drinking water, or both" (SWRCB, 2016d). Proposition 1 (Prop 1) Technical Assistance was made available to help small disadvantaged communities[17] (SDACs) develop, fund, and implement drinking water capital projects (SWRCB, 2017b). Consolidation projects qualified for Prop 1 because the technical assistance may include project coordination and development, legal assistance, engineering and environmental analysis, and/or leak detection and water audits (SWRCB, 2017b). On the other hand, consolidations are also one of the eight main types of eligible projects under the DWSRF (SWRCB, 2016e).

15 Senate Bill 1263, see: http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201520160SB1263
16 CPUC Division of Water and Audits. (2014). Report on Balanced Rate Rulemaking (R.11-11-008).
17 Defined as serving less than 10,000 people with median household income [MHI] < 80% statewide MHI.

Established by an amendment to the federal Safe Drinking Water Act in 1996, the DWSRF (administered by Board's DFA) provides low-interest loans, additional subsidy (principal forgiveness), and technical assistance to PWS for infrastructure improvements "to correct system deficiencies and improve drinking water quality for the health, safety, and welfare of all Californians" (SWRCB, 2016e). Other potential funding sources for consolidation projects include the Household & Small Water System Drought Assistance Program (HSWSDA) authorized by the Board. The $5 million assistance program provides funding to individual households and small water systems to address drought-related drinking water emergencies, including some limited consolidation efforts (i.e. laterals, aboveground interties) (SWRCB, 2016f). Additionally, the 2016-17 California state budget includes $9.5 million for improved water access and quality in schools (CWC, 2016). This investment in students is notable since for many students who live in SDACs impacted by unsafe drinking water, school is the only option for access to free, fresh drinking water (CWC, 2016). This illustrates the state's commitment to ensure residents' access to safe and clean drinking water.

2.4 County Level Land Use Policies and Water Management

As previously described, there are currently tools and some funding available at the state-level for consolidation efforts. Yet, without the involvement of local governments and agencies, the effects of state-level policies are very limited in consolidation projects. Local water management and planning are also only relevant to voluntary, instead of mandatory consolidation. Therefore, the work of encouraging consolidation of failing water systems would be more effective using county-level policy tools. Furthermore, land-use standards are avenues for regulating drinking water supplies in California. All 58 counties in the state have a General Plan, or a fundamental planning document that serves as a blueprint for land use planning at the county level. Each county General Plan describes the county's development goals and policies. Local planning commissions, city councils, and boards of supervisors are required to use the General Plan as the foundation for all land use decisions (Walsh, Roberts, & Pellman, 2005). Zoning, subdivisions, and public works projects must be consistent with the General Plan in order to be approved. Each General Plan typically consists of a written description of the county's goals, objectives, and policies for development; and illustrations of other policy statements, including maps and diagrams showing the land uses, road systems, environmental hazard areas, and open space in the county (Walsh et al., 2005). All General Plan contains at least seven required components that addressed the basic planning issues (referred to as General Plan "elements"). The seven mandatory elements of a General Plan are: Land Use, Circulation, Housing, Conservation, Open Space, Noise, and Safety Walsh et al., 2005). Although "water resources" is not a required General Plan element, each county is allowed to voluntarily adopt additional elements ("optional elements") that incorporate local interests. A Public Utilities element is an example optional element which encompasses the topic of drinking water supply in a General Plan. Moreover, among the mandatory elements, water resources are often included in the context of the Conservation or Open Space Element. The "Internal Consistency" principle of the county General Plan ensures the data and text regarding water resources are consistent among all the General Plan elements (Tully and Young, 2007).

Local Agency Formation Commissions (LAFCOs) are the other integral component in the land use and water supply planning framework at the county scale. LAFCOs were established in each county by the Cortese-Knox-Hertzberg Local Government Reorganization Act of 2000.[18] They control

18 Reference California Government Code Section 56000 et seq.

city's annexation decisions and establish, as well as modify, the city's Sphere of Influence[19] (SOI). A LAFCO consists of elected officials chosen by their county, cities, and special districts (Walsh et al., 2005). LAFCOs are particularly relevant for CWS consolidation efforts because they are responsible for considering the water service efficiency when evaluating provision of public services as part of annexation and SOI modification proceedings (Walsh et al., 2005). LAFCOs are tied with General Plan water supply planning because General Plan updates often serve as the platform for SOI expansion and territorial annexations (Tully & Young, 2007). General Plan and LAFCOs proceedings therefore present important opportunities to connect land use decisions and water resources planning, including implementing consolidation of failing CWS.

Also on the local level, County Boards of Supervisors can have significant influence over consolidation efforts in California. The Board of Supervisors exercises both legislative and executive authority over the county. The board's executive duties include priorities setting for the county, oversight of most county departments and programs, approval of the annual budgets, and appropriation of spending on programs that meet county residents' needs (CSAC, 2014). As a legislative body, the Board of Supervisors may act by a resolution, a board order, or an ordinance. A resolution from the Board of Supervisors can be a declaration about future proceedings of the Board or a policy statement by the Board. The Board often utilizes the board order as a directive to its subordinate county officers. On the other hand, an ordinance is a local law adopted by the Board with all the legal formality of a statute. Under the California Constitution, a county is allowed to make and enforce ordinances and regulations that do not conflict with the state's own general laws (CSAC, 2014). The California Government Code provides specification of the form, content, and adoption process for county ordinances.[20] Making water system decisions are among the many responsibilities for the Board of Supervisors. However, the county supervisors do have the authority and potential to do more in order to help ensure the residents in their counties have access to safe and clean drinking water.

19 The sphere of influence designates the physical boundaries and service area of a city or special district.
20 California Government Code Section 25120 et seq.

3. Literature Review

In order to achieve and maintain compliance with safe drinking water standards, CWS should evaluate whether they have sufficient capacity to ensure the adequate delivery of safe drinking water. Owners or managers of CWS must evaluate the water system capacity from three perspectives: financial, technical, and managerial (EPA, 2006). Financial capacity is the CWS's ability to acquire and manage sufficient financial resources and achieve cost efficiency, which would indirectly affect the customer water affordability. Technical capacity encompasses the system's infrastructure and operational abilities, which can be observed through the water quality, source reliability, and water production efficiency. Managerial capacity demonstrates the CWS's capabilities for administrative system management. The ability to attract, retain, and continually train certified operators is an important component of CWS's managerial capacity.

Several studies have documented the failures of small water systems (serving 3,300 people or less) in providing safe and affordable drinking water across the nation (EPA, 2017a). Particularly, system's technical efficiency was identified as one of the main shortcomings of small water systems, as opposed to larger systems (Shih, Harrington, Pizer, & Gillingham, 2004). Characteristics of public water systems, such as ownership structure, geographical location, and size are critical factors that affect production efficiency for water utilities (Romano & Guerrini, 2011). Small water systems inherently have smaller customer bases, which result in greater financial constraints than the large systems in financing drinking water infrastructure. Some scholars argue that larger systems are better than smaller systems at bargaining and obtaining inputs at a lower unit cost in, for example, capital and material costs (Shih et al., 2004). Larger water systems were thus able to observe economies of scale in technical efficiency, measured by capital costs, material costs, and labor costs (Shih et al., 2004). Water utilities were found to achieve greater cost efficiency by increasing water production (Torres & Paul, 2006), which could be made possible with consolidation of small systems. Moreover, the water user fees, crucial components to the financial capacity of water systems, are typically the funding source for the daily operation, maintenance and long-term capital investments of a CWS (EPA, 2017b). Small CWS would need to generate greater funds to cover the costs of providing safe drinking water, maintaining infrastructure due to its lack in economies of scale for water production. Water prices for these small CWS are thus typically higher even if the water provided by these systems is likely unable to meet drinking water standards. Households served by these small CWS, which are typically low-income and disadvantaged communities (VanDerslice, 2011), are thus also faced with affordability problems to safe drinking water.

The quality of drinking water, which has significant public health implications, was also found to be affected by the size of a water system. Pon's research showed that quality insufficiency in small water systems is tied to deficiencies in these systems' technical capacity. Her research in Ontario, Canada illustrated that the outbreaks in the small water systems were often results of the existing water treatment system failures and the lack of adequate water treatment facilities (Pons, 2015). The lack of managerial capacity also contributed to the substandard water quality. 66 percent of water operators in Ontario received no training, while 16 percent had only one year or less of experience (Pons, 2015). Financial constraints for the small water systems lead to problems with operator training and retention, which means operators are often less than qualified to operate the systems (NRC, 1997). Consequently, small water systems are more likely to have water quality violations than large

water systems (Eskaf, 2015). The lack of managerial resources, particularly water operators' lack of technical ability, in these small water systems caused serious concerns to water safety for the communities served. In addition, small systems are often located in rural communities and low-income areas (VanDerslice, 2011). Source reliability demonstrates yet another important concern about the technical capacity of small CWS. Unreliable water access negatively impacts the health and welfare of the population. Disadvantaged communities in the U.S. are found to be facing more problems with drinking water source reliability (Olmstead, 2004). In particular, populations living in mobile home parks encounter significant challenges with water service reliability (Pierce & Jimenez, 2015). These disadvantaged communities (entire area of a water system or community where median household income is less than 80 percent of the statewide average)[21] are often without the necessary resources to fund improvement and maintenance projects on the water distribution systems. The cost of providing safe drinking water will continue to increase as more regulations are implemented to enhance public health protection (EPA/DWA, 2003). This rising cost will generally result in less affordable water for the disadvantaged communities served by the small CWS. The financial capacity of the small CWSs may be impacted by the increasing cost and financial burden to comply with water quality standards and ultimately fall out of compliance and unable to provide safe drinking water to their customers.

A smaller group of studies has found that consolidation of small water systems is effective in overcoming the financial, technical, and managerial capacity challenges that small water systems are facing. Consolidation is effective in resolving the lack of economies of scale in costs relating to water production. Eskaf and Moreau proposed using shared management (similar in concept to consolidation) of small water systems to enhance the overall performance of these systems in North Carolina (Eskaf & Moreau, 2009). Eskaf and Moreau recognized that consolidating management of small systems can potentially achieve overall cost savings. For example, they found that cost savings can be realized through equipment sharing and bulk purchases of materials (Eskaf & Moreau, 2009). Moreover, improvement of water quality would usually require large capital investment that small water systems cannot afford (EPA, 2002). Consolidating could be a cost-effective method in pursuing costly capital projects for these small systems due to economies of scale (Lee & Braden, 2007). Ultimately, the conceptual and empirical literature on water system size and performance supports the Board's effort to promote consolidation of small water systems and limiting formation of new water systems.

An even smaller group of studies has evaluated the factors which led to successful implementation of water system consolidation or water service extension efforts by municipal or public utilities. Small systems that have lower costs associated to being merged into a larger system are more likely to be consolidated. For example, systems with existing connections or interties to the neighboring large consolidating system will make a potential consolidation more likely to occur. On the other hand, a publicly-owned system, with its associated bureaucratic and political costs, is less likely to be consolidated (Lee & Braden, 2007). Moreover, Naman and Gibson conducted a multi-site case study interviews with key informants from the communities to identify the common themes in the decision-making process that provides access to municipal services in North Carolina (Naman & Gibson, 2015). "Financing (costs and benefits)" for water and sewer systems has a stronger influence than "improved health effects" in advocating for policies that would provide municipal services to

21 Definition in the Safe Drinking Water Act, see Health and Safety Code section 116275(ab).

unincorporated communities in North Carolina (Naman & Gibson, 2015). Tailoring recommendations to include more information on cost-savings could have a higher success rate to implement municipal policies. This finding is particularly relevant because the objective of this project is to encourage consolidating small water systems in California through local government policies. Municipal annexation practices are important for encouraging small system consolidation because they affect the potential provisions of adequate water services to unincorporated areas that are currently served by failing small CWS. Mukhja and Mason found that funding, particularly federal support, is a crucial component in addressing the infrastructure challenges in unincorporated areas (Mukhja & Mason, 2013). Cities' resistance to annexing unincorporated areas often lies in the lack of federal funding for infrastructure upgrades associated with the annexation (Mukhja & Mason, 2013). Mukhja and Mason (2013) concluded that LAFCOs are critical players in convincing cities to annex nearby communities with failing water systems.

On the other hand, Kentucky's SB 409 provided interesting insight into how a state might radically re-structure regional water planning. The state's success in their efforts to consolidate water systems and extend services to unserved areas is unique in the U.S. The legislation illustrates how a statewide effort can be delegated to regional bodies. The experience from the Kentucky's SB 409 could be applicable to current consolidation efforts in California. Consolidation efforts in Kentucky demonstrated that it is possible and viable for California to encourage additional consolidation of water systems, not necessarily with mandatory consolidation orders. In 2000, Kentucky's Senate Bill 409 (SB 409) created a structured planning process for water services in Kentucky. The Kentucky Infrastructure Authority (KIA) was designated as the responsible agency for developing a program that would make potable water available to all Kentuckians by 2020 (Hager, 2005). SB 409 created a funding source, the "2020 Account", to incentivize regionalization and consolidation among water distributors and to provide service to underserved and unserved households.[22] In 2000, House Bill 502 provided $50 million in initial funding through the Water Resources Development Bond Fund, which KIA implemented through the 2020 Account (Hager, 2005). Moreover, the legislation created water management planning council by Area Development Districts[23] (ADDs), water management areas by ADDs, water management area plans by ADDs, and a statewide water management plan. The water management planning councils are composed of local elected officials, water utility staff, and local health department officials (Hager, 2005). These components of SB 409 were developed to facilitate a bottom-up water planning process in which local and regional planning bodies prioritize water projects and forward them to the KIA for final ranking and funding.[24] KIA serves as the facilitator between the ADDs, which develop and submit project proposals, and the Division of Water, which approves projects.

The results from the implementation of SB 409 are remarkable. Within four years of implementation (from 2000-2004), the number of PWS was reduced by 25 percent (532 water systems by 2004), which was much lower than the national average of approximately 3,000 systems (Hager, 2005).

22 Kentucky SB 409, see: http://www.lrc.state.ky.us/recarch/00rs/SB409.htm.

23 Area Development Districts are Kentucky's regional planning organization.

24 Water service coordinators from each area development district enter each approved water project into the Water Resource Information System, a statewide database that includes information on water resources, drinking water systems, wastewater treatment systems, project development, emergency response, regulations, and planning. Water project proposals are then presented to a water management planning council, which reviews them and prioritizes projects. Once local projects have been reviewed and prioritized, the next step involves combining separate planning council project proposals into a regional water plan. If multiple water management planning councils operate within one district, the district combines and prioritizes all the projects. KIA staff review the 15 Area Development District plans and consolidate them.

The typical Kentucky system also serves more people than the national average. Most notably, the eliminated systems were mostly small systems and PWS that do not provide water service year-round. Between 2000 and 2004 SB 409 helped provide water service to about 20,000 Kentuckians who previously lacked potable water (Hager, 2005). Over 10 years of implementation the law, more than 97% of Kentuckians have access to safe drinking water (KCADD, 2016). In 2014, the commonwealth of Kentucky are served by 445 PWS (KDOW, 2015). Nevertheless, more than half of the PWS in Kentucky are still small PWS (serving less than 3,000 people) and face water affordability and production efficiency challenges (KDOW, 2015). Based on the goal of providing sustainable drinking water to all, SB 409 required the local formation of planning councils the development of long-term regional drinking water planning by basin. These plans began with the focus of providing for underserved or poorly operated communities. Similar strategies can potentially be applied to LAFCOs in California to facilitate regional water planning and ensure adequate drinking water supply for all residents in California.

4. Data and Methods

The analysis of this research report is divided into two parts. The first part evaluated past cases of California water systems consolidation. The second part of the analysis consist of reviewing existing county level policy tools and assessing current consolidation evaluation decisions to limit community water system expansion and encourage small system consolidation in California. Qualitative and quantitative data were used to illustrate the need for local planning and water management agencies to adopt county-level policies to limit water system sprawl and encourage small system consolidation.

In order to gain insight from the previously-used policy tools to facilitate water systems consolidation, this report analyzed the 106 past and existing consolidation projects in California (data provided by the Board's Division of Financial Assistance). The data tables (separated by funding sources of the projects) contain information regarding the project status (in planning stage or completed), funding sources, funding amount, and the participating water systems for the consolidation projects. The funding sources for these projects included Safe Drinking Water Bond Law (SDWBL of 1976, 1984, 1986, & 1988), Safe Drinking Water State Revolving Fund (SRF) / American Recovery and Reinvestment Act (AARA) of 2009, Proposition 84 of 2006, and Proposition 50 of 2002. The data for the consolidation projects from these four funding sources were compiled into a single spreadsheet for analysis. Summary for the funding amount and number of systems eliminated through consolidation by funding sources was produced using Microsoft Excel Pivot Table. Summary breakdown of the consolidation projects by county was also created to showcase the number of consolidation projects, number of water system eliminated, and funding amount used in each county.

The core of this study, however, is an examination of county-level policy tools that are appropriate for encouraging consolidation of small water systems that are out of compliance with the drinking water standards. These policy tools include the General Plans, Local Agency Formation Commissions, Board of Supervisor decisions, and Local Primacy Agencies. This report provides an evaluation of these policy tools in regards to their effectiveness and how they are currently being used to encourage consolidation of water systems.

Since the county General Plan serves as the blueprint for all future local development, a systematic review of the most recent General Plans for all 58 counties in California was conducted a) to see if guidance was provided regarding water system formation, and b) to assess the quality of the guidance. For each General Plan, the table of content was reviewed first to identify the sections where consolidation guidance could be located. As suggested in the background section, topics regarding water supply and resources management are typically included in the Open Space or Conservation elements. These two mandatory elements were the primary target for the targeted word search for each county's consolidation guidance. In the case where the county voluntarily adopted an Optional Element that is specific to drinking water services (i.e. Public Utilities Element or Water Resources Element), the water-specific optional element was the primary target for the systematic review for consolidation guidance. In a few cases, the Public Facilities and Services sections that are related to drinking water systems were included in chapters contained in the Built Environment Element. Every element that could potentially provide guidance regarding consolidation of water systems in each county General Plan was carefully reviewed. Guided by the "Internal Consistency" principle of county General Plans, the guidance for CWS consolidation policies will be consistent even if it is presented in multiple elements within the General Plan.

The systematic review of General Plans was conducted by identifying key words (such as: public water system, water facilities, water supply, water services, and consolidation) within each General Plan. Each match of the keyword search was individually assessed to determine whether or not the section or passage contained guidance on water system consolidation or limit water system sprawl. This focus was guided by the example of water system consolidation policy tools presented in Tuolumne County General Plan. A typology of General Plan guidance was created following the systematic review (see table in appendix). The information from the table was summarized using a Pivot Table. Each county General Plan was categorized into one of four categories based on the quality of guidance provided. County population, number of CWS, and county median household income data were gathered as part of this analysis to provide further insight. Average number of CWS per county per Level (General Plan consolidation guidance level) was also calculated. The number of CWS per county was obtained through the data from the Board's Safe Drinking Water Information System (SDWIS).[25] Population and median household income data were compiled from the 2013 American Housing Survey.[26]

Five district engineers from the Board's Division of Drinking Water (DDW) district offices were interviewed to gain insights on the regional perspectives of consolidation projects in different California regions. This is an important perspective since the district engineers from the Board are responsible for issuing the mandatory consolidation letters under SB 88, and they have the most practical experience with other county tools potentially usable for consolidation efforts.

Moreover, since municipal annexation is controlled by LAFCOs, the role it played in consolidation of water systems was evaluated. This report reviewed documents authorizing LAFCO and interviewed DDW district engineers in regards to their experience working with LAFCO on consolidation projects. Consolidation case studies found in LAFCO proceedings in Orange County were also examined to provide insight on how LAFCO was involved in the process to encourage water systems consolidation.

The role of Local Primacy Agencies (LPAs) was reviewed. District engineer's' experience working with the LPAs was recorded and evaluated in regards to the LPA's role in facilitating consolidation projects. There are limited resources that can provide information regarding the LPA functioning and their involvement in consolidation projects. The quarterly reports from the LPAs to the Board do provide some insight about the governance of state small water systems at the local level.

Finally, the potential for county Board of Supervisors to facilitate consolidation within their jurisdiction was also considered.

25 Safe Drinking Water Information System, see: https://sdwis.waterboards.ca.gov/PDWW/
26 2013 American Community Survey, see: https://www.census.gov/programs-surveys/acs/

5. Findings

The analysis of the past consolidation efforts in California and results from the research on the county-level policy tools to encourage consolidation of small water systems are outlined in the following sections:

CWS, population, and median household income information for the top 10 most populous California counties are presented in Table 1 below. A low average population per CWS ratio is an indicator of water system sprawling in California. The summary table illustrates that even the densest counties in California, there is a high ratio between the number of CWS and county population.

Table 1. Water System Sprawl in the Top 10 Most Populous California Counties.

County	Number of CWS (SDWIS) (09/2015)	Total Population per County (2013)	Average Population per CWS	Median Income per County (2013)
Los Angeles	217	9,893,481	45,592	55,909
San Diego	78	3,138,265	40,234	62,962
Orange	45	3,051,771	67,817	75,422
Riverside	116	2,228,528	19,211	56,529
San Bernardino	151	2,056,915	13,622	54,090
Santa Clara	69	1,812,208	26,264	91,702
Alameda	14	1,535,248	109,661	72,112
Sacramento	68	1,435,207	21,106	55,064
Contra Costa	41	1,065,794	25,995	78,756
Fresno	119	939,605	7,896	45,563

5.1 Past and Existing Consolidation Projects in California

State technical assistance for small, under-performing water systems is critical to help system operators complete the necessary process leading up to the consolidation of their systems. The Board currently provides technical assistance to small water system through existing mechanisms such as Proposition 1 and State Drinking Water Revolving Fund. Encouraging the expansion of these resources for technical assistance would help more consolidation projects come to fruition.

The four major funding sources for past and existing consolidation projects include the Safe Drinking Water Bond Law (SDWBL of 1976, 1984, 1986, & 1988), Safe Drinking Water State Revolving Fund (SRF) / American Recovery and Reinvestment Act (ARRA), Proposition 84, and Proposition 50. Table 1 provides the summary of past and existing consolidation projects (through 2013) and a breakdown of the total funding from each source and the number of systems that were eliminated through consolidation for consistently failing to comply with water quality standards and lack of reliable sources to provide adequate drinking water. A total of 145 water systems were eliminated through these consolidations projects over the span of roughly 40 years. An additional 32 systems would be eliminated through consolidation projects that are currently in the planning stage.

The Safe Drinking Water Bond Law was a program that provides loans and grants to water systems with projects that help them meet safe drinking water standards, which include water system consolidation. Other projects eligible for funding under SDWBL include planning, water conservation, water loss detection, capital improvements, and corrosion control. The SDWBL eliminated the most water systems (a total of 85 water systems) with approximately 3.5 times less funding than the consolidation projects funded by SRF/ARRA (without adjusting for inflation). In addition to Proposition 1 (as mentioned in the background section for consolidation funding), Proposition 50 and Proposition 84 were another two California propositions that provided funding for projects consolidating water systems. Proposition 50, also known as the Water Security, Clean Drinking Water, Coastal and Beach Protection Act of 2002, allocated $47 million for a program directed projects for small CWS, including consolidation projects.[27] Four systems were eliminated under Proposition 50. Proposition 84, the Safe Drinking Water, Water Quality and Supply, Flood Control, River and Coastal Protection Act of 2006 allocated a total of $157 million for grants for small CWS infrastructure improvements and related actions to meet safe drinking water standards. Priority was given to projects that address chemical and nitrate contaminants and disadvantaged communities (CDPH, 2013). Proposition 84 removed a total of 50 CWS through consolidation. The American Recovery and Reinvestment Act (ARRA) of 2009 allocated $2 billion to the State Revolving Fund (SRF) for drinking water infrastructure improvement. SRF/ARRA provided the greatest amount of funding for consolidation projects and eliminated a total of 38 water systems.

Table 2. Summary of Past and Existing Consolidation Projects.

Funding Source	Amount	Number of Systems Eliminated by Projects in the Planning Stage*	Number of Systems Eliminated through Consolidation*
SDW Bond Law	$32,061,962	0	85
Prop 50	$6,170,938	0	4
Prop 84	$55,995,466	20	30
SRF/ARRA	$116,372,969	12	26
TOTAL	$210,601,335	32	145

*Prop 84 / Prop 50 Consolidated System Totals exclude SRF Co-funded Projects

Table 3 summarized the past and existing consolidation projects by the 31 counties in California. The table includes the number of consolidation projects, total funding amount allocated to the county for consolidation projects, and the number of water systems eliminated through consolidation within each county. Nearly half (27 out of the 58) of the California counties do not have past consolidation projects. The total funding amount and the number of consolidation projects over the years varied in each county. Kern, Tulare, and Tuolumne County are the top three most proactive counties with the most consolidation projects (23, 13, and 8 projects, respectively). However, Lake County had eliminated the most water systems (57 water systems total) through consolidation projects, even though it only had two independent consolidation projects. The amount of funding needed for each consolidation project appears to be dependent on the specific situation and conditions of the case.

27 Water Code Section 79500, et seq.

Table 3. Summary Breakdown of Consolidation Projects by County.

CA County	Number of Consolidation Projects	Total Funding Amount (Not adjusted for inflation)	Number of Water Systems Eliminated (Include Potentially Eliminated) through Consolidation
Kern	23	$22,745,288	33
Tulare	13	$18,400,404	12
Tuolumne	8	$2,979,071	8
Sonoma	7	$6,560,388	10
San Bernardino	5	$14,523,006	4
Fresno	5	$3,279,771	5
Sutter	4	$35,164,901	6
Kings	4	$5,089,113	6
Merced	3	$1,860,111	3
San Diego	3	$4,343,670	3
Riverside	3	$1,700,889	3
Monterey	3	$1,322,147	4
Placer	3	$4,048,976	2
Plumas	2	$1,429,444	2
Butte	2	$4,890,291	2
Orange	2	$1,563,378	2
Lake	2	$9,385,411	57
Total	106	$148,221,080	177

Counties with 1 consolidation projects include: Siskiyou, San Luis Obispo, Madera, San Benito, Santa Cruz, Stanislaus, Solano, Imperial, Humboldt, Napa, Colusa, Los Angeles, Nevada, and San Joaquin. The following counties had no consolidation project: Alameda, Alpine, Amador, Calaveras, Contra Costa, Del Norte, Eldorado, Glenn, Inyo, Lassen, Marin, Mariposa, Mendocino, Modoc, Mono, Sacramento, San Francisco, San Mateo, Santa Barbara, Santa Clara, Shasta, Sierra, Tehama, Trinity, Ventura, Yolo, and Yuba.

Despite substantial resources invested in the state to consolidate systems, according to interviews with DDW district engineers, the greatest obstacles to consolidation have always been and remain the availability of funding (either from the propositions and/or loans from the State Revolving Funds) and the length of time required to reach an agreement for consolidation, process the legal paperwork with the appropriate agencies, and have funds available to construct infrastructure for consolidation (S. Williams, personal communication, February 13, 2017). Providing the necessary funding to relieve the burden of the consolidation agencies can be helpful in drawing additional consolidation projects. Moreover, customers in the to-be-subsumed water systems are likely unsupportive of consolidation projects because of the additional costs they might incur (as seen in the cases of Irvine Ranch Water District consolidation projects described in the LAFCOs section below). Interestingly, among the 10 counties, only Contra Costa and Fresno County have detailed consolidation guidance in their General Plans. Most of the other top 10 most populous counties have little to no consolidation guidance. However, among counties with Level 3 guidance in their General Plans, CWS in Contra Costa and Fresno County still serve less household on average in comparison to other counties.

5.2 California General Plans

The effects of state-level policies are limited in consolidation efforts without the involvement of local governments and agencies. Local water management and planning agencies are critical components in encouraging the consolidation of failing water systems. County-level policies tools should be utilized to best achieve the consolidation efforts and ensure the delivering of safe drinking water to all households in California. The most recent General Plans for all 58 counties in California were systematically reviewed. Consolidation guidance, if found, was recorded in the "General Plan Consolidation Guidance Table" (See Appendix), organized by County name. The table contained the General Plan element(s) and the section(s) where the guidance was extracted from. The keywords used for the search, as well as any additional comments or useful information, were also noted in the table. For the county General Plans that do not have any guidance regarding water system consolidation, the General Plan elements that were reviewed are noted in the table for the respective county. Even though there is no standard format for county General Plans, many contain similar features. General Plans typically contain "Goals" illustrating the general expressions of community values, "Objectives" outlining steps to achieve the goals, "Policies" delineating statements that guide decision makings, and "Implementation Programs" describing how the goals, objectives, and policies are executed (Walsh et al., 2005).

Based on the quality of consolidation guidance provided, each county General Plan was categorized into one of four levels. Level 0 contains counties which provide no consolidation guidance while level 3 has the most detailed guidance for consolidation efforts. The General Plans of 28 out of the 58 counties in California do not have any relevant water system consolidation guidance. There are 30 counties that have varying degrees of consolidation guidance in their General Plans. The distinction between levels of guidance is sometimes minor. Whereas Level 0 and Level 3 counties are clearer, the difference between Level 1, and Level 2, is less clear. When the General Plan guidance contained details that have both Level 1 and Level 2 qualities, the General Plan was categorized as Level 2. Moreover, within Level 3, there are two counties which stand out as having the most progressive consolidation guidance, Placer and Tuolumne counties.

The different levels are defined as follows:

Table 4. Levels of Consolidation Guidance.

Level	Count	Definition	California Counties
0	28	No consolidation Guidance	Alameda, Alpine, Amador, Del Norte, El Dorado, Imperial, Kings, Lassen, Los Angeles, Mariposa, Mendocino, Modoc, Napa, Orange, Riverside, San Diego, San Joaquin, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Siskiyou, Solano, Sutter, Tehama, Trinity, Ventura, Yuba
1	11	Indirectly encouraging consolidation or expansion of water system and/or limiting new water system formation through guidance on land use and new developments	Butte, Calaveras, Colusa, Glenn, Lake, Madera, Marin, Monterey, Nevada, San Francisco, Stanislaus

Table 4. Levels of Consolidation Guidance *(continued)*.

Level	Count	Definition	California Counties
2	6	Encouraging consolidation or expansion of water system and/or limiting new water system formation through direct guidance on water systems/services	Inyo, Plumas, Sacramento, San Bernardino, Tulare, Yolo
3	13	Explicitly strongly encouraging consolidation or expansion of water system or limiting new water system formation.	Contra Costa, Fresno, Humboldt, Kern, Merced, Mono, Placer*, San Benito, San Luis Obispo, San Mateo, Sierra, Sonoma, Tuolumne*

Level 0 Guidance

Level 0 General Plans do not contain information regarding water system consolidation or expansion or any guidance on limiting water system sprawl. Almost half (48%) of California counties do not provide any guidance in their General Plans. Counties with Level 0 General Plan guidance do not necessarily indicate the lack of county-level effort on consolidation of water systems. These counties could be relying on other policy tools, which will be explored in the following sections, to encourage consolidation activities.

Level 1 Guidance

Level 1 General Plans provide guidance regarding water use or services, but not directly relating to community water systems, much less encouraging water system consolidation. The information regarding water systems provided in these General Plans involve guidance on the water supplies for new developments that would implicitly discourage formation of new water systems. Lake County, for example, gave instructions on the coordination of potable water with land use in the Lake County 2030 Comprehensive Plan, it states, "Lake County shall maximize the use of existing facilities prior to new planned facilities and discourage urban sprawl by encouraging the provision of central potable water services within existing and planned service areas where possible and prohibiting the extension of potable water facilities outside of existing and planned service areas".[28]

Some of these Level 1 General Plans also include instructions for public service providers to coordinate with Local Agency Formation Commissions (LAFCOs) to ensure the efficiency of these services. By suggesting coordination of water services with land use to increase efficiency of public services, these General Plans indirectly encourage consolidation of water systems. For instance, Colusa County's 2030 General Plan supports the "consolidation of special districts and/or responsibilities where increases in efficient public services are feasible and redundancy is eliminated" and states that "Public Works should coordinate with LAFCO during the preparation of Municipal Service Reviews and Sphere of Influence Updates to address coordinated public service and infrastructure planning".[29]

28 Lake County Comprehensive Plan 2030, adopted in 2011, see: https://www.lakecountyfl.gov/departments/economic_growth/planning_and_zoning/comprehensive_planning/

29 Colusa County 2030 General Plan, adopted in 2012, see: http://www.countyofcolusa.org/index.aspx?NID=137

Level 2 Guidance

Level 2 General Plans have direct guidance regarding water services and water systems, instead of indirect guidance on water systems from instructions based on land use developments like in Level 1 General Plans. Level 2 General Plans typically present guidance that either encourage the expansion of existing water systems or limit the formation of new systems. Plumas County, for example, included in its General Plan that "The County shall require any new community water system, in the unincorporated area of the county serving residential, industrial or commercial development to be owned and operated by a public or private entity that can demonstrate to the County adequate financial, managerial and operational resources".[30]

Similarly, Inyo County is another county with Level 2 General Plan that provides direct guidance regarding water services. Inyo County's General Plan have a policy that encourages "the development and viability of community water systems rather than the reliance upon individual water wells" and it included an implementation program that specifies that "development of a property within a CSD service boundary shall utilize the CSD services, instead of developing a private system, if the CSD can reasonably provide needed services".[31]

Level 3 Guidance

Level 3 General Plans have language that explicitly encourages consolidation or expansion of water systems. These General Plans are often strongly in favor of consolidation of small water systems to mitigate water quality problems or increase efficiency of water systems. For instance, San Luis Obispo County's General Plan has guidance that explicitly discourages formation of new water systems: "Enable expansion of public services by community services districts and County service areas to serve contiguous development when water is available. Strongly discourage the formation of new water and sewer systems serving urban development at the fringe and outside of urban or village reserve lines or services lines".[32] The guidance in these Level 3 General Plans demonstrates these counties' goals to limit proliferation of unsustainable water systems and encourage consolidation of small water systems to promote improved water quality and efficiency of water services.

Tuolumne and Placer County

While the majority of the California counties have no direct General Plan guidance on consolidation of water systems, Tuolumne[33] and Placer[34] counties have specific directions and details on achieving consolidation.

Most notably, Tuolumne County has strongly favorable policies toward consolidation of existing small water systems and discourages the creation of new ones. The Tuolumne Utility District has been instrumental in efforts for water system consolidation. The County currently has the 7th smallest average size of population served by CWS, but is only the 16th smallest county, so it appears

30 Plumas County General Plan 2020, began update in 2009, see: http://www.countyofplumas.com/index.aspx?NID=2116
31 Inyo County General Plan, adopted in 2001, see: http://inyoplanning.org/general_plan/index.htm
32 San Luis Obispo County General Plan, adopted in 2010, see: http://www.slocounty.ca.gov/planning/General_Plan__Ordinances_and_Elements.htm
33 Tuolumne County General Plan, adopted in 1996 and update began in 2015, see: http://www.tuolumnecounty.ca.gov/index.aspx?NID=184
34 Placer County General Plan, updated in 2013, see: https://www.placer.ca.gov/departments/communitydevelopment/planning/documentlibrary/commplans/placer-county-gp

to be ideal for consolidation. The Tuolumne County General Plan guidance advocates for "the consolidation of water purveyors in the County to facilitate improvements to the infrastructure and consistency of water quality of the systems; Consider the undesirability of proliferation of small water purveyors during the development review process; Discourage additional water purveyors in the county, particularly stemming from new development; Discourage creating new discontiguous water systems operated by existing water purveyors". In addition, Tuolumne County has specific implementation programs for consolidation of water systems. The Tuolumne County General Plan supports "actions by larger water purveyors and special districts to incorporate and maintain existing smaller systems and isolated privately or mutually-owned water supply systems." The General Plan also contains implementation programs that discourage developments from relying on new or discontiguous public water systems. It states that the county should "require residential development projects that are proposed to be served by a public water system to be served by an existing water purveyor that is either a district, or water company that is privately-owned, or a mutually-owned system. The new or expanded water service from a privately-owned or mutual water company must be geographically approximate to the existing system and have a direct infrastructure link between the existing and new system".

Placer County's General Plan addressed the financial issues often associated with newly formed water systems and gave guidance on limiting formation of new water systems. It states that, "When considering formation of new water service agencies, the County shall favor systems owned and operated by a governmental entity over privately- or mutually owned systems. The County will continue to authorize new privately- or mutually-owned systems only if system revenues and water supplies are adequate to serve existing and projected growth for the life of the system. The County shall ensure this through agreements or other mechanisms setting aside funds for long term capital improvements and operation and maintenance." Furthermore, Placer County favored consolidation as a mitigation strategy for water systems that experience water quality issues and specified that, "The County shall initiate a review of any water system that persistently fails to meet applicable standards and shall encourage consolidation or regionalization of surface water treatment systems to address problems in common." Placer County also designated the responsibility of this guidance to the Environmental Health Division and major water purveyors. The county also includes State MOU funds and General Fund as the funding sources designed for this guidance.

Table 5. Average Number of CWS per County by Category.

GP Guidance Level	Count of Counties in each Level	Sum of Total Population (2013)	Average Number of CWS per County
0	28	25,619,572	46
1	11	2,640,347	44
2	6	4,179,122	71
3	13	5,220,140	64
Total	**58**	**37,659,181**	

The General Plans in majority of the counties in California lack guidance (Level 0) regarding the consolidation of water systems or guidelines to limit water system sprawl. Approximately 19 percent of the counties have land use and new development guidelines (Level 1) that are indirectly relevant to water systems. Lastly, only slightly over 30 percent of the counties have direct or direct and explicit guidance (Level 2 and 3) on consolidation of water systems in their General Plans. As shown in Table 5, there is no apparent causal relationship between quality of consolidation guidance and average number of CWS per county in each level. Counties with Level 0 and Level 1 General Plans actually have lower average number of CWS per county than those with Level 2 or Level 3 General Plan consolidation guidance. This result suggests that more specific consolidation guidance in General Plans is incorporated as a result of water system sprawl, rather than acting as a historical barrier to system sprawl. The implementation of consolidation projects also seem to be independent of consolidation guidance in General Plans.

Despite these different county tools and responsibilities existing on paper, the practical disconnect between water resource management and land use development decision making at the county level is clear. This is most evident when new developments are built without adequate water services. Senate Bills 610 (SB 610) and Senate Bill 221 (SB 221) were established in 2002 to improve the link between certain land use decisions (enacted by cities and counties) and water supply availability (DWR, 2003). These two measures effectively promoted collaborative planning approaches among local water suppliers and local governments (DWR, 2003). The SB 610 Water Supply Assessment (WSA) additionally required the water supplier to provide information on the water availability for a proposed project to be included in the Environmental Impact Report (EIR) process specified under the California Environmental Quality Act (CEQA). It is important to note that the trigger for a SB 610 water assessment is only when the project is "a residential development of more than 500 units, a business or shopping center employing more than 1000 people, or any project that would increase a local water system's service connections by 10 percent or more, regardless of the number of dwelling units" (Tully & Young, 2007). As with other source documents for an EIR prepared for a proposed project pursuant to California Environmental Quality Act (CEQA), it must provide "substantial evidence showing that sufficient water will be available to meet water demands for the water purveyor's existing and planned land uses over a 20-year planning horizon" (Tully & Young, 2007). On the other hand, SB 221 requires a Water Supply Verification for a tentative map application for a subdivision[35] (Tully & Young, 2007). The local agency that received the tentative map application must send the application to the PWS that may provide the water for the lands. Once the PWS received the application, it is required to provide verification of sufficient water supply to the local agency within 90 days (Tully & Young, 2007). SB 221 is designed as a "fail safe" mechanism to ensure there is adequate water supply for the new large subdivision before construction begins. Most notably, SB 610 and SB 221 improved the coordination between local water supply and land use decisions and prompted local jurisdictions with lenient water-supply policies to increase enforcement (Hanak, 2005). The improved coordination in local water management is critical to limit new water system sprawl in California. However, the proposal of new legislations to limit sprawling of water system suggests that the problem still remains.

35 A subdivision is defined as an addition of 500 or more dwelling units, or, if fewer than 5,000 connections exist, upon an increase of 10% or greater in the number of service connections.

5.3 Local Agency Formation Commissions (LAFCOs)

Local Agency Formation Commissions (LAFCOs) are crucial parts of the water system consolidation process because they establish the sphere of influence (SOI) for each city. SOI represents the city's probable boundary and service area. SOI is necessary to determine which governmental agencies can provide services in the most efficient way to the people and property in any given area. Among other responsibilities, a LAFCO evaluates water service when considering whether an efficient SOI modification is possible. LAFCOs often require an extensive application process for a proposal to modify a SOI. For example, prior to submitting the SOI modification application, Monterey LAFCO recommends a preliminary Sphere of Influence Review, pre-application meeting with the LAFCO staff, a petition or resolution of an application (Monterey LAFCO, 2011). In addition, as part of the application, the applicant is required to submit a written request for LAFCO action, public notice, ordinance designating pre-zoning of affected property (adopted by the City Council), City-County Consultation meeting, and environmental documents, among other additional materials (Monterey LAFCO, 2011). Although county LAFCOs are not generally the initiators of the mergers between water systems, they are often involved in the discussions that ultimately led to the successful consolidations (as seen in Orange County). Indeed, studies have found LAFCO's informal cooperation and deal-making practices with the cities helped make it effective in encouraging cities to pursue annexation (Mukhja & Mason, 2013).

Past cases of consolidation projects in Orange County, the most consolidated county in the state, are a good example of the role LAFCOs can play in consolidation. In Orange County, Irvine Ranch Water District (IRWD) has facilitated the consolidation of 5 water districts in the past 10 years (IRWD, n.d.). In particular, consolidation of Los Alisos Water District with IRWD is a successful example of consolidation with LAFCO involvement. One of the main challenges that are associated with LAFCO for consolidation projects is the annexation process (R. Crenshaw, personal communication, February 15, 2017). Annexation is a long and expensive process that would potentially create financial burden for residents. There is evidence of small water systems that are established directly outside of the sphere of influence to avoid the annexation process (E. Zuniga, personal communication, February 7, 2017). In addition, annexation also means that the customers would be required to pay additional taxes associated with the added public services. Households in the consolidated water systems (likely population living in disadvantaged communities or mobile home parks) could be charged a higher rate after consolidation. An example of this phenomenon was observed in the consolidation between IRWD and the former Santiago County Water District in 2006. The merger agreement between the water districts established an acquisition balance and a rate schedule for the former Santiago service area. When the consolidation was completed, the water rates were reduced by 20 percent in comparison to the rate under the Santiago County Water District. Nevertheless, the reduced water rates for these residents were still higher than those in the IRWD service area. The difference in water rates was used to pay down the acquisition balance.

Sometimes, the only viable source to provide water in the annexed areas is still more expensive even after managerial consolidation. The benefit of consolidation would be realized through the added managerial and technical capacity, but water rates are not necessarily reduced y for water users. This occurred in the annexation case of the Los Alisos Water District into IRWD. The consolidation was approved by the Orange County LAFCO in 2000 and took effect in 2001. The areas in the former Los

Alisos Water District rely predominantly (approximately 94 percent of water) on water imported from the Metropolitan Water District of Southern California (MWD) (IRWD, n.d.). Taking into account that the water in the Los Alisos area rely heavily on the more expensive MWD imported water, customers in this area paid a higher rates than the rest of IRWD customers. Los Alisos area residents did not have the same water rate as customers in the IRWD Irvine rate area until a sale of the property in the Los Alisos area in Lake Forest was completed in 2008. The revenue from the sale helped equalize the higher cost of imported water to allow the Los Alisos area to have rate parity with other IRWD areas (IRWD, n.d.).

Moreover, LAFCOs have significant impacts on water system formation. The formation of new districts within the SOI is under LAFCOs' authority and the applications of new water systems are reviewed by LAFCO (Monterey LAFCO, 2011). Additionally, LAFCOs also conduct municipal service review to determine the availability and sufficiency of government services in a given geographic area and the information generated from the municipal service reviews are generally utilized for SOI determination (Napa LAFCO, 2014). They can also use the information for the municipal service reviews for purposes such as forming, consolidating, and dissolving of local agencies (Napa LAFCO, 2014). Therefore, LAFCOs are another important safeguard, in addition to county General Plans, to water system sprawling in California. Their authority to consolidate municipal services and modify SOI is crucial as the county-level tool to perform consolidation of failing water systems.

5.4 Local Primacy Agencies (LPAs)

Local Primacy Agencies (LPAs) are local environmental health departments that received primacy delegation (pursuant to Health and Safety Code Section 116330) to regulate community water systems that have less than 200 service connections. There are limited resources that can provide information regarding the LPA functioning and their involvement in consolidation projects. Nevertheless, the quarterly reports from the LPAs to the Board do provide some insight about the governance of state small water systems at the local level. In Los Angeles County, the Drinking Water Program under the Department of Public Health Division of Environmental Health operates as the regulators for these small water systems (CLADPH-EH, n.d.). The Drinking Water Program processes applications, issues permits, conducts inspections and evaluations, monitors water quality for the water systems (CLADPH-EH, n.d.). In 2011, the Los Angeles County Board of Supervisors required the Drinking Water Program to produce quarterly reports on its water quality monitoring of the water systems in order for the Board of Supervisors to stay informed of current water quality issues (DPH-DWP, 2016). The report document the records of Notice of Violation (NOV) issues to small water systems that violated the drinking water standards. LPAs work closely with the Board's district engineers to identify small water systems that are failing to comply with the safe drinking water standards (M. McNamara, personal communication, February 15, 2017). LPA staff is responsible for maintaining the working relationship and open communications with staff of the small water systems they regulate (S. Williams, personal communication, February 13, 2017). The role of LPA in consolidation of small water systems is thus to help the Board's district engineers obtain mutual voluntary consolidation agreement between the small water systems (the subsumed system) and the large water system who will be performing the merger. However, there is some evidence that some counties' LPAs are not monitoring situations where a CWS should be formed (HR2W-SWRCB, 2017). This type of oversight is essential in preventing unsustainable small water systems from being established.

5.5 County Board of Supervisors

Unless it is a high-profile case, County Boards of Supervisors are generally not actively involved in the process of water system formation or consolidation. However, the Board's district engineer has found that "when the Board of Supervisors gets actively involved, the County level planning and activities move more rapidly, and if the Board also contacts the Governor's Office and their State Representatives, it can facilitate more rapid movement at the State level, too" (S. Williams, personal communication, February 13, 2017). Therefore, involvement of the County Board of Supervisors could be integral to the success of consolidation efforts. The Board has been in contact with the Board of Supervisors in some counties to discuss the Board's initiatives to encourage water system consolidation. Providing access to safe drinking water for all the residents in the county should be a priority for the Board of Supervisor. With the influence of the Board of Supervisor, including its legislative and executive authority, consolidation efforts could be more effectively implemented with the county supervisors' involvement and with a goal of ultimately providing safe drinking water to all (M. Frederick, personal communication, February 7, 2017).

6. Discussion

The history of past state level consolidation efforts has been impactful, yielding the elimination of 177 systems over the span of approximately 40 years. However, given the money and time spent to accomplish this degree of consolidation, even the newfound legal authorities granted to the State Water Board suggest that state level support of individual projects can likely only go so far to accomplish California's ambitious drinking water system consolidation goals.

In reviewing each General Plan for all counties in the state, I found that the majority of counties have little to no consolidation guidance. Counties with General Plans that lack guidance (Level 0 and 1) actually have lower average number of CWS per county than those with direct and explicit General Plan consolidation guidance (Level 2 and 3). This illustrates that more specific consolidation guidance may been incorporated in plain language as a result of water system sprawl. The implementation of consolidation projects also seem to be independent of consolidation guidance outlined in General Plans.

Still, simply illustrating to county planning officials the latent authority they have regarding water system consolidation decisions could lead to proactive efforts. Showcasing county General Plans with helpful guidance in encouraging consolidation of water system or limiting formation of unsustainable small water systems can also positively influence the counties which are currently inactive. Tuolumne and Placer County's General Plans contain specific directions and details on achieving consolidation. Other counties can use language from these General Plan and develop consolidation policies that might be more suitable for each of their counties.

By contrast with General Plan guidance, LAFCOs appear to be the most influential actor for consolidation at the county level. LAFCOs routinely exercise authority in the approval process of annexation decisions and modification of Sphere of Influence (SOI) for municipality service territories. LAFCO's informal cooperation and deal-making practices with cities can increase the commissions' effectiveness in encouraging cities to incorporate nearby water systems with their own. Municipal Service Reviews conducted by LAFCO can be an important tool and avenue to limit water system sprawling in California. LAFCOs should be encouraged to further integrate water service areas with other municipal service boundaries in SOI decisions.

Without Boards of Supervisors support, the role of the LPAs are limited by their jurisdiction over only small system, other more influential actors in the consolidation decisions, and local political development pressure. Therefore, Boards of Supervisors' participation in the consolidation of water systems could be integral to the success of the efforts by putting pressure on and/or encouraging the actors above and the cities within their remit. Nevertheless, the supervisors' role is likely to have a more general impact on consolidation efforts and not on day to day details and procedures to consolidate water systems.

7. Conclusion

Consolidation of small water systems that are under-performing will have important benefits in ensuring all residents in California have access to safe and clean drinking water. County-level policies are available but to date have been under-utilized in order to encourage consolidation among small water systems. As detailed above, while state level funding support or the lack thereof is a major barrier hindering consolidation projects, the involvement of county-level policy tools including General Plan guidance, LAFCOs, LPAs, and Boards of Supervisors is critical to the success of efforts to consolidate water systems.

Other methods for encouraging consolidation could include policies that lower the political, regulatory, transaction, and physical costs associated with consolidation projects (Lee & Braden, 2007). An effective way to reduce the regulatory cost is to streamline the processes for the consolidation of water systems and significantly eliminate some spending associated with these projects. Rate paying assistance for customers in the subsumed water systems could help address the increased financial burden from the typically higher water rates consumers in the consolidated water systems would have to pay. Education for local government and responsible regulatory agencies could also help initiate additional mergers of failing small water systems.

Areas for further research and policy support to facilitate consolidation include analyzing the disconnect between county guidelines and practice in approving developments, and making more detailed information about consolidation benefits available to residents, guidelines for negotiation between unequally-sized and capable systems, and the role of cities in expanding their water sphere of influence.

Further evaluation of the disconnect in the process in approving new water systems applications or new developments without sufficient water supply is necessary to prevent the establishment of small water systems that have inadequate capacity to provide safe and clean drinking water. Evaluating the implementation of SB 1263 would be helpful in assessing the effectiveness of the new policy and understanding if there are additional needs to amend the new law.

Moreover, district engineers suggest that more effort must be put into detailed, but also accessible explanations to ratepayers showing the underlying reasons why they should agree to a consolidation of their water systems. It would be helpful to outline the financial benefits of consolidation in term of the estimated capital costs and long-term operation and maintenance costs. Also helpful is to point out the support and funding available for consolidation projects to help relieve the financial burden for these residents. Consumers' recognition of the benefits of consolidation of water systems (e.g. improved water quality for consumers) is an important component to successful consolidation of problem systems.

It is also important to maintain open communications with water systems, especially the larger water systems that would need to agree to consolidate the smaller water systems with drinking water problems. The relationship between small water systems (subsumed systems) and large water systems (consolidators) is critical to the success of consolidation projects, but is often broken from the outset. The consolidating water system (often the large water system) is likely unwilling to

cooperate because there is no guarantee that households that will be better served by the newly consolidated water system will pay their water bills (B. Sahota, personal communication, February 9, 2017). The large water system could also be unwilling to consolidate systems that have existing serious water quality problems. The large water systems are unwilling to incur costs to their current customers when consolidating a water system. Customers from the small, consolidated water systems could be charged a higher rate for water when they are consolidated into a large system (B. Sahota, personal communication, February 9, 2017). There are also cases when a consolidation agreement is reached between a large water system and a failing water system, but the large water system requires the consolidated system to design the consolidation facilities to their local design specifications. The poorly-performing water systems often lack funds to address their problem, and also lack funds necessary to pay for a consolidation.

Consolidation into a municipal water system can also face potential resistance from city council members. This issue again returns to the recurring issue of annexation and under-bounding by cities in efforts to consolidate water systems. More research should be conducted in developing methods to incentivize cities and municipalities to incorporate smaller systems in their SOI. A more comprehensive effort in water management in California could better achieve the goals of the Human Right to Water. Most radically but also most influentially, the potential for a regionalized water management model similar to Kentucky's SB 409 should be considered. This model could help create a regional approach to mainstreaming consolidation with overarching state support.

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Appendix: General Plan Consolidation Guidance Table

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search
0	Alameda County	None	Public Facilities and Services, Public Safety, Land Use, Open Space		Water system, water supply, consolidation
0	Alpine County	None	Land Use (Public Services and Facilities)		Water system
0	Amador County	None	Land Use (Public facilities), Conservation		consolidation, water system, water supply, public facilities
1	Butte County	The expansion of public water systems to areas identified for future development on the General Plan land use map is encouraged	Water Resources	W-P2.5	water supply, consolidation, water system

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
1	Calaveras County	Coordinate with public service providers and LAFCO where growth will be reliant upon public water and public sewer in areas in and around existing communities. (IM PF-2B, PF-2C, PF-2G and LU-3C)	Public Facilities and Services	Policy PF 2.8	Water system, water	
		Public Water and/or Public Sewer/Wastewater Requirements for I, PR, PI and CR Amend the Calaveras County Code to allow land designated as Industrial (I), Parks and Recreation (PR), Public Institutional (PI), Commercial Recreation (CR) or similar land use designations to be served by an individual on-site water or sewer system subject to the approval of the Environmental Health Department when public water and public sewer service are not otherwise available in close proximity or where the extension of public facilities will result in the potential for significant adverse impacts related to growth inducement outside of existing communities. Implements: Policy PF 2.8 Responsible Entity: Planning Department		Measure PF-2D		
1	Colusa County	Support consolidation of special districts and/or responsibilities where increases in efficient public services are feasible and redundancy is eliminated.	Public Services and Facilities	Policy PSF 5-6	Consolidate, water supply, water system	
		The Department of Planning and Building and the Department of Public Works should coordinate with LAFCO during the preparation of Municipal Service Reviews and Sphere of Influence Updates to address coordinated public service and infrastructure planning.		Policy PSF 5-7		

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
3	Contra Costa County	Urban development shall be encouraged within the existing water Spheres of Influence adopted by the Local Agency Formation Commission; expansion into new areas within the Urban Limit Line beyond the Spheres should be restricted to those areas where urban development can meet all growth management standards included in this General Plan	Public Facilities/ Services	Water service policies 7-19	water, water service	
		Encourage water service agencies and the Local Agency Formation Commission (LAFCO) to annex lands planned for urban development by this General Plan into their service areas. Conversely, encourage water agencies and LAFCO to detach the private lands from the service boundaries which are not planned for urban development and which are not currently served.		Implementation Measures 7-m		
		Encourage LAFCO to establish water service Spheres of Influence that are coincident with the boundary of planned urban development in this General Plan, including those rural properties that currently receive service.		Implementation Measures 7-n		
0	Del Norte County	None	Public Facilities and Services		Water supply, water system, consolidation	
0	El Dorado County	None	Public Services and Utilities, Land Use, Conservation		water supply, water system, consolidation	
3	Fresno County	The County shall discourage the proliferation of small community water systems.	Public Facilities and Services,	Policy PF-C.19	water supply	
		The County shall not permit new private water wells within areas served by a public water system.		Policy PF-C.20		
1	Glenn County	Undeveloped lots within the service area boundaries can be served by the existing facility. Future large scale developments will determine expansion needs. [...] Extension of public water service is dependent on the applicant's ability to pay for the new service and the capacity of the District providing the water.	Housing	5.2.3 Adequate Infrastructure Capacity	water system	

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
3	Humboldt County	Consolidation and Cost Sharing. Support consolidations or cost sharing to reduce service delivery costs, including costs related to administration, staff training, insurance, purchasing, and vehicle maintenance.	Community Infrastructure and Services, Water Resources	Policy IS-P11	Water system	Applies to all public infrastructure, not specific to water systems
0	Imperial County	None	Water, Land Use, Housing		consolidation, water system, public facilities	-In the unincorporated areas of the county, water and sewer services are generally limited to parcels within or immediately adjacent to established communities or incorporated cities. Modest residential development can usually be accommodated, but larger subdivisions generally require costly facility expansions. Financing for expansions is available from state and federal sources but may take several years to obtain. Those communities that have recently been expanded, including Heber and Palo Verde, have the most potential for short-term growth. -Residential developments that are built adjacent to cities and plan to "plug into" their service systems are subject to available capacities and Local Agency Formation Commission (LAFCo) regulations. Although local cities are under no obligation to provide services, in the past they have typically allowed the connection via an extension of city services or assisted in the annexation of the proposed development. Both approaches are subject to LAFCO regulations. -Outside established communities, where urban services cannot be extended or an individual water well cannot be provided, water is available through a canal system for uses other than drinking and through commercial drinking water companies. Sewage is by individual septic tank system. Larger developments may require state-approved sewer or water treatment systems or may have to connect to special districts.

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
2	Inyo County	Community Water Systems The County shall encourage the development and viability of community water systems rather than the reliance upon individual water wells	Land Use (Public Services and Utilites)	Policy PSU-3.2	water, public services, consolidation	
		Development of a property within a CSD service boundary shall utilize the CSD services, instead of developing a private system, if the CSD can reasonably provide needed services.		Policy IMP PSU-3.3		
3	Kern County	The efficient and cost-effective delivery of public services and facilities will be promoted by designating areas for urban development which occur within or adjacent to areas with adequate public service and facility capacity. a. Ensure that water quality standards are met for existing users and future development b. Ensure that adequate storage, treatment, and transmission facilities are constructed concurrently with planned growth. c. Ensure the maintenance and repair of existing water systems. d. Encourage the utilization of wastewater treatment facilities which provide for the reuse of wastewater. e. Encourage the consolidation or elimination of small water systems. f. Encourage the conversion of private sewer systems (septic tanks) to public systems. g. Ensure that adequate collection, treatment, and disposal facilities are constructed concurrently with planned growth. h. Ensure that appropriate funding mechanisms are in place to fund the needed improvements which result from development and subsequent growth.	Land Use, Open Space, and Conservation Element	PUBLIC FACILITIES AND SERVICES: Policy 2	Public facilities, water system, consolidation	
		The Kern County Environmental Health Services Department will develop guidelines which will establish criteria for development of proposed new water systems when an existing water system, within a reasonable distance, is able to supply water.		Implementation Measure T		
0	Kings County	None	Land Use, Housing, Resource Conservation		water system, water service	

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
1	Lake County	Coordination of Potable Water with Land Use: Lake County shall maximize the use of existing facilities prior to new planned facilities and discourage urban sprawl by encouraging the provision of central potable water services within existing and planned service areas where possible and prohibiting the extension of potable water facilities outside of existing and planned service areas.	Public Facilities	Policy IX-2.2.8	water system, potable water	
0	Lassen County	None	Circulation, Land Use, Natural Resources		Public services, water system	
0	Los Angeles County	None	Public Services and Facilities		utility(ies), water system, water supply, consolidation	
1	Madera County	The County shall approve new development based on the following guidelines for water supply: a. Urban and suburban development should rely on community water systems b. Rural communities should rely on community water systems. Individual wells may be permitted in cases where no community water system exists or can be extended to the property but development will be limited to densities which can be safely developed with wells. c. Agricultural areas should rely on public water systems where available, otherwise individual water wells are acceptable.	Public Facilities and Services	Goal 3.C.2	Water System	
		The County shall limit development in areas identified as having severe water table depression to uses that do not have high water usage or to uses served by a surface water supply.		Goal 3.C.3		

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
1	Marin County	Plan Effectively to Minimize Costs: Plan public facilities in cooperation with service providers to minimize short-and long-term construction, operation, and maintenance costs	Built Environment - Public Facilities and Services	Goal PSF-1.2	Public facilities	Talks about LAFCO: The Local Agency Formation Commission (LAFCO) establishes a sphere of influence (SOI) for each city — its probable boundary and service area. Within each SOI is an urban service area, which is designated by LAFCO for each jurisdiction, where development can best be accommodated over the next 5 to 10 years. Development proposals in urban service areas are reviewed by both the affected city or town and the County, and unincorporated land within an urban service area may be annexed to the city at the time of development.
		Reduce Demand on Public Facilities. Reduce per capita and total demand for water and wastewater treatment, and enhance storm water management through integrated and cost-effective design, technology, and demand reduction standards for new development and redevelopment.		Goal PSF-1.4		
		Plan for Service Expansion: Work with LAFCO, cities and towns, and special districts to ensure that necessary public facilities and adequate water supply are in place prior to occupancy of new development and funded at levels that reflect their true short- and long-term costs (also see CD-6.c and PFS-2.a).		Implementation PSF-1.b		
		Reduce Demand on Public Facilities. Assess and revise community development and facilities rules to incorporate least-cost (including environmental, economic, and societal costs) and integrated resources planning for water, wastewater, and storm water infrastructure.		Implementation PSF-1.d		
		Clarify City and Town Policies. Encourage cities and towns to amend their general plans and implement ordinances as necessary to clarify their policies regarding development of the unincorporated portions of their urban service areas. Require annexation of those areas prior to providing services to undeveloped properties. Prezone all undeveloped land located within the urban service area or in areas of probable annexation (as allowed by Section 65859 of the California Government Code).		Implementation CD-6.c		
0	Mariposa County	None	Circulation, Infrastructure, and Services; Conservation and Open Space; Land Use		water system	Most of Mariposa County is not within the service area of public water and wastewater treatment providers. Therefore, most development in the County must provide for its own water and wastewater treatment through on-site means or small, private communal systems.
0	Mendocino County	None	Resource Management, Development		water system, water supply	

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3	Merced County	Policy PFS-1.4: Regional Coordination (IGC) Support efforts to coordinate with regional and local agencies to a. Identify potential funding mechanisms; b. Pursue regional grant opportunities; c. Encourage consolidation of services; d. Create efficiencies between service districts; and e. Promote joint use facilities.	Public Facilites and Services	Policy PFS-1.4	Water supply, water system	
0	Modoc County	None			water system, consolidation, water supply	
3	Mono County	Encourage the consolidation of small water providers to increase operational and service efficiency.	Conservation/Open Space	Policy 3.B.5.	water resource, consolidation	
		Require new developments to be served by existing water providers, where feasible, rather than creating new service entities.		Action 3.B.5.a.		
1	Monterey County	Coordination among, and consolidation with, those public water service providers drawing from a common water table to prevent overdrawing the water table is encouraged.	Public Service	Goal PS-2.1	consolidation, water supply	
		New development shall be required to connect to existing water service providers where feasible. Connection to public utilities is preferable to other providers.	Public Service	Goal PS-2.3		
0	Napa County	None	Conservation		water supply, water system, consolidation	
1	Nevada County	Where community sewer or water systems are installed or required as a condition of development, there shall be a contract, development agreement, formation of an area service district, or other legally enforceable mechanism to insure long term maintenance of the community system.	Public Facilities and Services	Policy 3.16	water system	
		The use of community sewer and/or water systems are encouraged where such systems are economically feasible for the intended service area.		Policy 3.17		
		All proposed land divisions shall be connected to a public water supply if the initial and long-term cost of extending the public water system to serve the land division is less than the installation of individual water supply system.		Policy 3.18		

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0	Orange County	None	Public Services and Facilities, Land Use		water system, water facilities	
3*	Placer County	When considering formation of new water service agencies, the County shall favor systems owned and operated by a governmental entity over privately- or mutuallyowned systems. The County will continue to authorize new privately- or mutually-owned systems only if system revenues and water supplies are adequate to serve existing and projected growth for the life of the system. The County shall ensure this through agreements or other mechanisms setting aside funds for long term capital improvements and operation and maintenance.	Public Facilities and Services	4.C.8.	water system	
3*	Placer County	The County shall initiate a review of any water system that persistently fails to meet applicable standards and shall encourage consolidation or regionalization of surface water treatment systems to address problems in common. Responsibility: Environmental Health Division Major water purveyors Time Frame: As needed Funding: State MOU funds, General Fund		Implementation Program 4.9		
2	Plumas County	Community Water Systems: The County shall require any new community water system, in the unincorporated area of the county, serving residential, industrial or commercial development to be owned and operated by a public or private entity that can demonstrate to the County adequate financial, managerial and operational resources.	Water Resources	W 9.5.7	water system	
0	Riverside County	None	Multipurpose Open Space, Land Use, Housing		water, public facilities, consolidation, water system	
2	Sacramento County	PF-3. Public water agencies shall comply with General Plan policies prior to annexation of additional service areas.	Public Facilities	PF-3.	water facilities	

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3	San Benito County	Maximize Use of Existing Facilities: The County shall require new development projects to be designed and sited to use existing facilities and services to the extent practical and to the extent that such a design and site choice would be consistent with good design principles.	Public Facilities and Services	PFS-1.10	water system, consolidation	
		Single User Well Consolidation: The County shall encourage consolidation of single user wells into public water districts.		PFS-4.4		
3	San Benito County	New Community Water Systems The County shall require any new community water system, in the unincorporated area of the county, serving residential, industrial, or commercial development to be owned and operated by a public or private entity that can demonstrate to the County adequate financial, managerial, and operational resources.		PFS -4.6		
2	San Bernardino County	Encourage local distribution systems to interconnect with regional and local systems, where feasible, to assist in maximizing use of local ground and surface water during droughts and emergencies.	Circulation and Infrastructure	CI 11.8	water system	
		Prior to approval of new development, ensure that adequate and reliable water supplies and conveyance systems will be available to support the development, consistent with coordination between land use planning and water system planning Program 9 -- Encourage new development to locate in those areas already served or capable of being served by an existing approved domestic water supply system.		CI 11.12		
0	San Diego County	None	Conservation and Open Space; Land Use		water, water system, water supply	
1	City and County of San Francisco	Maintain an adequate water distribution system within San Francisco: Storage reservoirs and distribution lines within San Francisco should match the pattern of development in the city. Areas most intensively developed, having the greatest water demand, should be served by facilities having the greatest capacity.	Environmental Protection	Policy 5.1	water system, water supply	

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0	San Joaquin County	None	Community Development (Infrastructure Services - Utilities), Resources (Water resources and quality)		Water system, utilities, water,	
3	San Luis Obispo County	Discourage new water systems: Enable expansion of public services by community services districts and County service areas to serve contiguous development when water is available. Strongly discourage the formation of new water and sewer systems serving urban development at the fringe and outside of urban or village reserve lines or services lines. Strongly discourage the formation of new mutual or private water companies in groundwater basins with Resource Management System Levels of Severity I, II, or III, except where needed to resolve health and safety concerns.	Conservation and Open Space (Water Resources)	Policy WR 1.9	Water supply, water resources	
3	San Mateo County	Improving Existing Water Systems: a. Support, where local residents express an interest, the possible consolidation of water systems under one management and pursue methods of financing this consolidation, such as assessment districts, Federal and State grants, and creation of new districts.	Water Supply	Water Supply Policy 10.17a	water supply, consolidation	For rural water supply
0	Santa Barbara County	None	Conservation, Land Use		water system, consolidation, public facilities, water supply	
0	Santa Clara County	None	Resource Conservation		consolidation, water system, public facilities, utilities	
0	Santa Cruz County	None	Conservation and Open Space; Parks and Recreation, and Public Facilities		water system, water supply, consolidation, public facilities	
0	Shasta County	None	Water Resources, Public Facilities		water supply, water system, consolidation	

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3	Sierra County	Encourage community water systems where economically feasible and assure a legally enforceable mechanism is in place for long term financing and maintenance of a water or sewage disposal system.	Public Facilities	Water Supply Policy 5b	public facilities, water supply, water resource	
		In particular, assist Water Districts in securing funding to upgrade to meet federal and State drinking water standards. Consider formation of a Marks-Roos investment pool to finance improvements and/or to pay for consolidation of smaller districts.		Implementation Measures 5d		
0	Siskiyou County	None	Open Space, Conservation, Land Use		water system, water service, consolidate	
0	Solano County	None	Public Facilities and Services, Resources, Land Use		water system, water service, consolidate	
3	Sonoma County	Help resolve water problems resulting from proliferation of small water systems	Public Facilities and Services	Objective PF-1.2	Water system	State small water system: State Small Water Systems are regulated by the County's Environmental Health Division and provide potable water to at least five but no more than fourteen service connections. On occasion, operator inattention or lack of funding leads to system failure and to requests for County takeover. County management of the system can improve reliability, but funding may still be lacking. These long term management issues suggest that care be taken in relying upon small water systems to support new development.
		Limit extension of public water and sewer services into rural areas.		Objective PF-1.3		
3	Sonoma County	When considering formation of new water service agencies, favor systems owned and operated by a governmental entity over privately or mutually owned systems. Continue to authorize new privately or mutually owned systems only if system revenues and water supplies are adequate to serve existing and projected growth for the life of the system. Ensure this through agreements or other mechanisms setting aside funds for long term capital improvements and operation and maintenance costs.		Policy PF-1j		

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1	Stanislaus County	Development within a public water district and/or waste water district shall connect to the public water system and/ or the waste water treatment facility; except where capacity is limited or connection to existing infrastructure is limiting and an alternative is approved by the County's Department of Environmental Resources. For development outside a water and/or waste water district, it shall meet the standards of the Stanislaus County Primary and Secondary Sewage Treatment Initiative (Measure X) and domestic water. Responsible Departments: Environmental Resources, Planning, Planning Commission, Board of Supervisor	Land Use	Policy 24, Implementation Measure 2	water system, consolidation	
0	Sutter County	None	Infrastructure, Public Services		water system, consolidation, water supply, water service	
0	Tehama County	None	Public Services, Open Space and Conservation		water supply, water system, consolidation	
0	Trinity County	None	Open Space and Conservation		water system, water supply, consolidation	
2	Tulare County	Water Connections. The County shall require all new development in UDBs, UABs, Community Plans, Hamlet Plans, Planned Communities, Corridor Areas, Area Plans, existing water district service areas, or zones of benefit, to connect to the community water system, where such system exists. The County may grant exceptions in extraordinary circumstances, but in these cases, the new development shall be required to connect to the water system when service becomes readily available.	Public Facilities and Services	Water Supply PFS-2.4	water system, water supply, consolidation	
		New Systems or Individual Wells Where connection to a community water system is not feasible per PFS-2.4: Water Connections, service by individual wells or new community systems may be allowed if the water source meets standards for quality and quantity.		PFS-2.5		

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3*	Tuolumne County	Encourage consolidation of existing small water systems and discourage the creation of new ones. Advocate the consolidation of water purveyors in the County to facilitate improvements to the infrastructure and consistency of water quality of the systems; Consider the undesirability of proliferation of small water purveyors during the development review process; Discourage additional water purveyors in the county, particularly stemming from new development; Discourage creating new discontiguous water systems operated by existing water purveyors. Discontiguous water systems are those that serve geographically separate areas with no direct infrastructure connections.	Public Facilities and Services	Policies 7.I	Water, Public water supplies	
3*	Tuolumne County	Implementation Programs Define Limits of Water Service - Support the master planning of water purveyance systems that define the geographic limits of their service areas. New development shall not be approved that is proposed to be served by a public water purveyance system that does not include the project area within the defined geographic limits of service;	Public Facilities and Services	Implementation Programs 7.I		
		Support Consolidation of Smaller Systems - Assist and support actions by larger water purveyors and special districts to incorporate and maintain existing smaller systems and isolated privately or mutually-owned water supply systems;	Public Facilities and Services	Implementation Programs 7.I		
		Discourage Development from Relying on New or Discontiguous Public Water Systems - Require residential development projects that are proposed to be served by a public water system to be served by an existing water purveyor that is either a district, or water company that is privately-owned, or a mutually-owned system. The new or expanded water service from a privately-owned or mutual water company must be geographically approximate to the existing system and have a direct infrastructure link between the existing and new system. This requirement is not intended to apply to isolated commercial or industrial developments which are served by water systems which are transient-noncommunity or nontransientnoncommunity water systems;	Public Facilities and Services	Implementation Programs 7.I		

Quality of Guidance (0-3)	County	Guidance Re: Consolidation/Limit Expansion	General Plan Element	Section	Keywords Used for Search	Comments/ Notes
3*	Tuolumne County	Discourage Additional Discontiguous Public Water Systems - Require amendments to the General Plan land use diagrams to add new areas designated for urban residential or commercial development, with the exception of new areas designated for Special Commercial (SC), be approved only with assurance that the area can be served by public water from either a district, or from an existing privately-owned or mutually-owned water company. The public water service from an existing privately-owned or mutually owned water company is only acceptable if it would not create discontiguous service systems. Discontiguous service systems are those operated by the same company but are geographically separated and not related by a shared infrastructure. Discontiguous service systems can be provided by water districts.	Public Facilities and Services	Implementation Programs 7.I	Water, Public water supplies	
0	Ventura County	None	Public Facilities and Services		water system, consolidation	
2	Yolo County	Facilitate the extension of water service to nearby underserved existing unincorporated developments, such as Binning Farms. (Policy CO-5.6, Policy CO-5.17, Policy CO-5.23) Responsibility: Planning and Public Works Department Timeframe: Ongoing	Conservation and Open Space	Action CO-A99	water system, consolidation, water resource	
0	Yuba County	None	Public Services and Utilities	13.6 Water Supply	Water system, consolidation	Water supply and distribution systems are not under County control. Coordinating with these individuals districts and companies is vital to the planning process. [...] In newly developing areas, the County may choose to establish systems under the auspices of a County Service Area. This will provide greater control over the planning and development of such systems and permit closer coordination between infrastructure availability and development opportunities. Where existing special districts are unable to meet the demands of new regulations and growth, the County may wish to consider taking over such operations. Water facilities can be operated without posing a burden to County taxpayers as long as a realistic rate structure is adopted.

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