Final consolidation data set analysis

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## Overview of consolidations 2015-2021

In 2015 there were 7,642 Public Water Systems (PWSs) in the state, 3,015 of which were Community Water Systems (CWS) (2015 Safe Drinking Water Plan). Today, the state counts 7,351 PWS with 2,870 CWS. Some of this reduction can be attributed to system consolidations. Compiling various state data sources we have identified 185 cases of completed consolidation projects between 2015 and 2016.

These consolidations have taken place in nearly every county (48 total) and involve the water providers of an estimated 11420338 Californians. Of them, 131511 have been incorporated as customers into a new water system as part of a consolidation project, in other words, were previously served by a *consolidated* system.

Of the 185 cases we identify, 23 were managerial consolidations, another 162 were physical consolidations. Our data set consists of only 2 mandatory consolidations (Pratt MWC and Ceres West MHP) with the remainder being voluntary consolidations.

Among the 180 water systems physical consolidated, the mean distance between these systems and the service boundary of the system to which they were connected was 0.904 miles, the median distance was 0.179. The minimum distance was 0 miles (ie already in the service boundaries) and the maximum was 17.85 miles.

Only considering the 82 physically consolidated CWS the mean distance between these systems and the service boundary of the system to which they were connected was 1.061 miles, the median distance was 0.174

## Drivers of consolidation

The SWRCB has publicly available information on factors driving or incentivizing consolidation in 187 of the consolidated water systems in our dataset. Grouping this descriptive information into categories, we find that water quality concerns are by far the most common reason for consolidation (100 cases). Table 1 below provides frequencies for all five categories, none indicates that no driving factors or issues were listed. “Sustainability” in turn indicates that the reasons given were pro-active, e.g., reliance on a single source. Capacity indicates source capacity whereas TMF capacity indicates technical, managerial and financial capacity.

|  | # |
| --- | --- |
| Capacity | 5 |
| Disaster | 8 |
| Multiple | 13 |
| None | 51 |
| Quality | 100 |
| Sustainability | 3 |
| TMF Capacity | 7 |

## Characteristics of all consolidated systems

As preciously mentioned, 131511 Californians were served by a water system that was consolidated between January 2015 and December 2021. The mean population served by one of these systems is 638 with a minimum of 0 (as listed in SDWIS data) and maximum of 17503. The median population served, however, is 120 indicating that the vast majority of consolidated systems are very small.

The 185 consolidation projects studied here resulted in the inactivation of approximately 203 Public Water Systems between 2015 and 2016. 108 of these systems were Community Water Systems (CWS). The remainder are a mix of NC and NTNC systems. Further we identify 1 consolidation of a state small water systems and 2 instances of consolidating domestic well communities.

184 of these systems relied on groundwater as their primary source, another 22 relied on surface water.

These systems, in turn, represent 17 different institutional/governing types (See Dobbin & Fencl 2021). The most common type is Private (other) signifiying non IOU private systems that could not readily be identified as a mutual water company, homeowners association or mobile home park.The second most common types is Mobile Home Parks. See appendix.

## Characteristics of consolidated Community Water Systems

Among just the consolidated systems that were CWSs, these statistics are as follows.

| Count | Population\_mean | Population\_median | Population\_min | Population\_max |
| --- | --- | --- | --- | --- |
| 111 | 988.8829 | 150 | 0 | 17503 |

95 of the consolidated CWS relied on groundwater as their primary source, another 16 relied on surface water.

These systems, in turn, represent 15 different institutional/governing types (See Dobbin & Fencl 2021). The most common type is Mobile Home Parks followed by IOUs and “Private (other)” systems.

| Institutional\_Type | Freq |
| --- | --- |
| MHP | 27 |
| IOU | 21 |
| Private (other) | 21 |
| MWC | 14 |
| CSA | 7 |
| CSD | 4 |
| County Water District | 3 |
| City | 2 |
| Domestic wells | 2 |
| Federal | 2 |
| MWD | 2 |
| State | 2 |
| Water District | 2 |
| ID | 1 |
| School | 1 |

## Characteristics of receiving water systems

Among the 143 unique receiving water systems, 87 rely on groundwater as their primary source, another 55 rely on surface water. 133 of these systems are community water systems.

20 of these systems participated in more than one consolidation project over the study period. 2 systems participated in 6 consolidation projects each over the course of the 6 years. Another system, South Tahoe PUD, participated in 9.

## Characteristics of only systems “receiving” CWSs in consolidations

Among the systems that were receiving systems in the above cases of CWS consolidation, we find similar diversity in institutional types, IOUs are the most common receiving system type and City’s the second most common. Overall, 14 different institutional types acted as receiving systems over the studied period.

| Institutional\_Type | Freq |
| --- | --- |
| IOU | 34 |
| City | 29 |
| County Water District | 14 |
| CSD | 10 |
| PUD | 7 |
| Special Act District | 4 |
| Water District | 3 |
| Irrigation District | 2 |
| MWC | 2 |
| MWD | 2 |
| CSA | 1 |
| Private (other) | 1 |
| School | 1 |
| State | 1 |

## Governance change as a result of CWS consolidations

Using this information about consolidated and receiving system types, then, we are able to identify how CWS governance is changing in the state as a result of consolidations. In total, CWS consolidations represent 45 distinct governance changes, the five most common of which are displayed in the table below.

| Change from, to | # |
| --- | --- |
| IOU , IOU | 18 |
| MHP , City | 11 |
| Private (other) , City | 8 |
| MHP , CSD | 6 |
| MWC , City | 5 |

## Demographic comparison between consolidated CWS and receiving systems

The demographic make up of community water systems (inclusive of private well and SSWS) consolidated during the study period are described below based on the census block group of the system area

| var | min | mean | median | max | sd |
| --- | --- | --- | --- | --- | --- |
| MHI.consolidated | 13974.00 | 62010.58 | 54667.00 | 250001.00 | 36695.05 |
| Percent.asian.consolidated | 0.00 | 6.71 | 1.07 | 79.94 | 14.68 |
| Percent.black.consolidated | 0.00 | 2.20 | 0.05 | 30.83 | 4.99 |
| Percent.hispanicorlatino.consolidated | 0.00 | 33.64 | 24.63 | 99.28 | 28.64 |
| Percent.native.consolidated | 0.00 | 0.53 | 0.00 | 7.29 | 1.39 |
| Percent.PI.consolidated | 0.00 | 0.22 | 0.00 | 17.89 | 1.74 |
| Percent.renter.consolidated | 0.00 | 36.83 | 34.08 | 100.00 | 22.36 |
| Percent.white.consolidated | 0.72 | 53.38 | 56.24 | 100.00 | 29.68 |

The demographic make up water system that “received” consolidated community water systems (inclusive of private well and SSWS) consolidated during the study period are described below based on an areal interpolation of the demographics of the system boundaries based on census block groups

| var | min | mean | median | max | sd |
| --- | --- | --- | --- | --- | --- |
| MHI.receiving | 26364.55 | 72832.07 | 65603.14 | 172724.42 | 32559.12 |
| Percent.asian.receiving | 0.00 | 5.24 | 2.78 | 54.78 | 8.14 |
| Percent.black.receiving | 0.00 | 2.39 | 0.82 | 18.61 | 3.87 |
| Percent.hispanicorlatino.consolidated | 0.00 | 33.64 | 24.63 | 99.28 | 28.64 |
| Percent.native.receiving | 0.00 | 0.71 | 0.23 | 18.41 | 2.03 |
| Percent.PI.receiving | 0.00 | 0.23 | 0.01 | 7.03 | 0.74 |
| Percent.renter.receiving | 3.12 | 38.45 | 39.35 | 98.68 | 18.26 |
| Percent.white.receiving | 5.79 | 52.95 | 53.52 | 100.00 | 26.52 |

Looking at these consolidations individually, there is little to no clear trends

| var | min | mean | median | max | sd |
| --- | --- | --- | --- | --- | --- |
| dif.MHI | -77276.58 | 7967.32 | 332.52 | 70746.17 | 29462.14 |
| dif.renter | -79.92 | 1.20 | 0.12 | 55.50 | 20.73 |
| dif.white | -47.72 | 0.78 | 0.05 | 55.81 | 17.29 |

## Appendix

### Institutional types for all consolidated water systems (not just CWS):

| Consolidated\_Inst\_Type | Freq |
| --- | --- |
| Private (other) | 80 |
| MHP | 31 |
| IOU | 22 |
| School | 20 |
| MWC | 14 |
| CSA | 7 |
| State | 7 |
| City | 4 |
| CSD | 4 |
| Federal | 4 |
| County Water District | 3 |
| County (other) | 2 |
| Domestic wells | 2 |
| MWD | 2 |
| Water District | 2 |
| ID | 1 |
| Recreation and park district | 1 |

### Institutional types for all receiving water systems (not just those receiving CWS systems):

| Institutional\_Type | Freq |
| --- | --- |
| City | 39 |
| IOU | 36 |
| County Water District | 12 |
| CSD | 9 |
| Irrigation District | 6 |
| PUD | 6 |
| Special Act District | 6 |
| MWC | 5 |
| Private (other) | 4 |
| CSA | 3 |
| MWD | 3 |
| State | 3 |
| Water District | 3 |
| PA | 2 |
| School | 2 |
| Federal | 1 |
| JPA | 1 |
| RCD | 1 |
| Tribal | 1 |

### Top ten governance change pathways for all consolidations cases (not just CWS)

| Change from, to | # |
| --- | --- |
| Private (other) , City | 38 |
| IOU , IOU | 18 |
| MHP , City | 11 |
| Private (other) , IOU | 11 |
| Private (other) , PUD | 8 |
| MHP , CSD | 7 |
| MHP , IOU | 5 |
| MWC , City | 5 |
| City , City | 4 |
| CSA , County Water District | 4 |
| MWC , IOU | 4 |
| Private (other) , County Water District | 4 |
| Private (other) , CSD | 4 |
| State , State | 4 |