SHR-21

Arsenic in Delta groundwater

1. What caused the increase after 2005 and was the CalSim II and/or DSM2 model updated to reflect the change?
2. What do the WaterFix model(s) show will be the impact to Delta area groundwater during construction and when in operation?

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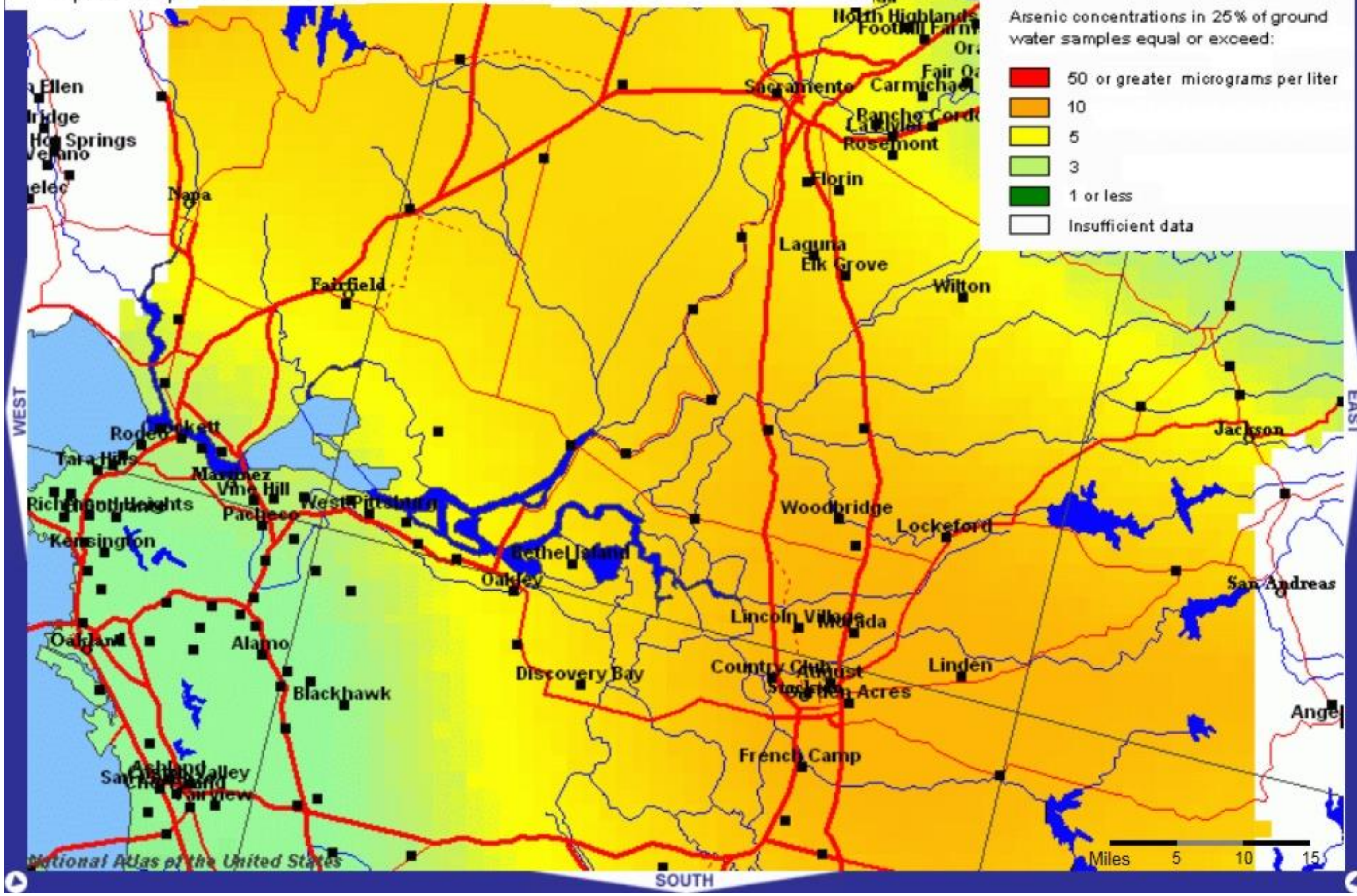
As more Sacramento River water is diverted away from the Northern California aquifer, trace consentrations of natural minerals, like arsenic, will increase most likely. How does the Delta Plan and BDCP address the impacts to private and commercial wells in NorCal?

Zoom to State(s)



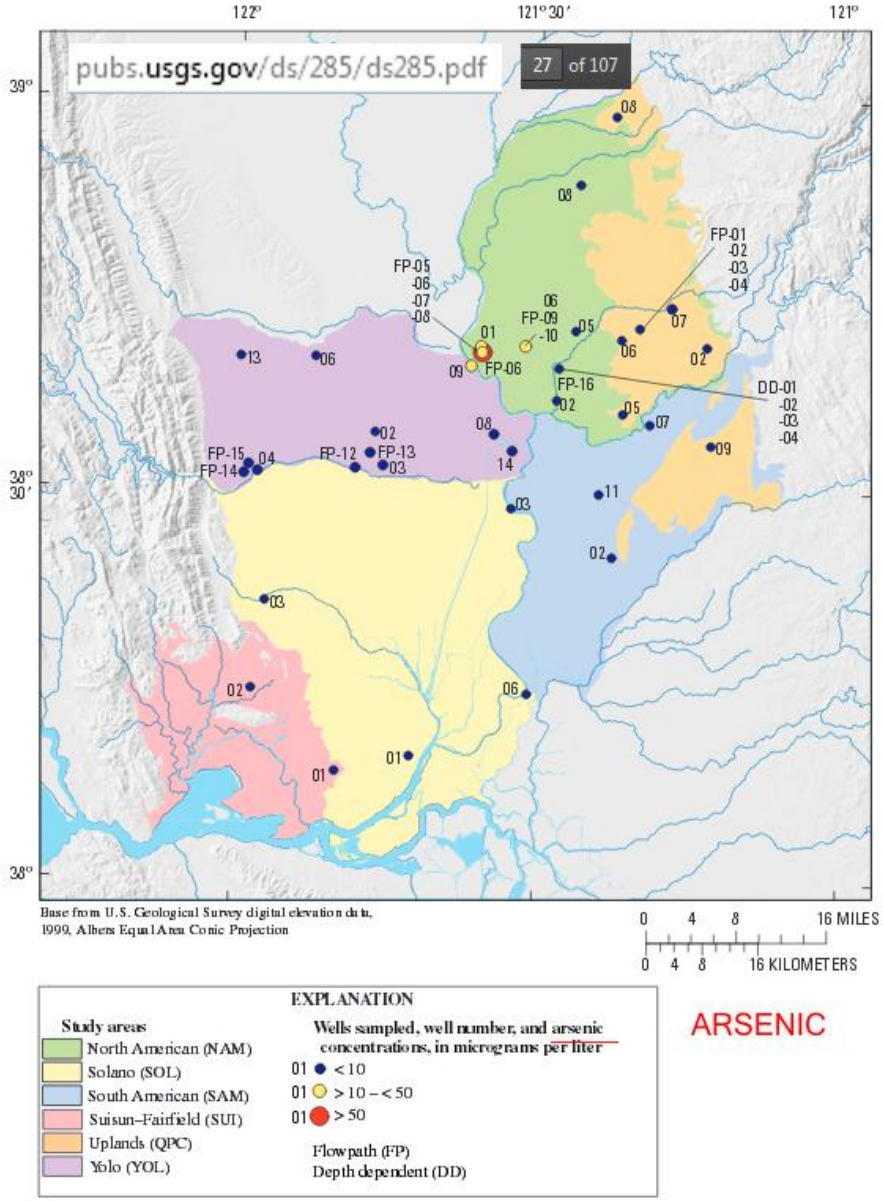
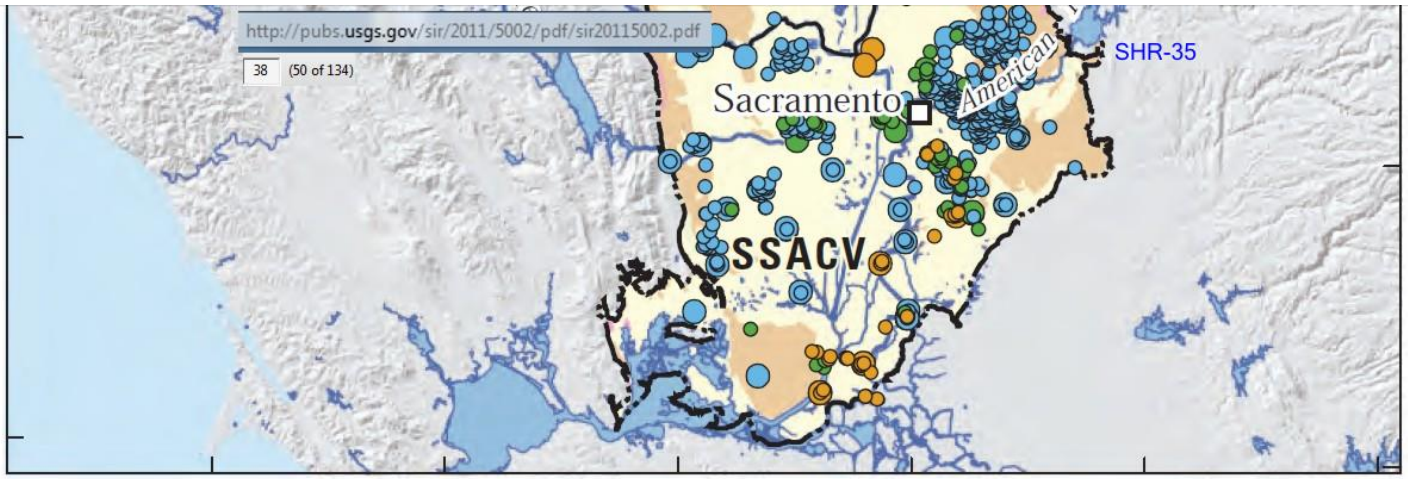


Figure 5 Arsenic concentrations in ground water in the study areas of the Southern Sacramento Valley Ground-Water Ambient Monitoring and Assessment (GAMA) study unit.

In 2000 groundwater tests
Showed limited incidence
Of arsenic above 10 ppb, and
That higher level of arsenic
Was located at the north end
Of the Yolo Bypass, at the
Catchment basin west of
Woodland, from appearances.

By 2006 there was a substantial increase in wells that tested higher for arsenic In drinking water. Since this a known but unexplained problem , did the WaterFix Computer modelers assess the impact of diversion of Sacramento River on wells of The Delta?



Shaded relief derived from U.S.Geological Survey National Elevation Dataset, 2006,
Albers Equal Area Conic Projection
Horizontal datum: North American Datum of 1983 (NAD 83)

0 10 20 40 Miles

0 10 20 40 Kilometers

EXPLANATION

Geology

- Quaternary alluvium (Q)
- Quaternary/Plio-Pleistocene semiconsolidated (QPc)
- Quaternary/Tertiary volcanic pyroclastic (QTvp)

Relative-concentration of arsenic in:

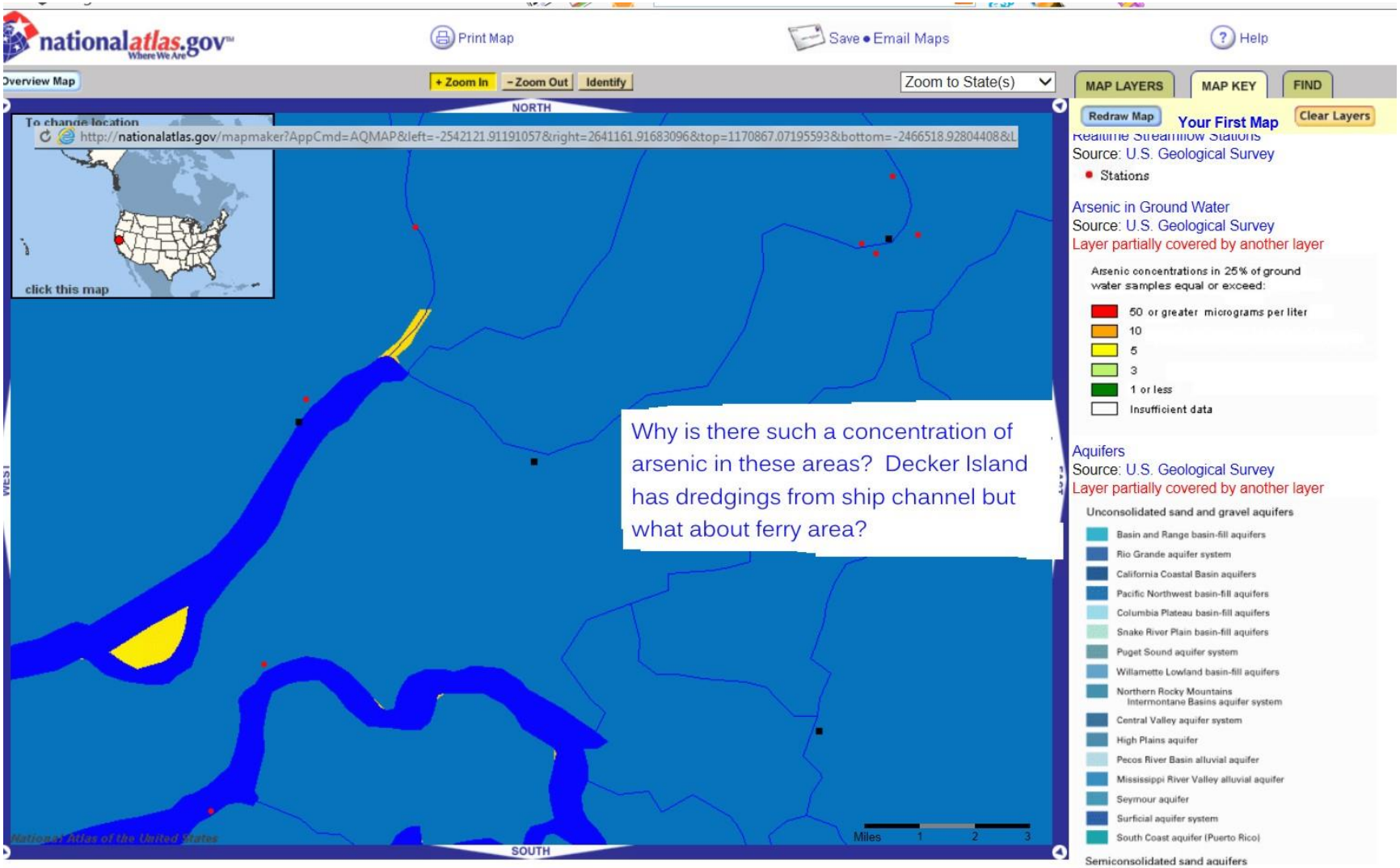
	USGS-Grid wells	CDPH wells
High	●	●
Moderate	●	●
Low	●	●

WHY is there such high reading in wells on Sacramento River just north of Steamboat and Sutter? And on lower Sac River?

Boundary of Sacramento Valley

Study units

Northern Sacramento Valley study unit (NSACV)
Middle Sacramento Valley study unit (MSACV)
Southern Sacramento Valley study unit (SSACV)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Identify
Zoom to State(s)
MAP LAYERS
MAP KEY
FIND
Redraw Map
Your First Map
Clear Layers
To change location
http://nationalatlas.gov/mapmaker?AppCmd=AQMAP&left=-2542121.91191057&right=2641161.91683096&top=1170867.07195593&bottom=-2466518.92804408&L
click this map
NORTH
WEST
EAST
SOUTH
Why is there such a concentration of arsenic in these areas? Decker Island has dredgings from ship channel but what about ferry area?
Miles 1 2 3
National Atlas of the United States
Source: U.S. Geological Survey
Stations
Arsenic in Ground Water
Source: U.S. Geological Survey
Layer partially covered by another layer
Arsenic concentrations in 25% of ground water samples equal or exceed:
50 or greater micrograms per liter
10
5
3
1 or less
Insufficient data
Aquifers
Source: U.S. Geological Survey
Layer partially covered by another layer
Unconsolidated sand and gravel aquifers
Basin and Range basin-fill aquifers
Rio Grande aquifer system
California Coastal Basin aquifers
Pacific Northwest basin-fill aquifers
Columbia Plateau basin-fill aquifers
Snake River Plain basin-fill aquifers
Puget Sound aquifer system
Willamette Lowland basin-fill aquifers
Northern Rocky Mountains Intermontane Basins aquifer system
Central Valley aquifer system
High Plains aquifer
Pecos River Basin alluvial aquifer
Mississippi River Valley alluvial aquifer
Seymour aquifer
Surficial aquifer system
South Coast aquifer (Puerto Rico)
Semiconsolidated sand aquifers

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Location and population served by domestic wells in California

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Dates

Publication Date : 2015-08-21
Time Period : 1990-01-01

Citation

Johnson, T.D. and Belitz, K., 2015, Location and population served by domestic wells in California: U.S. Geological Survey data release, http://dx.doi.org/10.5066/F70R9MFW.

Summary

This dataset identifies the number of individually-owned domestic wells, and the number of households relying upon domestic water supply in the state of California. The number of wells and households are summarized for each Public Land Survey System (PLSS) section. The well locations were determined from more than 635,000 scanned well-completion reports (WCRs) provided by the California Department of Water Resources in 2011. This is only a partial sample of the total number of WCRs (estimated at 1 to 2 million in total). The number of domestic wells was estimated based upon a spatially distributed and randomized survey that determined the Township Ratio (TR) for each township in the state (4,692 in total). Each township generally contains 36 sections (6 x 6). The total number of wells within a section was multiplied by the corresponding TR to estimate the number of domestic wells within each section. See the "TRatio" column in the attribute table. Each section within the same township will have the same Township Ratio. The domestic household data are from the 1990 US Census. These data were provided at the census tract level and were subsequently aggregated to PLSS sections that contained a domestic well. In the case where census tract data identified households using domestic supply, but there were no domestic wells within the tract, the household data were distributed evenly to all sections within the tract. In San Luis Obispo County, the scanned WCRs were incomplete. Therefore, a surrogate method was used. The total number of households reported by the 1990 census did not change; only the distribution of where those households existed within the tract

... show more ...

Contacts

Map »

Spatial Services

ScienceBase WMS :
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ScienceBase WFS :
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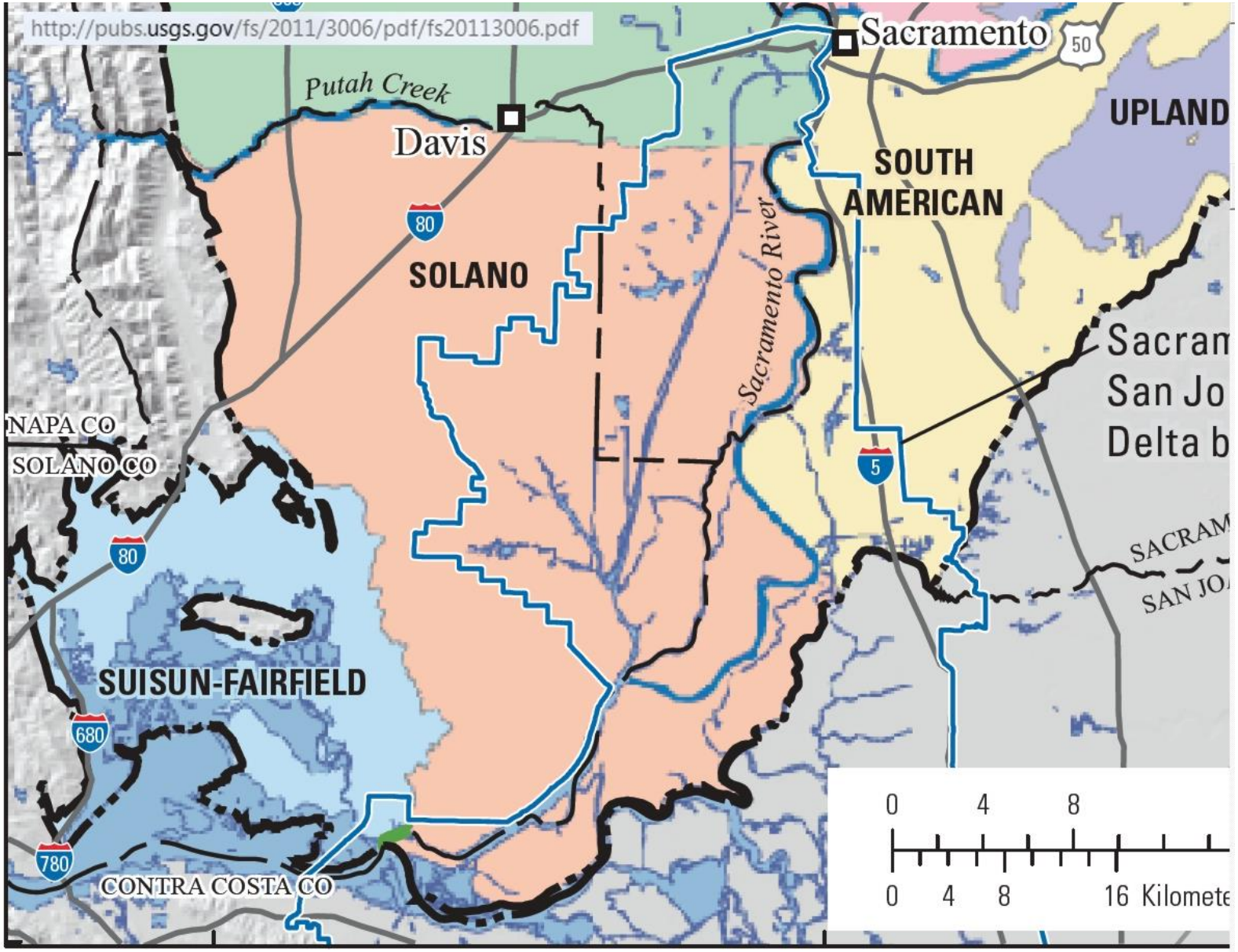
Communities

- USGS California Water Science Center
- USGS Data Release Products

Associated Items

- *related to* Identifying the location and population served by domestic wells in California

View Associated Items


http://pubs.usgs.gov/fs/2011/3006/pdf/fs20113006.pdf
Sacramento
50
Putah Creek
Davis
UPLAND
SOUTH
AMERICAN
80
SOLANO
Sacramento River
Sacram
San Jo
Delta b
NAPA CO
SOLANO CO
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SUISUN-FAIRFIELD
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1. Introduction

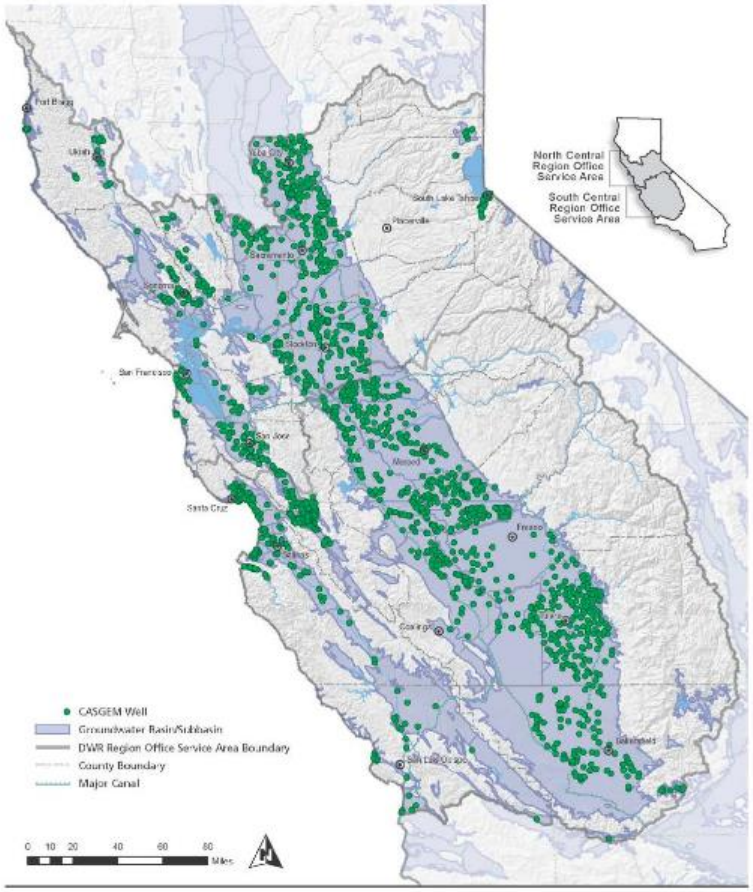
The Shallow Aquifer Assessment Survey, a component of the California State Water Resources Control Board's Groundwater Ambient Monitoring Assessment program Priority Basin Project (GAMA), is focused on the study of groundwater used by individual households. Individual household wells (domestic wells) are usually shallower than public-supply wells, and are therefore more susceptible to contamination from the land surface, or from shallow underground contaminant sources such as leaking fuel or septic tanks. The U.S. Geological Survey (USGS) was tasked to identify where domestic wells are located in the state, and to identify and sample areas with high densities of domestic-well users. This paper describes the methodology and results of the domestic-well survey, and the identification of high-density domestic-well areas.

According to the 1990 decadal census, the last year the US Census surveyed drinking-water sources, 464,621 California households, equivalent to 1.2 million people were using domestic well water for their drinking water supply. The rest of the population (29.76 million at the time) relied upon a municipal source of water. The population of California reached 37.25 million in 2010. If the proportion of those using domestic wells is the same as in 1990, then over 1.5 million people obtained drinking water from domestic wells in 2010. The location of the 1.5 million people using domestic well water, prior to the research presented here, has only been aggregated into the geographic boundaries of a census tract, some of which can be quite large in California (up to 19,295 km^2). Simply distributing the population across the entire census tract would be a generalization that does not capture the natural clustering of populations that occurs due to the physical, cultural, and economic geography of the landscape. Therefore a more accurate method of determining the location of households using domestic well water was needed.

The California Department of Water Resources (DWR) keeps records of all types of wells drilled within the state in the form of Well Completion Reports (WCR) which are submitted to DWR by the well-drilling company. Some of these reports are in paper format only, however many have been digitally scanned. These files often contain a single scanned image of the driller's log, but sometimes they also contain a cover page or accompanying material. If a driller's log was included in the WCR, it often described specifics about the well such as the depth of the well, casing perforations, owner, well type (irrigation, domestic, monitoring, etc.), and location. Driller's log information is confidential by state law, making them unavailable to the general public. The USGS was granted access to these scanned images

www.water.ca.gov/groundwater/casgem/pdfs/CASGEM_5_year_Report.pdf

Figure 4 – General Distribution of CASGEM Wells in Central California



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

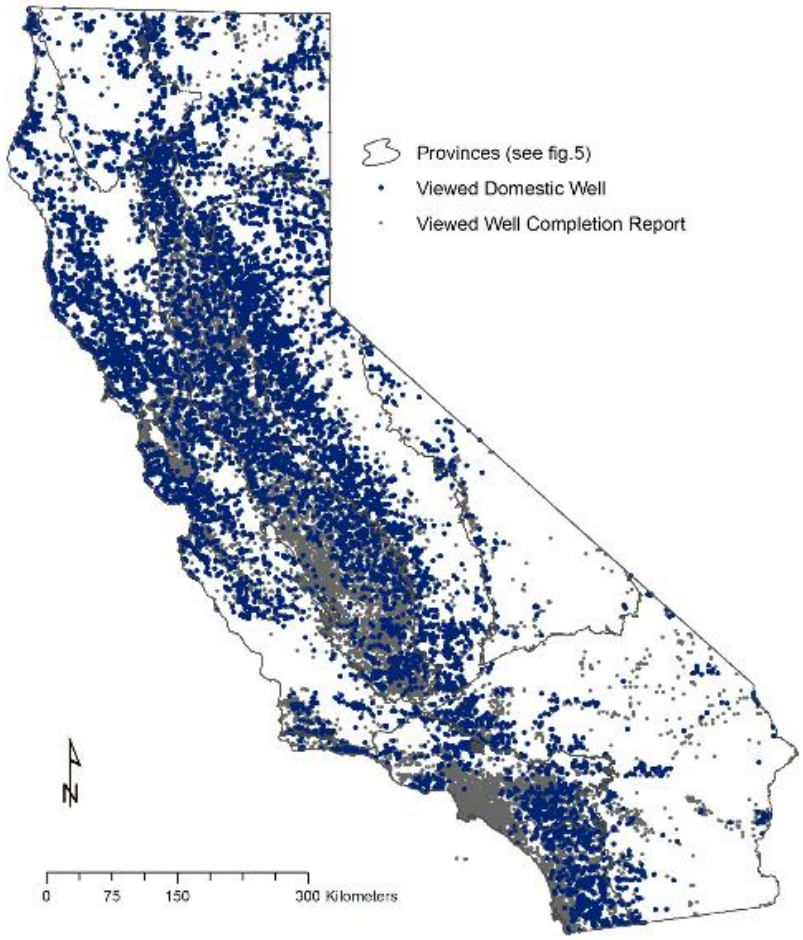


Fig. 2. Analysts viewed 41,671 well completion reports, of which 10,839 were identified as individually owned domestic wells.

The total number of townships with one or more domestic well was 2369, slightly more than ½ the state's townships, and the township ratio in these townships ranged from 0.01 to 1, with an average value of 0.526 (Fig. 3).

For all counties except for San Luis Obispo County, the number of domestic wells per section was estimated using the township ratio (Eq. (2)) for a total 287,248 domestic wells. For San Luis Obispo County, the number of domestic wells per section was estimated from geology, road networks, and well data from the adjacent counties (see Appendix) bringing the total number of domestic wells in

capability with DFA staff, application upload functionality, and the ability to submit and review claims online.

4. **Improve Management of Drinking Water Spatial Data:** Maximize the use of the State Water Board's GIS to identify the drinking water infrastructure needs of PWSs, report on funded projects, and identify opportunities for consolidation.

5. **Provide Affordable Financing Alternatives:** DWSRF funding reduces PWS's costs of supplying reliable, safe drinking water by providing affordable financing for the construction of technically sound drinking water infrastructure projects. The State Water Board encourages PWSs to include energy efficiency and water conservation measures, including water meters, in conjunction with public health related projects. The DWSRF Policy expands the eligibility of projects to include water meters. Water meters not only encourage the conservation of water, thereby producing savings related to costs of production, treatment, storage and pumping, but also allow systems to establish effective water rate structures as well as identify potential distribution system water loss.

6. **Acknowledge and Address Household Affordability Constraints:** Strategically use the DWSRF additional subsidy, set-aside funds, and Prop 1 drinking water funds to maximize the DWSRF's impact on achieving affordable compliance. The State Water Board will regularly reevaluate the affordability criteria to ensure that PWSs receive an appropriate amount of additional subsidy and technical assistance.

7. **Ensure Program Outcomes:** The State Water Board continues to monitor and manage the DWSRF to ensure that the fund remains financially sound and self-sustaining over the long term as an ongoing source of funding to assist PWSs in achieving and maintaining compliance with the SDWA. The State Water Board continues to focus on streamlining and expediting project selection based upon public health priority ranking as well as readiness to proceed to funding.

8. **Ensure TMF Capacity of PWSs:** Continue to provide financial and technical assistance to PWSs under California's drinking water capacity development strategy. The State Water Board's Office of Sustainable Water Solutions plans to bring an informational item before the Board in May of 2016, which will present a new strategy that combines strategies of small and/or disadvantaged community wastewater and drinking water capacity development. Even though the primary focus of the new strategy is small and/or disadvantaged communities, assistance described in the drinking water capacity development portion of the new strategy will be available to all drinking water systems regardless of size. The strategy will address compliance and sustainability challenges by outlining the general approaches to be taken over the next three fiscal years to improve both compliance and sustainability.

9. **Further Enhance The State Water Boards' LGTS:** Begin developing an LGTS mobile application for DFA staff and a public-facing LGTS platform for applicants to access, interact, and monitor funding applications throughout the entire funding cycle.

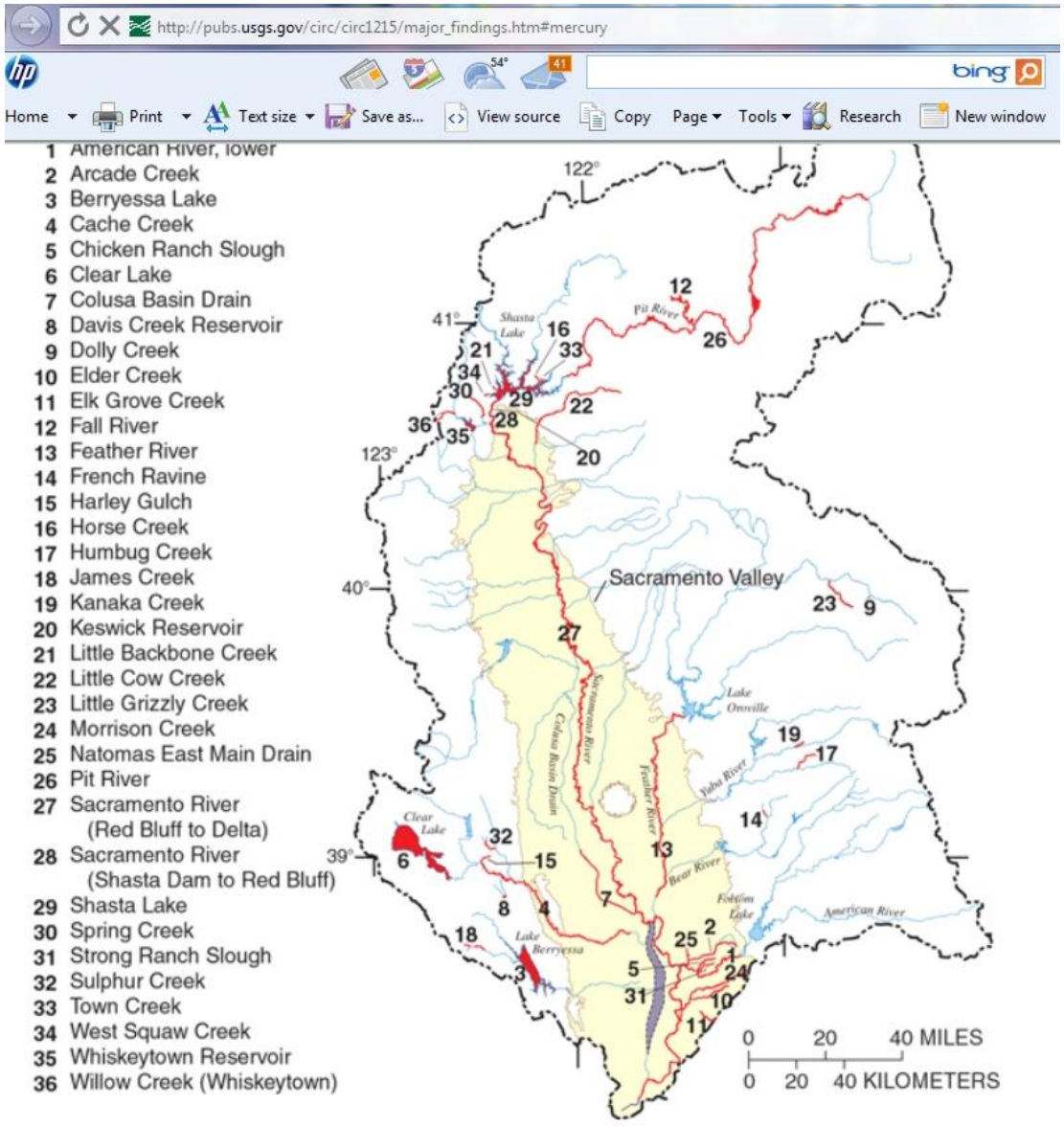
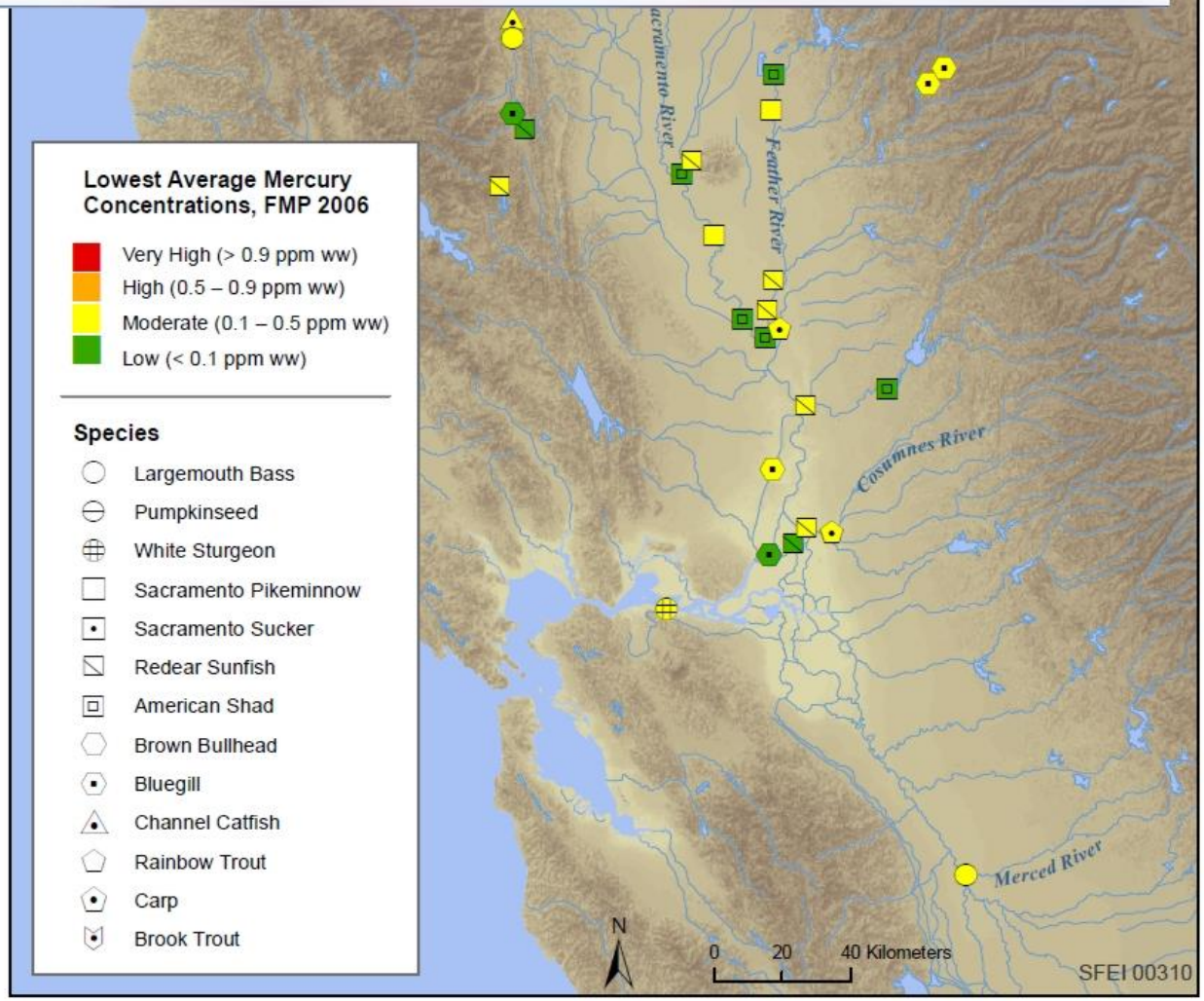


Figure 8. Impaired water bodies of the Sacramento River Basin according to the California 303(d) list (U.S. Environmental Protection Agency, accessed January 2, 2000). Impaired water bodies require the implementation of a management plan called a Total Maximum Daily Load (TMDL) to bring the water body into compliance with existing standards. Most of the impairments are the result of pesticides from agricultural or urban use, or from metals derived from historical mining operations.

Does the modeling for WaterFix assess impacts To Delta and exporter Exposure to mercury From runoff?



Map 4. The species at each sampling site with the lowest average mercury concentration (ppm wet weight) in 2006 is shown. Symbol types represent species, and colors represent average mercury concentration (see legend). Size limits were applied (Table 5).