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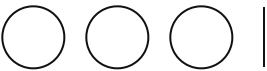
BAY AREA

Sea level rise could flood toxic sites along the Bay Area's shore. This city has 21 facilities at risk



Julie Johnson

Dec. 7, 2021





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Richmond's shoreline is dotted with 32 miles of heavy industry, including the Chevron oil refinery, shown here.

Yalonda M. James / The Chronicle

Richmond boasts the longest shoreline of any Bay Area city, 32 miles dotted with heavy industry such as chemical plants, factories and the Chevron oil refinery. It's also vulnerable to rising seas predicted to increase regular flooding in the Bay Area by the end of the century.

Researchers say that combination threatens to spread toxic materials from an industrial shoreline into mostly working-class neighborhoods, placing immigrants and people of color at greater risk of exposure to pollutants.

That is true for Richmond, home to a combined majority of Black, Latino and Asian residents and with high rates of poverty in neighborhoods near its industrial shoreline.

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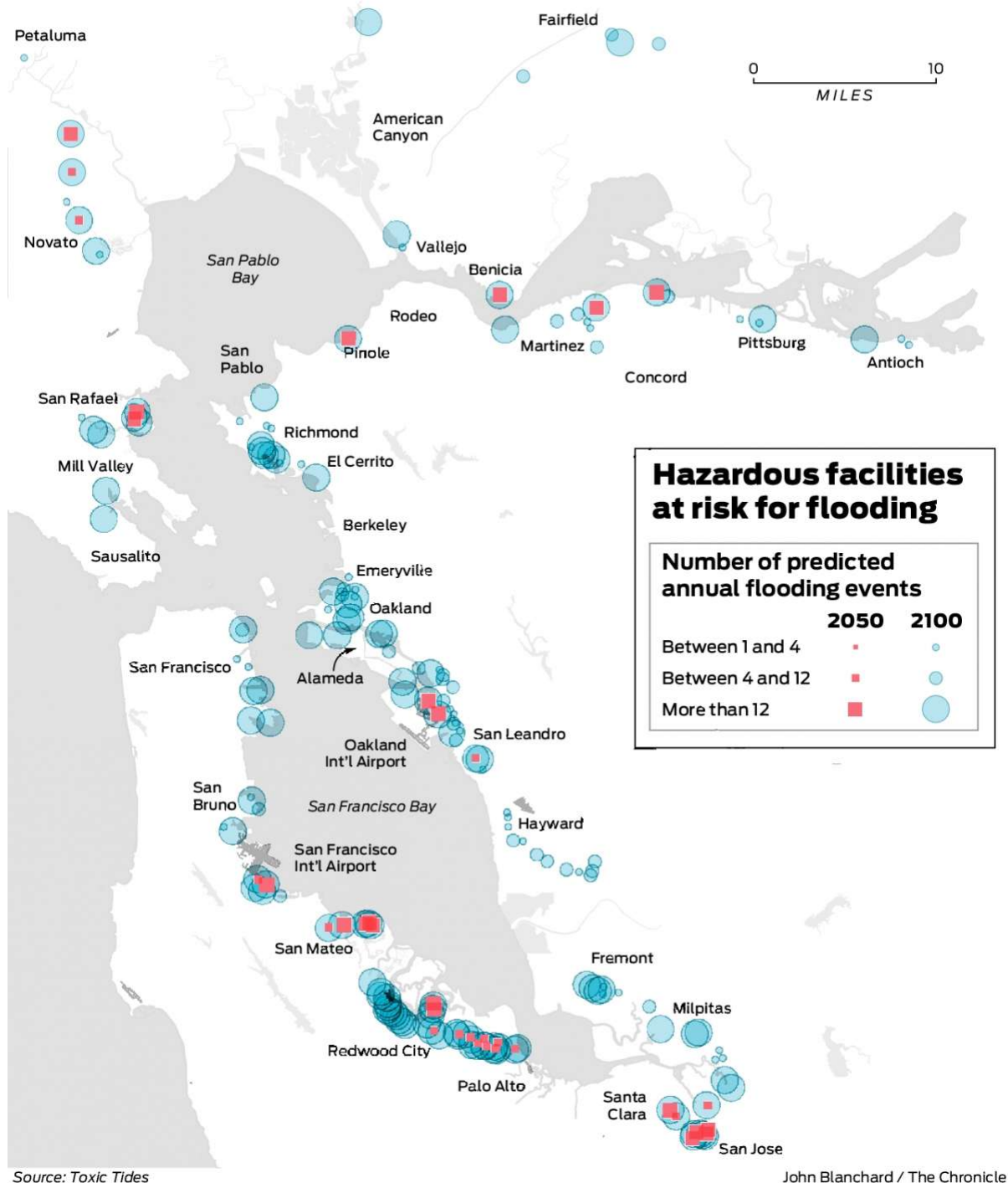
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Researchers at the University of California at Berkeley and Los Angeles and New Jersey-based research nonprofit Climate Central overlaid on maps demographic data and sea level rise predictions with the location of landfills, refineries, hazardous waste sites and other toxic facilities. The project underscores how climate change will only worsen inequality and long-standing environmental justice issues.

“People think of Malibu or the Palisades when they think of sea level rise, but in reality there’s a lot of long-term industry and toxic sites in coastal areas,” said Rachel Morello-Frosch, lead researcher and environmental health science professor at UC Berkeley’s school of public health. “That could pose threats to communities that live nearby. Many are located in poor communities and communities of color.”

Across California, 400 hazardous facilities in low-lying areas are likely to experience regular flooding by the end of the century, according to the report dubbed “Toxic Tides.” Most facilities are clustered in just five counties, including


Contra Costa, Alameda and San Mateo in Northern California and Los Angeles and Orange counties in the south.




People living in disadvantaged communities, such as those in Richmond and Alameda County, are five times more likely to suffer from flooding by 2050, researchers found.

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The research looked only at surface flooding and doesn’t include other potential impacts of sea level rise, such as groundwater infiltration.

Percentage of low-lying facilities in California facing flood risk

Facility type	2050 ▼	2100
Sewage treatment	9.6%	18.4%
Refineries	7.7%	23.1%
Ports and terminals	7.6%	19.7%
Hazardous waste	5...	14.5%
Power plants	5...	11.4%
Cleanup sites	4.4%	10.3%
Landfills and incinerators	3.4%	5...
Animal operations	2.4%	2.4%
Industrial	1.7%	5...
Oil and gas wells	0.1%	2.0%

Researchers spotlighted Richmond, where they found 350 toxic facilities, including 21 sites at risk from repeat flooding annually by 2100 as sea levels rise. Demographic data shows these facilities are located near neighborhoods with higher-than-average poverty rates compared to other low-lying areas of California.

Morello-Frosch and her fellow researchers hope the project will be a tool for local governments and environmental justice groups pushing to reduce the impact of pollution on disadvantaged communities.

Amee Raval, policy and research director with the Asian Pacific Environmental Network, said her organization and others helped researchers shape the demographic factors used in the maps and inform their plans to bring the information to grassroots groups and policymakers. They also helped researchers learn more about Richmond's rich history of environmental activism among its immigrant communities.

"In Richmond there is a whole suite of toxic facilities of hazardous sites that range across industrial sectors," Raval said. "Working-class communities of color are on the front lines of historic health burdens like pollution but also the climate crisis."

One Richmond site, a fossil fuel port on the Santa Fe Channel, is at risk of 114 floods annually by the year 2100, according to the map. An asphalt paving material factory in Richmond is at risk of 127 floods annually by the end of the century.

Richmond City Councilwoman Gayle McLaughlin, whose district includes the city's southeastern shore, said the council is discussing ways to protect its shoreline through projects like wetland restoration, but they need to do more.

"We need to protect our communities very close to our shoreline and especially the southeast side," McLaughlin said.

There is growing acknowledgment in Sacramento that rising seas are expected to add burdens to already vulnerable communities. Last year, the Legislative Analyst’s Office estimated if water levels increased four feet, that could cause daily flooding for nearly 28,000 socially vulnerable Bay Area residents.

**Demographic comparison between California census blocks with at-risk facilities vs. without**

Among blocks near low-lying areas vulnerable to sea level rise

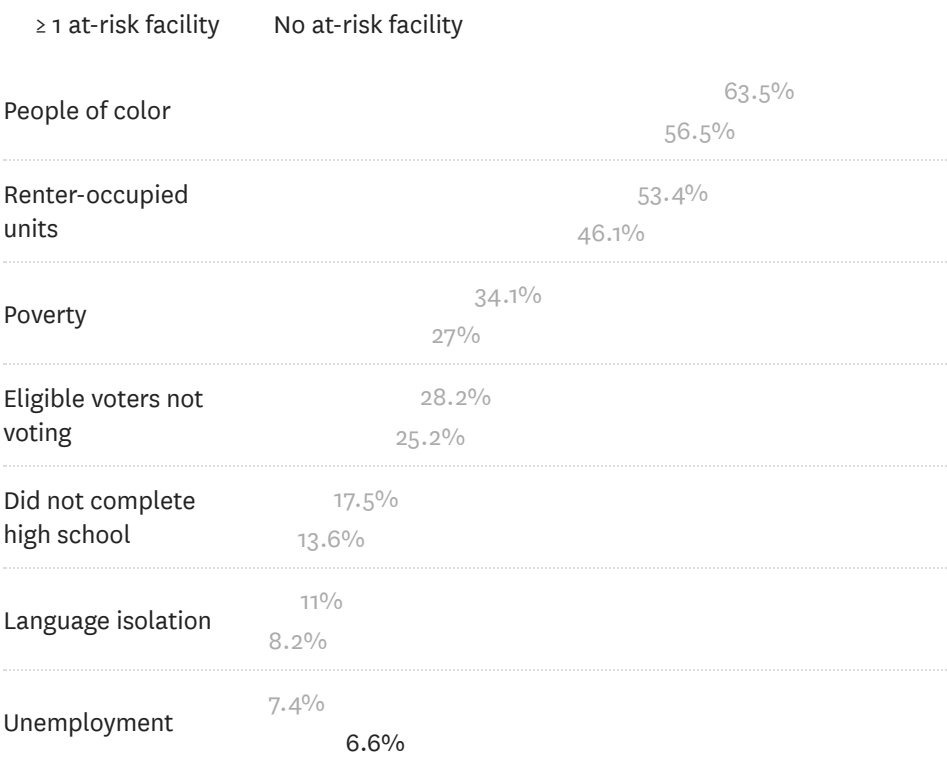


Chart: Yoohyun Jung / The Chronicle • Source: [Toxic Tides](#)

Demographic data is based on the 2017 American Community Survey

In September, Gov. Gavin Newsom signed Senate Bill 1 to allocate \$100 million each year to help local governments prepare for sea level rise.

Mike Futrell, city manager for South San Francisco, said city officials are concerned about low-lying areas, especially the old Oyster Point landfill on the bay. It was closed and capped in the 1960s, but could still pose serious threats to health and



safety if, without intervention, sea level rise inevitably thwarts the systems in place to ensure hazardous materials don't escape. If water inundates the old landfill, "that could lead to catastrophic results," Futrell said.

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The city has transformed the old Oyster Point landfill into a park. But sea level rise projections put its future in doubt. The city council is currently discussing how to protect the old landfill from rising waters.

Futrell said he hoped cities and other government agencies along the bay can band together to share the significant costs coming with such a monumental change to



the state's shorelines.

The maps are designed as resources for communities and public agencies to illustrate the threat, but they are not intended as the final arbiter of what areas are at risk, Morello-Frosch said.

The map, published Nov. 30, stirred controversy in Richmond because it did not include a toxic site slated for a [housing project](#). The project is tied up in court as activists try to argue partial cleanup of the site is not sufficient to protect future residents from the pollutants left behind from its 120-year industrial history.

The shoreline property is on higher ground, and it wasn't listed as at risk from sea level rise on the Toxic Tides map. Morello-Frosch said they added language to their website explaining that they only mapped surface flooding projections and didn't analyze sea level impact on groundwater systems — a much more complex analysis.

Morello-Frosch said the issue underscores the vast impacts of climate change and how local governments must undertake site-specific studies along shorelines to understand specific risks.

"In many ways, we're underestimating the extent of risk," Morello-Frosch said.

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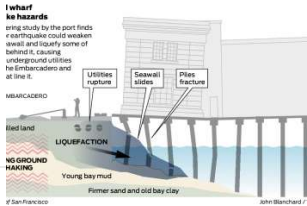
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Written By  
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Julie Johnson covers the changing climate, sea level rise and strategies to stem California's wildfire crisis. Before joining The Chronicle, she spent 11 years as a staff writer at the Santa Rosa Press Democrat, where she had a leading role on the breaking news team awarded the 2018 Pulitzer for coverage of the 2017 Wine Country fires. Julie has covered murderous pot deals, police corruption and marijuana's rocky path from a black-market trade to a legitimate industry.

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