JUNE 2018
IB: 18-06-C

ISSUE BRIEF

DATA GONE MISSING: FARM WATER INFORMATION FALLS THROUGH THE CRACKS DURING CALIFORNIA DROUGHT

California irrigation districts that supply water to farms are required by state law to annually report to the California Department of Water Resources (DWR) the amount of water actually delivered to farmers' fields. The reporting requirement has been in effect since 2012, but a recent review found that as of 2017, only 12 percent of the state's largest irrigation districts had turned in all of the required reports, and 28 percent never turned in any report. What's more, DWR has not monitored or enforced compliance with this reporting requirement, and it has taken six years for the agency to beta-launch an online data portal that makes farm-gate reports publicly available and more easily accessible. The online portal only includes reports from 2014 onwards, meaning that two years of farm-gate data is located on an internal agency database and not readily available to the public. As a result, there is effectively no accurate or complete documentation of drought response from the agricultural sector during California's driest consecutive years in the historical record, stretching from 2012 to 2016.[1] Below, we offer solutions to make this essential data more consistent, transparent, and useful.

BACKGROUND ON FARM-GATE DELIVERY REPORTING

In 2014, amid record-breaking drought conditions that affected farms, cities, and ecosystems throughout California, Governor Jerry Brown called for unprecedented actions to conserve water.[2] Among other measures, Governor Brown mandated that urban water use be cut by 25 percent, a challenge that the state's urban population tackled with impressive results.[3] The state also passed a law in 2014 requiring statewide groundwater reporting and management for the first time, recognizing the old adage that "you can't manage what you don't measure."[4] Despite the urgency of the drought response, only a small fraction of agricultural water suppliers had complied with basic water measurement laws that had been passed in 2007 and in effect since 2012.[5]

California is a national leader in agricultural production. To grow all these crops, agriculture uses roughly 80 percent of the water used by businesses and homes in the state.[6] Yet surprisingly, we know very little about exactly where, how, and by whom that agricultural water is used. This makes it impossible to plan effectively for reliable supplies and comply with state policies that call for water conservation and reducing dependence on the San Francisco Bay-Delta Watershed. As the state's largest water user, the agricultural sector has a tremendous opportunity to save water through implementing conservation and efficiency practices, but again, without measurement there can be no meaningful management.

A FARM-GATE DELIVERY REPORT IS A ONE-PAGE REPORT THAT LISTS:

- Total number of farm-gates (locations at which water is delivered to the farmer)
- Number of measured farm-gates
- Irrigated acreage for reporting period
- Total service area acreage
- Submittal date
- Reporting year
- Monthly or bimonthly water deliveries, measured in acre-feet

See Appendix B for example

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Years before the record-breaking drought of 2012 to 2016, the state mandated that all water suppliers—both urban and agricultural—improve water measurement and management practices. This was intended to help the state better respond to future droughts. In 2007, the state legislature enacted Assembly Bill 1404 (Laird), requiring water suppliers to report on aggregate water delivery volumes.[7] Assembly Bill 1404 required that, starting in 2012, districts supplying more than 2,000 acre-feet of surface water for agricultural purposes or serving more than 2,000 acres of agricultural land submit to DWR annual reports on their total monthly or bi-monthly water deliveries (known as farm-gate delivery reports).[8] A farm-gate is the location at which water is delivered to a farmer's field from the irrigation district's system.

Prompted by a drought that spanned 2007 to 2009, the legislature also enacted Senate Bill X7-7 in 2009 to reinforce and strengthen the earlier requirements, mandating that suppliers report on individual water delivery volumes. This would provide data needed for irrigation districts to implement water pricing structures that reflect the amount of water used.[9]

MOST IRRIGATION DISTRICTS HAVE FAILED TO COMPLY WITH REPORTING REQUIREMENTS.

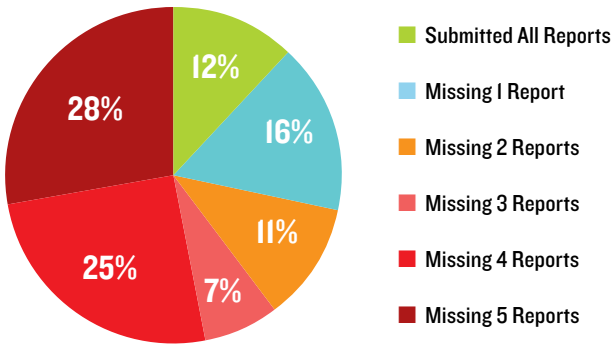
According to DWR's databases, only 12 percent of the state's largest irrigation districts submitted all of their required annual reports for the 2012 to 2016 reporting periods, and 28 percent of the largest districts never submitted a single one.[10]

IRRIGATION DISTRICT COMPLIANCE BY YEAR

YEAR	PERCENTAGE OF COMPLIANT LARGE IRRIGATION DISTRICTS
2012	28%
2013	65%
2014	38%
2015	38%
2016	30%

Many irrigation districts also failed to submit their farm-gate delivery reports on time. By law, completed reports for a given year must be submitted by July 31 of the following year.[11] In reviewing all 75 reports listed in DWR's Excel databases that include submission dates (including some from smaller districts), and submittal dates from DWR's online farm-gate delivery report data portal, NRDC found that only 42 percent of submitted reports were turned in on time.

LARGE IRRIGATION DISTRICT REPORT COMPLIANCE 2012–2016



Percentage does not add up to 100% because of rounded numbers

DWR HAS MISMANAGED AGRICULTURAL WATER MEASUREMENT REPORTS.

In 2016, in the fifth consecutive year of drought in California, NRDC asked DWR for the agricultural water delivery data DWR had collected thus far, to see how irrigation districts had been responding to the drought conditions. Our research shows that DWR's current management of the small number of farm-gate delivery reports it has received is rudimentary, unreliable, and riddled with errors and discrepancies.

When NRDC made its data request in September 2016, DWR warned us that the data may be incomplete or contain errors.[12] Irrigation districts submit annual reports to DWR either by mail or by e-mail, and DWR then manually enters the data into its database.[13] We found data entry errors resulting in double-counting of water deliveries, mix-ups between the number of irrigated acres and the number of service area acres, and discrepancies in the list of received reports. We also found multiple instances where DWR had hard copies of reports but the reports data were missing from their databases.

To further complicate matters, DWR created a second database in 2015 (the Water Use Efficiency Data (WUEData)), and in May 2018, DWR made the WUEData portal available to the public online. The online portal provides farm-gate delivery reports from 2014 onwards, but does not include reports from 2012 and 2013. Those older reports are housed in a separate internal DWR database.[14] Thus farm-gate delivery information currently resides in two separate databases that are not consistent with respect to the information contained within them. DWR did not record the submittal date, the supplier contact information, or the number of measured and total farm-gates until it switched to its newer database in 2015. This information is not available for any of the farm-gate delivery reports' housed in DWR's older database.

A fundamental problem with DWR's management of the

farm-gate delivery report process is that the agency does not know which districts are required to submit reports every year (see Appendix A). DWR relies entirely on self-reporting by the irrigation districts and does not maintain a master list of the districts that are subject to annual reporting requirements.[15] This recordkeeping flaw makes it difficult for DWR to readily determine which districts have not submitted annual reports and follow up accordingly, and the public is left with no way of knowing the full universe of districts required to report (see Appendix A).

Finally, some districts express confusion over whether they are subject to this farm-gate delivery report requirement, with some mistakenly believing they are exempt from it.[16] DWR does not routinely notify noncompliant irrigation districts of the requirement, nor does it publicize or post the list of districts that have failed to file. Furthermore, DWR is not authorized to issue fines as a penalty.[17] Without any significant repercussion from DWR for failing to turn in an annual farm-gate delivery report—on time or at all—irrigation districts across the state have little incentive to comply.

DWR's mission is "to sustainably manage the water resources of California, in cooperation with other agencies, to benefit the state's people and protect, restore, and enhance the natural and human environments."[18] Our review indicates that DWR does not have enough accurate data to measure current agricultural water use, which makes it hard to plan for future sustainable management.

RECOMMENDATIONS TO IMPROVE COMPLIANCE AND DATA MANAGEMENT

As a result of the lack of compliance by agricultural water suppliers and DWR's mismanagement of report data, California has little information on how much water is being used by the agricultural sector—the single largest consumer of the state's developed water supply. A more complete and accurate data set with farm-gate delivery information would allow the state to better plan for future water needs and better manage its limited and valuable water resources. Robust farm water use data would also be a boon to researchers exploring future strategies for efficient use and reliable supplies.

In 2016, a public stakeholder group was created to help DWR implement Governor Brown's Executive Order B-37-16, intended to make water conservation a "California way of life." During this process, rather than looking for ways to improve compliance, DWR suggested eliminating farm-gate delivery reports.[19] DWR's approach would have worsened the state's already poor information on agricultural water use, and made agricultural water management even more difficult than it is now. Fortunately, DWR's initial proposal was not accepted by the governor's office.

Rather than scrapping the reporting requirement altogether, NRDC suggests the following policy changes to improve the process and make the data reliable and useable, as intended by the state legislature:

- Improve data quality and access through electronic reporting.
  - We live in the digital information age. Instead of manually inputting the farm-gate reports' data on the online portal, DWR should require irrigation districts to submit reports electronically with standardized forms, and DWR should be required to post all reports publicly on its website. California Assembly Bill 1668, an NRDC-supported bill, was passed by the state legislature and signed by the Governor on May 31, 2018, and includes these requirements of electronic filing and public posting of reports. DWR should fully implement this new law as quickly as possible.
  - DWR should integrate its Access database (which houses the 2012 and 2013 farm-gate reports) with the WUEData portal. DWR should enter missing information on submittal dates, the number of measured farm-gates, and total farm-gates. DWR should consolidate these databases to maintain consistency so the public can better understand water delivery trends from 2012 to 2016.
- Improve accountability among water suppliers through compliance and enforcement efforts.
  - Laws must be enforced to be effective. DWR should maintain a master list of which districts are required to submit reports each year, actively work to notify districts of reporting requirements, and follow up with noncompliant irrigation districts.
  - DWR should take steps to fill gaps in its database to improve accuracy and usability by contacting noncompliant irrigation districts to elicit missing reports from all required years.
  - DWR should refer districts that continue to ignore the law to the State Water Resources Control Board for enforcement action.

NRDC's policy recommendations to improve data quality and access and increase accountability among water suppliers would make farm-gate delivery report data more accessible, help identify opportunities for increased efficiency, and create an accurate baseline for future efficiency improvements. Robust and accurate data on how much water is being delivered to farms across the state are necessary to increase efficiency and improve management of the state's limited and valuable water resources.

APPENDIX A: METHODOLOGY

In September 2016, NRDC requested farm-gate delivery report data from the California Department of Water Resources (DWR). DWR e-mailed us an Excel spreadsheet exported from its MS-Access database, which the agency used through late 2015 before switching to a new database—WUEData. DWR also sent us an Excel export from WUEData. These databases contain different information: the older version does not include reported information on the number of measured versus total farm-gates, the report submittal date, or the supplier contact information, even though the report templates did not change and the agency has always collected all of this information. In May 2018, DWR beta-launched its WUEData portal, and made farm-gate reports from 2014 onwards available online. DWR told NRDC that they manually entered over half of the 2014 farm-gate reports into the WUEData portal because those 2014 reports were split between the MS-Access database and the WUEData portal.[20]

NRDC cross referenced DWR's Excel spreadsheets with the information available on the online portal. In the instances where data unavailable in DWR's Excel spreadsheets was available on the reports posted online, NRDC integrated the online data into its analysis. The online portal included 16 reports from 2014 and 2015 that were not included in DWR's Excel spreadsheets. There were 48 reports on the online portal that contained more information than what was provided in DWR's Excel spreadsheet data (e.g. total farm-gates, number of measured farm-gates). For 2016 farm-gate delivery reports, NRDC used information available on the WUEData portal.

DWR told NRDC that agency staff enter the report data by hand into its database after irrigation districts submit their annual farm-gate delivery reports either by e-mail in Adobe PDF or Excel spreadsheets, or as hard copies in the mail.[21] DWR keeps hard copies of all the received reports.[22]

Nearly 40 percent of the entries in the DWR's Excel databases are missing the monthly or bimonthly delivery data. These mostly blank rows list only the irrigation district name, the reporting year, and the service area and/or irrigated acreage values. According to DWR, these entries do not represent submitted report data from irrigation districts.[23] DWR provided two explanations for these mostly blank rows: the information either is coming from other DWR databases or is an auto-populated row generated by MS Access using acreage values from a previous year.[24] When DWR was first creating its database, the agency incorporated data from other DWR databases to estimate baseline numbers for service area acreage and irrigated acreage.[25] There are 97 rows of data spanning the years 2008 to 2010, before farm-gate delivery reports were required, for which DWR incorporated acreage values from other sources. DWR's original MS Access database was set up to automatically generate sequential entries if an irrigation district submitted data in one year, and carry forward the data on service area and irrigated acreage.[26] However, the database was not consistent in doing this, and DWR is not sure why.[27] There are an additional 82 mostly blank rows of data from the years 2012 to 2013 that contain service area or irrigated acreage values that are either sourced from other DWR databases or were auto-generated by DWR's MS Access database.

NRDC analyzed the reports in DWR's databases using DWR's definition of whether a report was submitted. For the mostly blank rows in DWR's databases that contained no delivery volume data, DWR stated this meant the supplier did not submit a report and we counted it as such in our analysis.[28]

In DWR's databases, which span the years 2008 to 2017, there are 123 large irrigation districts that supplied water to more than 10,000 irrigated acres in at least one reported year. NRDC determined that it is likely that in *every* year between 2012 and 2016, these 123 suppliers met the 2,000 acre-feet delivery water volume or 2,000-acre service area threshold required to turn in a farm-gate delivery report because it is unlikely that the service area would have fluctuated by 8,000 acres. These 123 large irrigation districts are the ones that NRDC analyzed report compliance for between 2012 and 2016.

There are an additional 91 smaller irrigation districts in DWR's databases that in all reported years supplied water to fewer than 10,000 irrigated acres, but in at least one reported year supplied water to more than 2,000 irrigated acres or supplied more than 2,000 acre-feet of surface water. As DWR relies on self-reporting and does not keep a master list of required districts, there is a chance those smaller districts could have been below the reporting requirement threshold in one or more years. Thus NRDC decided not to analyze report compliance from those smaller districts.

There are an additional 14 irrigation districts in DWR's databases that were below the reporting thresholds in all reported years. Voluntarily, some of these districts reported supplying water to less than 2,000 irrigated acres or supplying less than 2,000 acre-feet of water annually. Some of the data for these districts were missing.

NRDC decided to analyze the compliance of only those irrigation districts that supplied water to more than 10,000 irrigated acres. Without a master required submitter list from DWR, there is no way to know which smaller suppliers were required to submit reports in which years. The deadline to submit farm-gate delivery reports is July 31 of the following year. NRDC analyzed reports up until 2016 because the deadline to submit 2016 reports (July 31, 2017) has already passed.

NRDC also requested that DWR send us the hard copy reports from 20 irrigation districts for the 2012 to 2015 period. Out of the 80 hard copies NRDC requested (4 years x 20 irrigation districts), DWR did not send us four reports they listed as having received, and they sent us three reports that they listed as not having received. DWR stated that these discrepancies could have resulted from data entry errors or a report being submitted late.[29] Data analysis was performed according to DWR's databases, despite errors.

APPENDIX B

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Agricultural Aggregated Farm-Gate[1] Delivery Reporting Form for Article 2

Title 23, Division 2, Chapter 5.1, Article 2 of the CCR requires water supplier subject to the regulation to report to DWR the previous calendar year's aggregated farm gate delivery by July 31 of the subsequent year

1. Water Supplier Information

Name:

Address:

Phone Number:

Fax:

Total Number of Farm-Gates:

Number of Measured Farm-Gates:

Irrigated Acreage for Reporting Period:

Total Service Area Acreage:

2. Contact information

Name:

Title:

Address:

Phone Number:

Fax:

E-mail:

Submittal date:

Reporting year:

3. Aggregated Farm-Gate Delivery Data[2]: (*provide monthly or bimonthly data, acre-feet*)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	**Total**
Monthly Deliveries													

	Jan-Feb	Mar-Apr	May-Jun	Jul-Aug	Sep-Oct	Nov-Dec	**Total**
Bimonthly Deliveries							

4. Explanations, Comments and Best Professional Practices[3]:

Note: An agricultural water supplier's total water use may be different from Aggregated Farm-Gate deliveries because measurement at these points may not account for other practices (such as groundwater recharge/conjunctive use, water transfers, wheeling to other agencies, urban use, etc).

1. "Farm-gate" means the point at which water is delivered from the agricultural water supplier's distribution system to each of its individual customers as specified in the Agricultural Water Measurement Regulation (Title 23, Division 2, Chapter 5.1, Article 2 of the CCR).
2. "Aggregated farm-gate delivery data" means information reflecting the total volume of water an agricultural water supplier provides to its customers and is calculated by totaling its deliveries to customers.
3. "Best Professional Practices" is defined in Title 23, Division 2, Chapter 5.1, Article 2 of the CCR, Section 597.2.

Article 2 Form - Rev.8 28 2013

ENDNOTES

1. California Department of Water Resources (hereinafter DWR), "Drought and Water Year 2016: Hot and Dry Conditions Continue," September 2016, http://water.ca.gov/waterconditions/docs/a3065_Drought_8page_v8_FINALsm.pdf.

2. DWR, "Drought Information: Governor's Drought Declaration," 2017, http://www.water.ca.gov/waterconditions/declaration.cfm.

3. State Water Resources Control Board, "California Meets Governor's Conservation Mandate for Seventh Straight Month," press release, February 2016, http://www.waterboards.ca.gov/water_issues/programs/conservation_portal/docs/2016feb/pr2216_dec_conser.pdf.

4. Wee, Heesun, "California Landowners Resist Efforts to Monitor Groundwater," CNBC, May 2015, https://www.cnbc.com/2015/05/12/the-growing-tension-over-california-water-metering-.html.

5. CA Water Code § 531 *et seq*.

6. Public Policy Institute of California, *Just the Facts: Water Use in California*, July 2016, http://www.ppic.org/main/publication_show.asp?i=1108.

7. CA Water Code § 531 *et seq*.

8. CA Water Code § 531 *et seq*.

9. CA Water Code § 10608.48 *et seq*.

10. For the purpose of this analysis, NRDC defines a large irrigation district as one supplying water to more than 10,000 irrigated acres in at least one reported year. There are 123 large irrigation districts in DWR's databases. NRDC chose to analyze compliance only from large districts, because it is possible some of the smaller districts would not have been required to submit reports in all years.

11. California Department of Water Resources, "Aggregated Farm-Gate Water Delivery Reporting Requirements," http://www.water.ca.gov/wateruseefficiency/agricultural/farmgatedelivery.cfm (accessed May 9, 2017).

12. Personal communication with Martin Berbach, senior environmental scientist, DWR, September 22, 2016.

13. Ibid.

14. Ibid, and personal communication with Martin Berbach, senior environmental scientist, DWR, June 9, 2018.

15. Personal communication with Martin Berbach, senior environmental scientist, DWR, February 23, 2017.

16. Sabalow, Ryan, "Most California Farm-Water Suppliers Are Breaking This Law. Why Doesn't the State Act?" *Sacramento Bee*, May 21, 2017, http://www.sacbee.com/news/state/california/water-and-drought/article151664387.html.

17. Ibid.

18. DWR, "Strategic Business Plan," http://www.water.ca.gov/strategic_business_plan.cfm (accessed June 8, 2017).

19. DWR, "Proposed Framework and Draft Recommendations for Updating AWMP Requirements," October 2016, http://www.water.ca.gov/calendar/materials/draft_framework_for_updating_awmp_requirements-10-17-16_21982.pdf.

20. Personal communication with Martin Berbach, senior environmental scientist, DWR, June 8, 2018.

21. Personal communication with Martin Berbach, senior environmental scientist, DWR, September 22, 2016.

22. Ibid.

23. Personal communication with Martin Berbach, senior environmental scientist, DWR, February 23, 2017.

24. Personal communication with Martin Berbach, senior environmental scientist, DWR, September 15, 2017.

25. Ibid.

26. Ibid.

27. Ibid.

28. Personal communication with Martin Berbach, senior environmental scientist, DWR, February 23, 2017.

29. Personal communication with Martin Berbach, senior environmental scientist, DWR, September 15, 2017.