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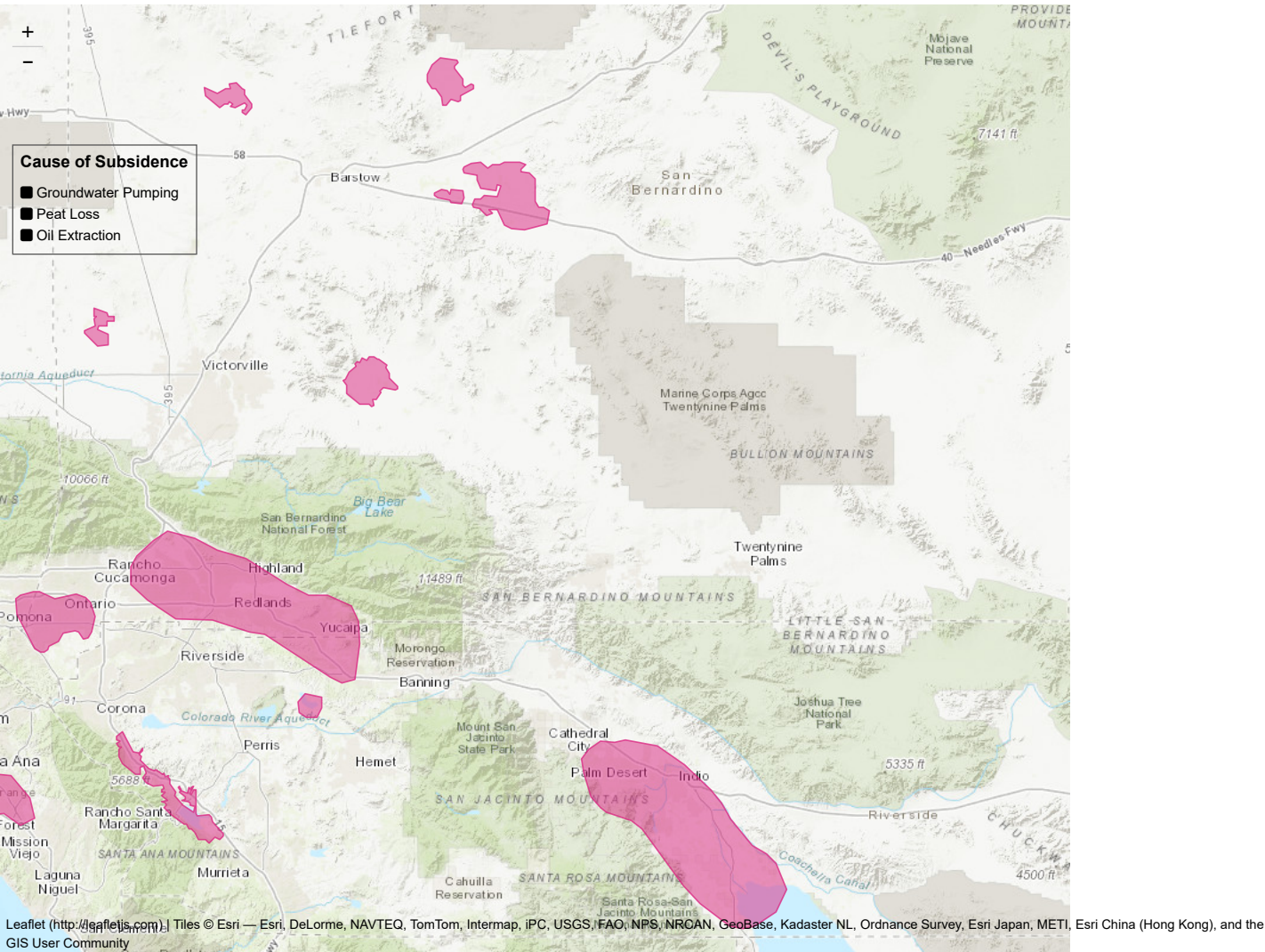
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Land Subsidence in California (<https://www.usgs.gov/centers/ca-water-ls/>)

# Areas of Land Subsidence in California

In California, large areas of land subsidence were first documented by USGS scientists in the first half of the 20th century. Most of this subsidence was a result of excessive groundwater pumping. Completion of California's State and Federal water projects that bring water from California's wet north to its dry south allowed some groundwater aquifers to recover, and subsidence decreased in these areas. However, subsidence continues today, sometimes at nearly historically high rates of more than 1 foot/year (ft/yr) (</projects/central-valley/land-subsidence-san-joaquin-valley.html>). The map below illustrates areas of recorded subsidence—historical and current—across California.



## Groundwater Sustainability Indicators

- Groundwater-Level Declines (</sustainable-groundwater-management/groundwater-levels-california.html>)
- Groundwater-Storage Reductions (</sustainable-groundwater-management/groundwater-storage-california.html>)
- Seawater Intrusion (</sustainable-groundwater-management/seawater-intrusion-california.html>)
- Water-Quality Degradation (</sustainable-groundwater-management/water-quality-california.html>)
- Land Subsidence (</sustainable-groundwater-management/land-subsidence-california.html>)
- Interconnected Surface-Water Depletions (</sustainable-groundwater-management/interconnected-surface-water-depletion.html>)

## Subsidence Studies

- San Joaquin Valley (</projects/central-valley/land-subsidence-san-joaquin-valley.html>)

[Coachella Valley \(coachella-valley-subsidence.html\)](#)

[Mojave Desert \(/mojave/subsidence.html\)](#)

[Sacramento-San Joaquin Delta \(bay-delta-subsidence.html\)](#)

[Santa Clara Valley \(santa-clara-valley-subsidence.html\)](#)

Data Downloads

[Subsidence: Interferometric Synthetic Aperture Radar \(InSAR\) \(central-valley\\_insar-timeseries.xlsx\)](#)

[Subsidence: Continuous GPS \(CGPS\) \(http://www.unavco.org/instrumentation/networks/status/pbo\)](http://www.unavco.org/instrumentation/networks/status/pbo)

[Compaction: Extensometers \(central-valley\\_extensometer-data.xlsx\)](#)

[Benchmark Sites \(http://www.restoresjr.net/monitoring-data/subsidence-monitoring/\)](http://www.restoresjr.net/monitoring-data/subsidence-monitoring/)

[Groundwater Levels \(http://nwis.waterdata.usgs.gov/ca/nwis/gwlevels\)](http://nwis.waterdata.usgs.gov/ca/nwis/gwlevels)

Popular Publications

[Glossary of selected terms useful in studies of the mechanics of aquifer systems and land subsidence due to fluid withdrawal \(http://pubs.usgs.gov/wsp/2025/report.pdf\)](http://pubs.usgs.gov/wsp/2025/report.pdf)  
USGS Water Supply Paper 2025

[Groundwater Availability of the Central Valley Aquifer, California \(https://pubs.er.usgs.gov/publication/pp1766\)](https://pubs.er.usgs.gov/publication/pp1766)  
USGS Professional Paper 1766

[Guidebook to studies of land subsidence due to ground-water withdrawal \(http://www.rcamnl.wr.usgs.gov/rgws/Unesco/\)](http://www.rcamnl.wr.usgs.gov/rgws/Unesco/)  
Prepared for the International Hydrological Programme, Working Group 8.4

[Land Subsidence along the Delta-Mendota Canal in the northern part of the San Joaquin Valley, California, 2003-10 \(http://pubs.usgs.gov/sir/2013/5142/\)](http://pubs.usgs.gov/sir/2013/5142/)  
USGS Scientific Investigations Report 2013-5142

[Land Subsidence from Groundwater Use in California \(land-subsidence-groundwater-use-california.pdf\)](#)  
Report of Findings, 2014

[Land subsidence in the San Joaquin Valley, California, USA, 2007-2014 \(http://www.proc-iahs.net/372/23/2015/piahs-372-23-2015.html\)](http://www.proc-iahs.net/372/23/2015/piahs-372-23-2015.html)  
Proceedings of the International Association of Hydrological Sciences

[Land Subsidence in the United States \(http://pubs.usgs.gov/circ/circ1182/\)](http://pubs.usgs.gov/circ/circ1182/)  
USGS Circular 1182

[Land Subsidence in the United States \(http://water.usgs.gov/ogw/pubs/fs00165/SubsidenceFS.v7.PDF\)](http://water.usgs.gov/ogw/pubs/fs00165/SubsidenceFS.v7.PDF)  
USGS Fact Sheet-165-00

[Measuring Land Subsidence from Space \(http://pubs.usgs.gov/fs/fs-051-00/pdf/fs-051-00.pdf\)](http://pubs.usgs.gov/fs/fs-051-00/pdf/fs-051-00.pdf)  
USGS Fact Sheet-051-00

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[Contact USGS \(https://answers.usgs.gov/\)](https://answers.usgs.gov/)

[U.S. Department of the Interior \(https://www.doi.gov/\)](https://www.doi.gov/)

[DOI Inspector General \(https://www.doioig.gov/\)](https://www.doioig.gov/)

[White House \(https://www.whitehouse.gov/\)](https://www.whitehouse.gov/)

[E-gov \(https://www.whitehouse.gov/omb/management/egov/\)](https://www.whitehouse.gov/omb/management/egov/)

[No Fear Act \(https://www.doi.gov/pmb/eeo/no-fear-act\)](https://www.doi.gov/pmb/eeo/no-fear-act)

[FOIA \(https://www2.usgs.gov/foia\)](https://www2.usgs.gov/foia)

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