

State of California
The Natural Resources Agency
DEPARTMENT OF WATER RESOURCES
Division of Integrated Regional Water Management

**Submittal of Report – Status Report on Implementation of the
California Statewide Groundwater Elevation Monitoring Program
Years 2012-2015**



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State of California

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The attached report describes progress during calendar years 2012 through 2015. The previous, January 1, 2012 report, can be viewed at:
<http://www.water.ca.gov/groundwater/casgem/pdfs/2012%20CASGEM%20Report%20to%20the%20Legislature.pdf>

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Introduction and Background

Senate Bill X7 6 (SBX7 6) (Chapter 1, Statutes of 2009) added provisions for groundwater monitoring to Division 6 of the Water Code (Water Code § 10920 et seq.). The bill authorized the Department of Water Resources (DWR) to establish permanent, locally managed, groundwater elevation monitoring and reporting for all 515 groundwater basins identified in DWR Bulletin 118, *California's Groundwater*, as shown in Figure 1. Groundwater elevation data are foundational to improving the management and sustainability of California's groundwater resources.

DWR developed the California Statewide Groundwater Elevation Monitoring (CASGEM) Program to implement SBX7 6. Water Code section 12924(c) requires DWR to report the status of the CASGEM Program to the Governor and Legislature by January 1, 2012, and thereafter in years ending in "5" or "0". This report covers calendar years 2012 through 2015. The 2012 CASGEM Program Status Report is available at: <http://www.water.ca.gov/groundwater/casgem/>.

The overall purpose of the CASGEM Program is to track seasonal and long-term groundwater elevation trends in groundwater basins statewide. The Water Code directs DWR to rely on, and build upon, the many established local agency groundwater monitoring and management efforts throughout the state. DWR works cooperatively with local agencies, referred to as CASGEM "Monitoring Entities," to collect and maintain groundwater elevation data in a manner that is readily and widely available to the public.

During 2010 and 2011, the first two years of the CASGEM Program, DWR focused its efforts on initiating the CASGEM Program and ensuring that Monitoring Entities would, by January 2012, be able to submit groundwater elevation data electronically. Key CASGEM Program accomplishments during the first two years included:

- Development of the CASGEM Program website and informational documents to provide easily accessible, up-to-date program information and technical support;
- Recruitment of local agencies to become Monitoring Entities;
- Review of submitted Monitoring Entity notifications for groundwater basins;
- Official designation of Monitoring Entities;

- Coordination with Monitoring Entities to develop groundwater elevation monitoring programs;
- Development of an online system for groundwater elevation data submittal by Monitoring Entities, and for public access to the data.

Monitoring Entities began submitting groundwater elevation data to the CASGEM online system in fall 2011. DWR launched the online system for public access in mid-November 2011.

Summary of Key Accomplishments - 2012 to 2015

A significant number of CASGEM Program accomplishments have been achieved from 2012 through 2015, including those listed below:

- The 515 groundwater basins identified in Bulletin 118, *California's Groundwater*, were prioritized in June 2014 following criteria detailed in Water Code section 10933.
- The number of groundwater basins monitored under the CASGEM Program increased from 152, as of December 2013, to 239 by the end of 2015.
- Sixty-seven (67) groundwater basins and subbasins were approved to participate in the CASGEM Program using alternative monitoring methods pursuant to Water Code section 10932.
- The CASGEM online data submittal and reporting system was maintained, and changes to the system were made to accommodate the ever-increasing amount of data submitted, and to improve system stability and functionality.
- A statewide and regional evaluation of the extent of groundwater elevation monitoring under the CASGEM Program was conducted. Individual Monitoring Entities were informed of any data collection gaps and, in certain cases, assistance was provided by DWR to help reduce those gaps.
- The State Water Resources Control Board's (SWRCB) Drinking Water Program was engaged by DWR to allow public supply wells to be used as CASGEM monitoring points, where needed.
- Historical groundwater elevation data from DWR's Water Data Library were incorporated into the CASGEM online system. This greatly increased the amount of data readily accessible to water resource managers and the public.
- Groundwater elevation data were provided for the April and November 2014 drought reports to the Governor, California Water Plan-Update 2013 (published in 2015), and for the identification of basins subject to critical conditions of overdraft pursuant to Water Code section 12924.
- DWR staff collaborated with, and provided assistance to, existing and prospective CASGEM Monitoring Entities to promote broader participation in the CASGEM Program.
- Funding for the CASGEM Program was secured for Fiscal Year (FY) 2014-15 through FY 2018-19.

Discussion

Basin Prioritization:

Section 10933 was added to the Water Code in 2010 requiring DWR to prioritize the 515 groundwater basins and subbasins identified in DWR Bulletin 118, *California's Groundwater*. In 2013, the CASGEM Program developed a process for prioritizing the state's groundwater basins based on criteria identified in the Water Code—current population, projected population growth, public supply well density, total well density, irrigated acreage, groundwater reliance (groundwater use and percentage of total water supply), impacts on groundwater (such as overdraft, subsidence, saline water intrusion and other water quality degradation, etc.), and any other information determined relevant by DWR.

DWR compiled information on the 515 groundwater basins and then applied a basin prioritization scoring system to sort them into four categories: high-, medium-, low-, and very low priority. DWR released the draft groundwater basin prioritization results in January 2014 and conducted public workshops statewide to describe the prioritization process, present the draft results, solicit comments on the process and data used, and identify the next steps to be taken. Established and prospective Monitoring Entities, local agencies, and other interested stakeholders participated in the workshops.

DWR revised the prioritization results in consideration of input received, along with updated water use data that were not available when the initial prioritization was performed. The final basin prioritization results were released in June 2014. Figure 2 illustrates the results of that effort. A total of 127 basins (about 25% of the State's groundwater basins) were ranked high- or medium-priority (43 high; 84 medium). The high- and medium-priority basins represent 96% of the State's groundwater use from groundwater basins and 88% of the population overlying groundwater basins. Additional information on the basin prioritization process and results can be found at: http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm

DWR has used the results of the prioritization process to focus CASGEM Program and other groundwater program resources on high- and medium-priority groundwater basins. CASGEM Program participation is essentially required for high- and medium-priority basins under Executive Order B-29-15. Also, high- and medium-priority groundwater basins are subject to the requirements of the Sustainable Groundwater Management Act (SGMA).

CASGEM Program Participation:

The following table lists changes that occurred from December 2013 to December 2015.

<u>Parameter</u>	<u>December 2013</u> ¹	<u>December 2015</u>
Agencies with submitted monitoring notifications	124	136
Basins either fully or partially designated for monitoring ²	152	239
Designated Monitoring Entities	71	113
CASGEM wells in the on-line system ³	3,700	5,706
Identified high-priority basins ⁴	46	43
Fully designated high-priority basins	24	41
Partially designated high-priority basins	5	2
Identified medium-priority basins ⁴	80	84
Fully designated medium-priority basins	49	78
Partially designated medium-priority basins	5	3
Percentage of high- and medium-priority basins fully designated ⁵	58%	94%
Percentage of high- and medium-priority basins fully or partly designated ⁵	66%	98%

¹ December 2013 is the first time during the reporting period for which statistics are available for the items listed above.

² Includes high-, medium-, low- and very low-priority groundwater basins.

³ The general distribution of CASGEM wells is shown in Figures 3, 4, and 5.

⁴ December 2013 basin prioritization was draft. December 2015 numbers reflect the final prioritization.

⁵ The status of monitoring in high- and medium-priority basins is shown in Figure 6.

DWR's continued outreach, coordination, and partnering with current and prospective Monitoring Entities have been important factors in maintaining and increasing CASGEM Program participation during the reporting period. Other significant factors that helped increase participation include the statewide prioritization of groundwater basins under Water Code section 10933, Integrated Regional Water Management (IRWM) grant eligibility requirements, and Governor Brown's Executive Order B-29-15 for the on-going drought.

Water Code section 10933.7(a) requires that, to maintain state water grant eligibility, CASGEM Program participation is required for all high- and medium-priority groundwater basins (along with certain exemptions for disadvantaged communities). This grant eligibility requirement was likely a major factor in the increased number of Monitoring Entities for high- and medium-priority basins designated during the first half of 2014. Increases in CASGEM Program participation were also observed during summer and fall 2014, when the drought emergency grant solicitation was initiated by DWR's IRWM Program, and in late 2015 during DWR's Proposition 1 grant solicitation process for counties with stressed groundwater basins. Increases in CASGEM Program participation in late 2015 may also have been due to Executive Order

B-29-15, which required high- and medium-priority groundwater basins that were not being monitored under the CASGEM Program by December 31, 2015, to be referred to the SWRCB for possible enforcement action.

On December 31, 2015, DWR notified the SWRCB that the following high- and medium-priority groundwater basins were not being monitored in accordance with CASGEM Program guidelines:

Cuyama Valley Basin (Basin 3-13) – Kern County Portion
San Antonio Creek Valley (Basin 3-14) – Santa Barbara County (since removed from list)
Tule Subbasin (Basin 5-22.13) – Tulare County Portion
Kern County Subbasin (Basin 5-22.14) – Kern County Portion
Cosumnes Subbasin (Basin 5-22.16) – Sacramento County Portion
Borrego Valley Basin (Basin 7-24) – Imperial County Portion
Cahuilla Valley Basin (Basin 9-6) – Riverside County

Alternative Monitoring Methods:

Assembly Bill 1152 (Chesbro) was signed into law in late 2011. It enabled prospective CASGEM Program Monitoring Entities to submit alternative monitoring plans for their groundwater basins/subbasins following criteria under Water Code section 10932. For a basin to be eligible for alternative monitoring, it must meet one or more of the following criteria:

- 1) *Groundwater elevations are unaffected by land use activities or planned land use activities, or naturally occurring total dissolved solids within the groundwater preclude the use of that water.*
- 2) *It is underlying land that is wholly owned or controlled, individually or collectively, by state, tribal, or federal authorities, and groundwater monitoring information is not available or was requested from, but not provided by, the state, tribal, or federal authorities.*
- 3) *It is underlying an area where geographic or geologic features make monitoring impracticable, including, but not limited to, a basin or subbasin that is inaccessible to well-drilling equipment.*

If a groundwater basin or subbasin qualifies under the above criteria, the Monitoring Entity must provide details about how the basin will be alternatively monitored. A typical alternative monitoring strategy in the case of low-use groundwater basins is to track the population living within the basin's boundaries, and any increased potential for groundwater use, through monitoring the number of building permits, well construction permits, and changes in land use over time.

As of December 31, 2015, DWR designated 49 entire groundwater basins and 18 partial basins for alternative monitoring under the CASGEM Program. All of these basins are either low- or very low-priority, and most are located in the remote areas of

Northern California, the area east of the southern Sierra Nevada Mountains, and the Mojave Desert, as shown in Figure 7.

Online System Maintenance and Improvement:

The CASGEM online data submittal and reporting system is a key component of the CASGEM Program. The CASGEM online system provides the means for Monitoring Entities to regularly upload groundwater elevation monitoring data into the CASGEM database and makes that data widely and readily available to Monitoring Entities and the public. The web-based public portal for the online system is located at http://www.water.ca.gov/groundwater/casgem/online_system.cfm

On-going maintenance of the CASGEM online system is required to ensure it is functioning properly and is meeting user needs. Changes to the system were required during the reporting period in response to the large amount of data submitted and to improve system functionality.

Extent of Monitoring Evaluation:

After the prioritization of groundwater basins was completed in 2014, DWR conducted an evaluation of groundwater elevation monitoring efforts in basins across the state in accordance with Water Code section 10933(a). Key goals of this effort were to identify areas not being monitored and any data gaps in areas being monitored. The types of gaps identified included:

- spatial data gaps, including insufficient density of monitoring locations (CASGEM guidelines suggest a minimum of 2-10 wells per 100 square miles, with high-use, high-priority groundwater basins warranting densities toward the high end of this range);
- well construction information gaps, such as CASGEM wells with missing total depth and/or screened intervals;
- temporal data gaps, including CASGEM wells not being monitored at a frequency of at least twice per year (spring and fall) to capture seasonal and long-term trends;
- insufficient monitoring plans by Monitoring Entities, including any failures to identify and mitigate monitoring gaps.

The initial findings of DWR's evaluation were presented to existing Monitoring Entities who were then given the opportunity to comment on DWR's findings and suggest any needed corrections. The final findings were reported in the April and November 2014 public reports on groundwater conditions prepared in response to the drought. These reports are available at:

http://www.water.ca.gov/groundwater/maps_and_reports/index.cfm

The following is a summary of DWR's key findings:

- Monitoring Point Densities

As of August 2014, out of 254 monitored areas evaluated (basins, subbasins, or portions thereof):

- 7 areas had fewer than 2 wells per 100 square miles
- 12 high-priority basins/subbasins had fewer than 10 wells per 100 square miles
- 31 medium-priority basins/subbasins had fewer than 10 wells per 100 square miles.

- Well Construction Information

As of July 2014, out of 3,422 CASGEM wells evaluated:

- 982 wells were missing total well depth and/or screened interval information
- well completion reports were reported as unavailable for 2,107 wells
- for 72 wells, well logs were reported to be available, yet no construction information had been submitted to the CASGEM system.

- Temporal Data

As of August 2014, out of 254 monitoring areas evaluated, 98 had at least one period when less than 100% of CASGEM wells were monitored and reported.

- Monitoring Plan Gaps

As of July 2014, based on a review of monitoring plans for 230 monitoring areas, 59 areas had plans that lacked data gap identification and mitigation measures.

DWR is working with monitoring entities on a continuing basis to address CASGEM data gaps.

Inclusion of Public Supply Wells as CASGEM Wells:

In October 2014, the CASGEM Program began accepting public supply wells as groundwater elevation monitoring wells. Prior to that date, DWR had not allowed public supply wells to serve as CASGEM wells because of potential public water supply security concerns.

DWR worked with the SWRCB Drinking Water Program to identify conditions under which public water supply wells could be included in the CASGEM Program. It was decided that, in order for a public water supply well to be used as a CASGEM monitoring well, the Monitoring Entity must obtain written permission from the manager of the public water system owning the well to use it for groundwater elevation monitoring. The Monitoring Entity must also receive written permission to disclose the well's water level and construction information to the public.

Public supply wells are sometimes less than ideal for groundwater elevation monitoring because of a variety of factors, including residual pumping effects. Some Monitoring Entities have had significant difficulty identifying other suitable alternatives for monitoring groundwater levels in portions of their basins/subbasins and must use public water supply wells for groundwater elevation measurements.

Incorporation of Data from the Water Data Library:

DWR maintains the “Water Data Library” (WDL), which provides public access to groundwater elevation and groundwater quality data collected by DWR and other agencies throughout the state. DWR made changes to incorporate water elevation data from the WDL into the CASGEM online system, including historical data that, in some cases, extends back several decades before the inception of the CASGEM Program. This historical data, together with groundwater elevation measurements that continue to be collected and entered into the CASGEM online system, are critical to groundwater management decisions and SGMA implementation.

As of December 31, 2015, the CASGEM online system contained nearly 1.5 million groundwater elevation measurements, about 1.2 million of which were imported from the Water Data Library.

Uses of CASGEM Data:

CASGEM groundwater elevation data are necessary for determining groundwater elevation and storage trends, and the effectiveness of groundwater management measures, including those to be implemented by Groundwater Sustainability Agencies under SGMA.

CASGEM data were used for the development of California Water Plan-Update 2013 (released in 2015). CASGEM data were key to the highly expanded and enhanced assessment of groundwater conditions in that update.

CASGEM data were also used to determine drought-related groundwater elevation declines for the April 2014 and November 2014 drought reports to the Governor and to identify groundwater basins subject to critical conditions of overdraft pursuant to Water Code section 12924. The April 2014 and November 2014 drought reports are available at: http://www.water.ca.gov/waterconditions/docs/Drought_Response-Groundwater_Basins_April30_Final_BC.pdf and http://www.water.ca.gov/waterconditions/docs/DWR_PublicUpdateforDroughtResponse_GroundwaterBasins.pdf .

Information on critically overdrafted groundwater basins is available at: <http://www.water.ca.gov/groundwater/sgm/cod.cfm>

Assistance to Local Agencies:

DWR's CASGEM Program staff provided extensive support to existing and prospective Monitoring Entities during the reporting period. This support included:

- general guidance on the CASGEM Program
- outreach to prospective Monitoring Entities to encourage CASGEM Program participation
- assistance during the Monitoring Entity designation process
- review and approval of basin monitoring plans
- assistance with the online data submittal and reporting system.

DWR's CASGEM staff also developed printed and web-based informational materials about the CASGEM Program and the online data system. The CASGEM website can be viewed at: <http://www.water.ca.gov/groundwater/casgem/>

Program Funding:

The Governor's California Water Action Plan (Action Plan), released in January 2014, acknowledges the importance of groundwater elevation data and the CASGEM program for managing the State's vital groundwater resources. At the time of release of the Action Plan, stable funding for the CASGEM Program did not exist beyond FY 2013-14.

The Legislature approved a Budget Change Proposal (BCP) for the CASGEM Program as part of the 2014-15 budget process. The BCP provides dedicated funding to DWR for the CASGEM Program through FY 2018-19. This funding will allow continued progress toward collecting timely groundwater elevation data for all of California's groundwater basins, and for maintaining that data and making it readily available to the public.

Challenges:

- Monitoring Costs

Local agencies participating as Monitoring Entities in the CASGEM Program do not receive state funding for their groundwater elevation monitoring efforts. This has been a point of concern for many agencies, especially those with significant budget constraints. Groundwater Sustainability Agencies (GSA) formed in response to SGMA will have the ability to levy fees to fund their operations, including the measurement of groundwater elevations. GSA formation is required for high- and medium-priority groundwater basins, but not for low- and very low-priority basins. There are 388 low- and very low-priority basins in California, and there is little expectation that GSAs will be formed for many of those basins.

- Permission to Monitor Wells

Many CASGEM Monitoring Entities reported difficulty securing well owner permission to monitor wells for the CASGEM Program. Many entities reported that the requirement to publicly disclose well location, total depth, screened interval information, and measured water elevations through an online database discourages well owners distrustful of government agency motives. In 2015, the Water Code was changed so that well completion reports are no longer confidential. It is unclear whether this change has had any effect on the willingness of well owners to allow their wells to be used for monitoring purposes.

- Availability of Suitable Wells

Another problem encountered by Monitoring Entities is the lack of wells that are suitable for water elevation monitoring purposes. Wells screened across multiple aquifers, irrigation or supply wells with extremely long well screens, and active high-capacity production wells that exhibit residual effects of pumping, are typically unsuitable for monitoring purposes. These types of wells are common, and there are often few alternative wells available to Monitoring Entities.

Wells that are specifically located, constructed, and reserved for monitoring purposes are the best option for long-term groundwater elevation monitoring programs. However, many Monitoring Entities cannot afford to install them. Funding for monitoring well installation can help Monitoring Entities improve their monitoring networks and provide for properly informed decisions under SGMA.

Future Activities

Subject to the availability of adequate program funding, the State's CASGEM Program efforts described above will continue, including efforts to maintain groundwater elevation data, increase program participation by local agencies, provide technical assistance to Monitoring Entities, improve the functionality of the online system, and make any necessary changes in response to SGMA implementation.

CASGEM Program operations will be closely coordinated with all local agencies involved with the implementation of SGMA. A key consideration will be reconciling and transitioning monitoring areas and practices established by Monitoring Entities under the CASGEM Program with Groundwater Sustainability Agencies and Groundwater Sustainability Plans established in response to SGMA.

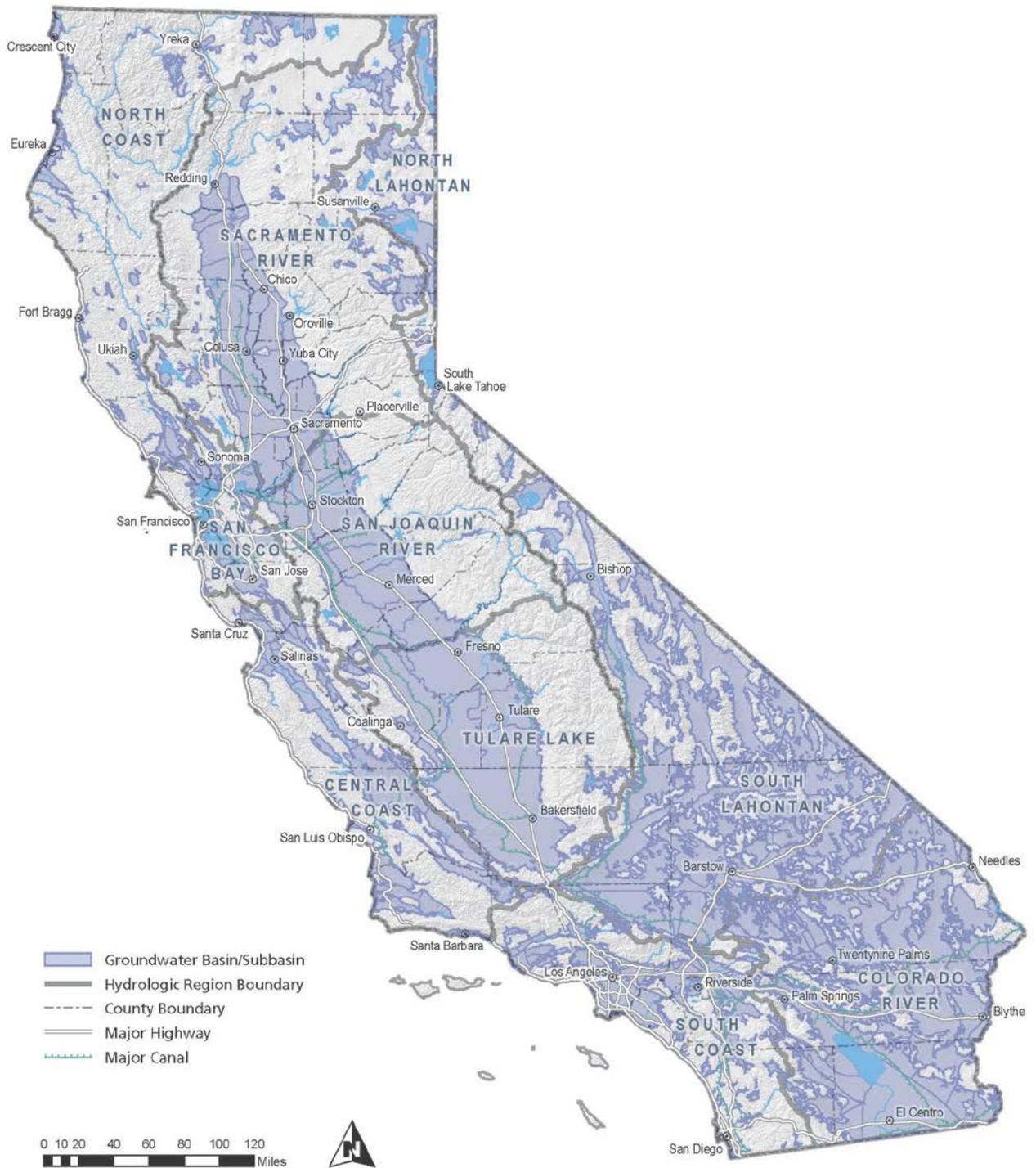
Conclusion

The CASGEM Program has significantly improved groundwater elevation information for California's groundwater basins. As of December 31, 2015, a total of 98% of the state's high- and medium-priority groundwater basins are being fully or partially monitored and reported under the CASGEM Program. Groundwater elevation data collected through the program are publically available and are essential to groundwater management decisions under SGMA, and for statewide and regional water resource evaluations, including California Water Plan-Update 2018 and the 2020 update of DWR Bulletin 118, *California's Groundwater*.

List of Figures

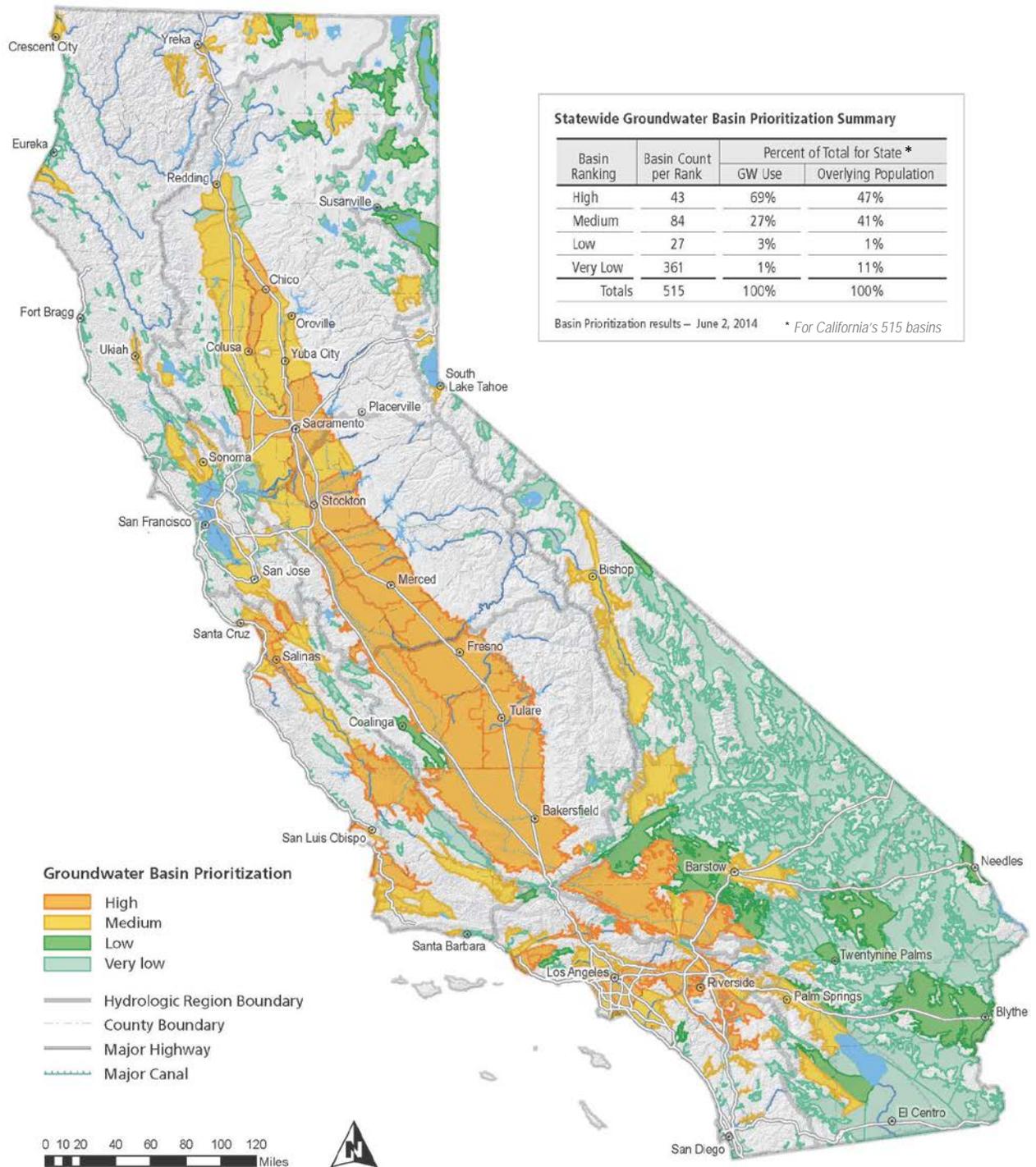
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Figure 1 – Bulletin 118 Groundwater Basins



Map based on groundwater basin boundaries established in Bulletin 118 Update 2003, Department of Water Resources. For additional information, please see <http://www.water.ca.gov/groundwater/bulletin118/index.cfm>

Figure 2 – Groundwater Basin Prioritization – June 2014



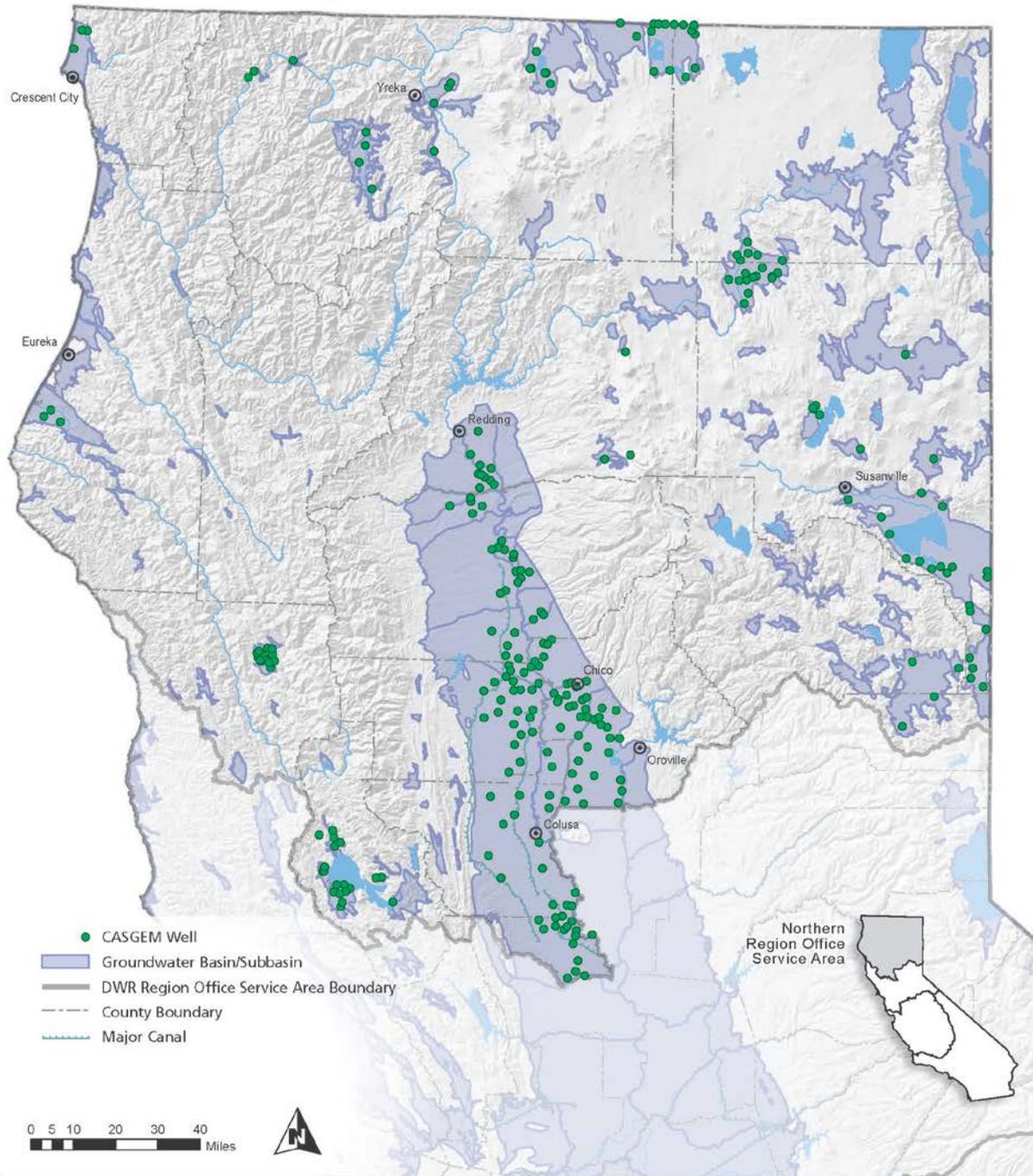
Statewide Groundwater Basin Prioritization Summary

Basin Ranking	Basin Count per Rank	Percent of Total for State *	
		GW Use	Overlying Population
High	43	69%	47%
Medium	84	27%	41%
Low	27	3%	1%
Very Low	361	1%	11%
Totals	515	100%	100%

Basin Prioritization results – June 2, 2014 * For California's 515 basins

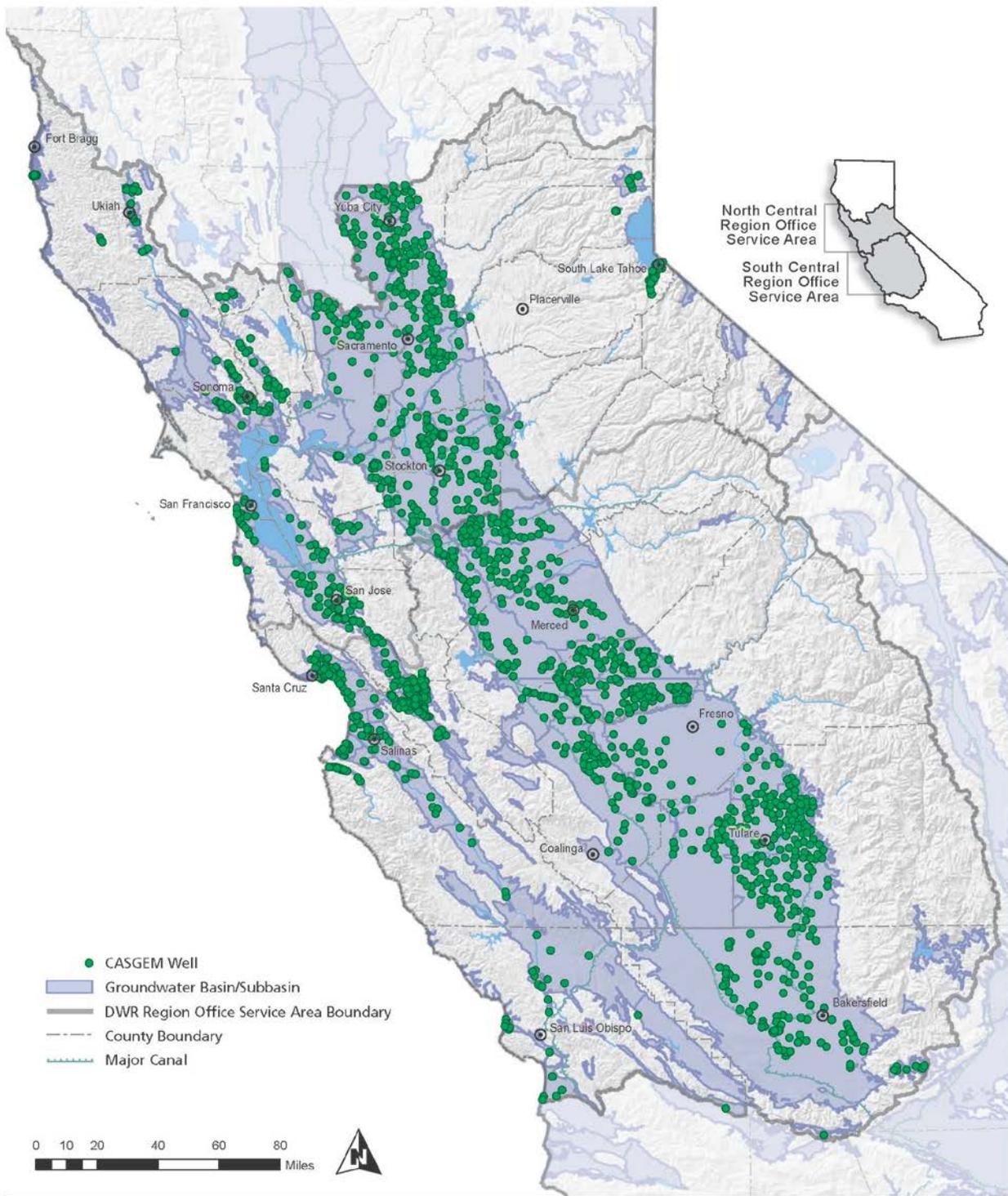
For additional information, please see http://www.water.ca.gov/groundwater/casgem/basin_prioritization.cfm

Figure 3 – General Distribution of CASGEM Wells in Northern California



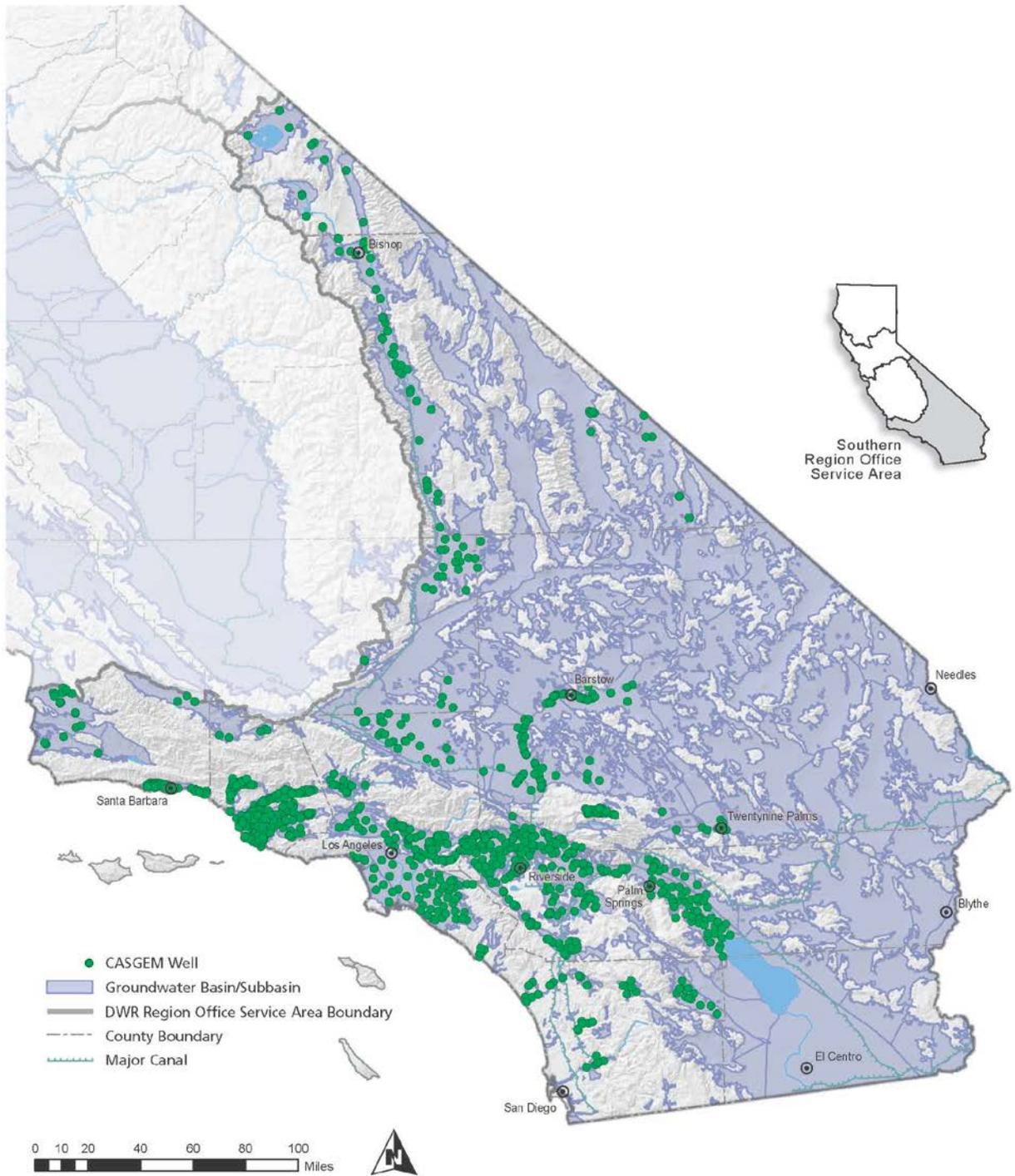
For additional information, please see <http://water.ca.gov/groundwater/casgem>

Figure 4 – General Distribution of CASGEM Wells in Central California



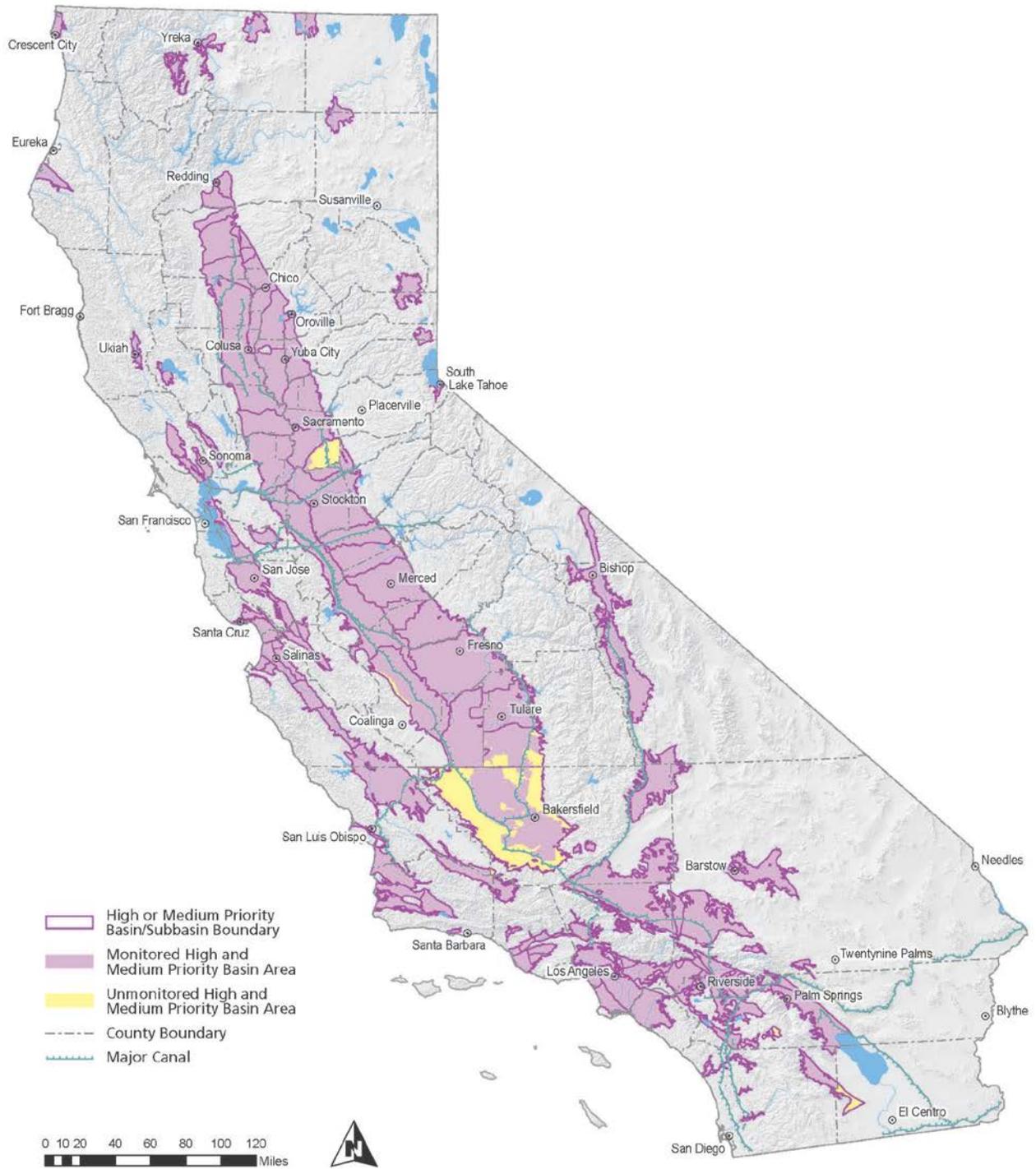
For additional information, please see <http://water.ca.gov/groundwater/casgem>

Figure 5 – General Distribution of CASGEM Wells in Southern California



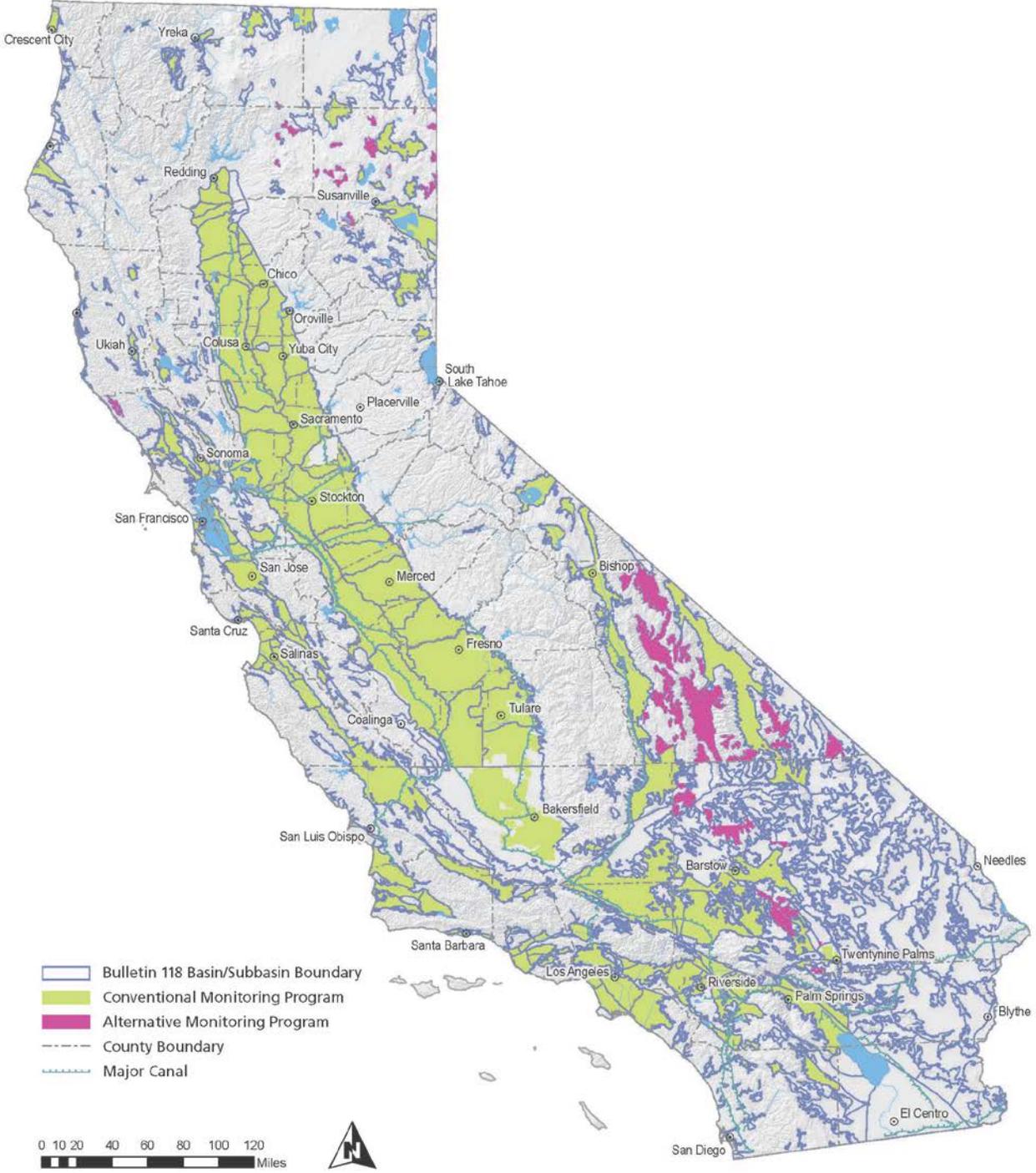
For additional information, please see <http://water.ca.gov/groundwater/casgem>

Figure 6 – Status of Monitoring in High- and Medium-Priority Groundwater Basins



For additional information, please see <http://water.ca.gov/groundwater/casgem>

Figure 7 – Groundwater Basins with Conventional and Alternative Monitoring Programs



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