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GOING UNDER

Rising sea levels and increased flooding are submerging Highway 37, threatening businesses and a way of life. What can be done to protect the Carquinez region from environmental disaster?

BY CASEY CANTRELL

FOR

DROUGHT-STRICKEN CALIFORNIA, the winter of 2016–17 was a welcome sight. From October through March, more than 30 inches of rainfall soaked the state—the second wettest rainy season in 122 years—filling up depleted lakes and reservoirs, rejuvenating desiccated landscapes, and giving residents hope that the drought would soon be over.

For commuters all around the Bay Area, however, the seemingly endless deluge brought its own host of problems: flooded freeways, slippery roads, sinkholes, collapsed thoroughfares.

Few roadways had it worse than Highway 37. Cutting through the salt marshes of the San Pablo Baylands, the 21-mile-long route services more than 46,000 drivers every day. East-bound cities such as Vallejo, Benicia, Napa, and even Sacramento rely on the corridor—a slow commute even on the best days—to shepherd traffic to and from the area.

But the storms from that historic winter brought traffic to a standstill. Flooding closed portions of the corridor for a total of 28 days—and as rain continued to pummel the area, infrastructure controlling the flow of water into the area started to fail. In February 2017, a levee in Marin County burst, submerging the roadway for another five days and forcing tens of thousands of drivers to navigate on side streets.

As it turns out, that winter presaged a larger crisis—one that jeopardizes not just commute times but local commerce and residents' livelihoods. Rising sea levels, more extreme weather events, and crumbling infrastructure have combined to create one of the Carqueez region's greatest existential threats—and a future that looks increasingly underwater.

COUNTDOWN TO DISASTER

With the close of 2019 came sobering news: Earth had just experienced its hottest decade on record, according to scientists from NASA and the National Oceanic Atmospheric Administration. And the upward trend hasn't slowed down in 2020—in February, the northern tip of Antarctica clocked in at nearly 70 degrees Fahrenheit, the warmest temperature ever recorded on the continent.

Of course, higher temperatures mean higher seas. Since the late 19th century, water levels in the Bay Area have risen by eight inches.

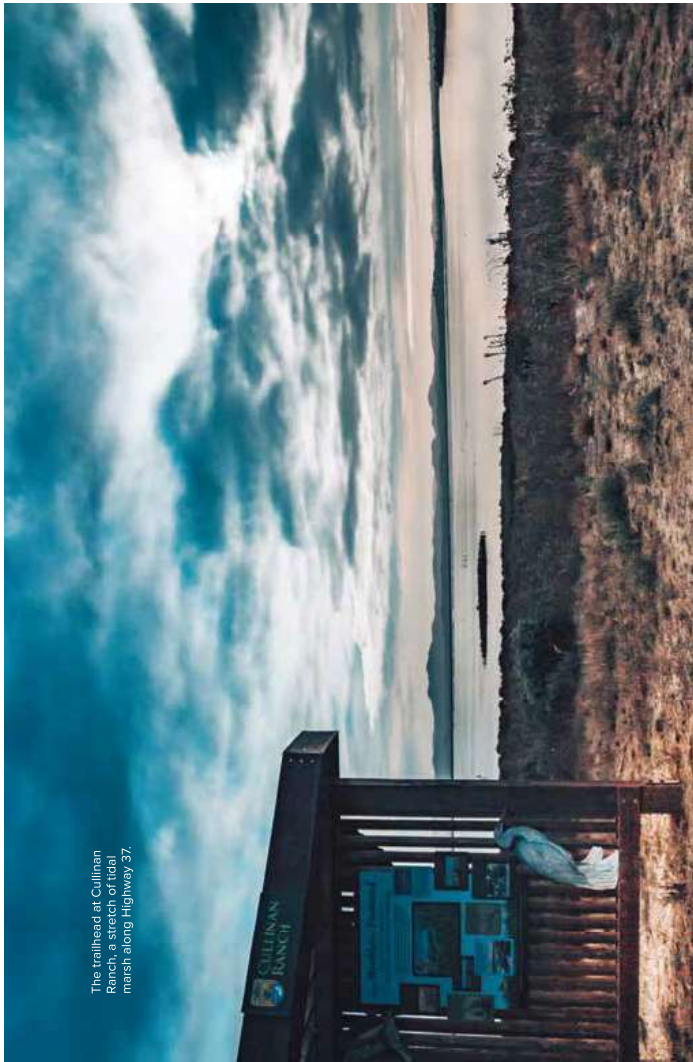
But that number only hints at the troubles the region faces. Two years ago, the California Ocean Protection Council released a report predicting that sea levels will likely climb by another foot in the next 30 years. By 2100, those projections increase to three feet.

In other words, the world's oceans are expected to rise more than four times as much as they did in the last 150 years, in nearly half of the time. And those are just the conservative projections.

"HIGHWAY 37 BASICALLY FLOATS ON AN ASPHALT PAD ON A MARSH. IT'S CONSTANTLY SINKING, THE MORE YOU PACK ON TOP OF IT, THE HEAVIER IT GETS AND THE FASTER IT SINKS."

— Fraser Shilling, co-director of the Road Ecology Center at UC Davis

The trailhead at Cullinan Ranch, a stretch of the marsh along Highway 37.



"WE SIT ON THE BORDER OF ONE OF THE TOP DESTINATIONS IN THE WORLD. WE HAVE HUNDREDS OF BUSINESSES THAT RELY ON THE HIGHWAY."

— Steve Page, CEO of Sonoma Raceway

front-prone sections. That is exactly what Caltrans has done in recent years, adding an average of one foot of extra asphalt to parts of the roadway. The department has also installed a new drainage system and floodgates while stationing tractor pumps

and inflatable barriers on standby in case of flooding. However, these are only temporary solutions—and in some cases, they contribute to the problem, says Shilling. "Highway 37 basically floats on an asphalt pad on top of it, the heavier it gets and the faster it sinks."

Even with the fixes an unexpected calamity can still lead to flooding. Last February, an atmospheric river storm caused a levee on Novato Creek to breach, shutting down Highway 37 for five days as crews worked around the clock to reopen the submerged lanes. Two weeks later, heavy rains returned to the Bay Area, flooding the roadway for four more days.

"The problem is sea level rise isn't a bathtub," says Shilling. "Water levels in the San Pablo Bay are constantly rising and falling due to tides, storm systems, river runoff, and other factors. Increase the baseline by six inches, toss in an extreme weather event and high tide, and suddenly, the water is a foot higher than it would normally be."

The easy fix is simply to raise the highway by paving over the sections. That is exactly what Caltrans has done in recent years, adding an average of one foot of extra asphalt to parts of the roadway. The department has also installed a new drainage system and floodgates while stationing tractor pumps

"I'VE LIVED HERE FOR ALMOST 40 YEARS. I SEE HIGH TIDES THAT WERE NEVER THIS HIGH BEFORE. AT KING TIDE, IT LAPS OVER THE TOP OF THE SEAWALL."

— Vallejo Mayor Bob Sampayan

acres it already owned, and it recently partnered with the Tennessee-based Southern Land Company to begin an ambitious decades-long development project of the former shipyard.

But the developer must grapple with a looming crisis: encroaching waters from the San Pablo Bay. Right now, the island's existing wetlands operate as a natural buffer against the bay, protecting developed areas from high tides and storm surges. However, as little as 10 inches of sea rise—predicted to happen in the next 20 years—will transform the southwestern end of the island into an ocean. In 50 years, the western shore will recede by about a quarter of a mile or more; in 80 years, the northern part of Mare Island will be underwater. And as the waters rise, more and more homes and businesses will be exposed to dangerous flooding.

Although no solutions have been finalized, city officials suggest the developer may preempt sea rise by elevating future buildings by up to 20 feet. (The Nimitz Group did not respond in time to requests for comment.)

Further inland, cities along the water have their own pressing issues. While Mare Island and the Carquinez Strait protect most of the area from the worst impacts of sea level rise, many cities are still vulnerable. Sitting in his office at City Hall, Vallejo Mayor Bob Sampayan is especially worried. After all, he only has to look out of his window to see the threat against his community.

"I've lived here for almost 40 years," he says. "I see high tides that were never this high before. At king tide, it laps over the top of the seawall." One particular vulnerability is the city's sewer system, which is perched next to the Napa River. If the wastewater facility experienced a severe flood—a risk that grows with every inch of sea rise—raw sewage could wash into the river and bay, creating a public health hazard.

City officials are already working on ways to protect the facility, including building a berm or seawall, but the price tag to address this and other consequences of climate change will be steep for the city—possibly north of \$100 million.

"The [biggest] obstacle is money," says Sampayan. While he expects the state to offer some support, he is less confident about other government funding. "The federal government currently refuses to believe in climate change. Would that change with another administration? I hope so."

Money is also a constant topic of discussion surrounding long-term solutions for Highway 37. Options for fixes include constructing a higher berm or building a 20-foot-high causeway "much like the Yolo Causeway between Davis and Sacramento," says Caltrans spokesman Vince Jacala. "Of course, this is very long term and would take several years. If not decades, of planning and construction."



NATURE AT RISK

THE REGIONS' ROADWAYS AND CITIES ARE NOT THE ONLY THINGS IMPACTED BY CLIMATE CHANGE. ALONG THE SHORELINE OF THE CARQUINEZ STRAIT, A SUBTLE BUT SINISTER CHANGE IS TAKING PLACE—AND WILDLIFE IS PAYING THE COST.

As sea levels rise higher, and higher, saltwater from the San Pablo Bay starts to intrude into the freshwater strait, devastating the local habitat and overwhelming native species. One such species, the Olympia oyster, has nearly disappeared due to environmental changes.

It's not just local wildlife at threat, though—migratory species are also impacted.

"The strait is a vital corridor for monarch butterflies," explains Heidi Petty, the watershed program manager at Contra Costa Resource Conservation District. Every summer and fall, hundreds of thousands of butterflies travel along the waterway, using the area's foliage for shelter and sustenance. But as native habitats shrink, so do "the chances of survival for the monarchs."

The decline in one species inevitably affects the survivability of the entire food chain, says Dean Kelch, a consulting biologist at the Crockett-based Carquinez Regional Environmental Education Center (CREEC). "It's a domino effect," he says. "What we're looking at is a lot of these species winking out within our lifetimes. We're reducing the biodiversity in our area, and who knows what impact that will have on other species."

Local organizations such as CREEC are trying to stem the tide of habitat loss through restoration projects, including the creation of a native plant park along Crockett's shoreline. Unfortunately, there's a catch.

"The Crockett waterfront is basically gravel," says Petty. "There's not much we can do to restore it. We have to work around the industries there, but we're literally running out of space."

Still, Kelch sees reason to be optimistic. He recalls attending a meeting late last year that brought together dozens of local community groups, all focused on restoring and protecting the area's wildlife.

"All these little efforts are so modest, but when you multiply that by dozens and even hundreds of people, you can start to make a difference," he says. "In the long run, life will find a way."

MAKE A DIFFERENCE

WANT TO TAKE ACTION? CONSIDER VOLUNTEERING AT OR DONATING TO THESE LOCAL ORGANIZATIONS.

BENICIA TREE FOUNDATION

Tree planting and maintenance and education programs. beniclatrees.org

CARQUINEZ REGIONAL ENVIRONMENTAL EDUCATION CENTER

Creek and habitat restoration projects and student education programs. creesyouth.org

FRIENDS OF ALHAMBRA CREEK

Creek and habitat maintenance and restoration projects. ccrcd.org/friends-of-alhambra-creek

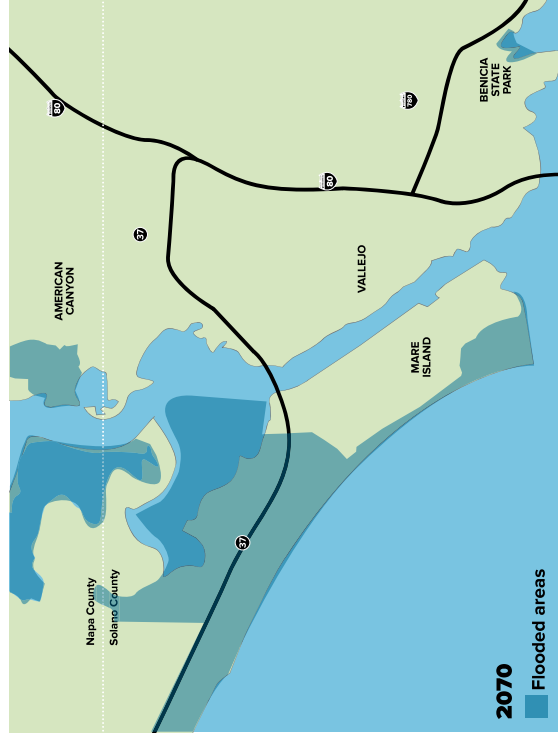
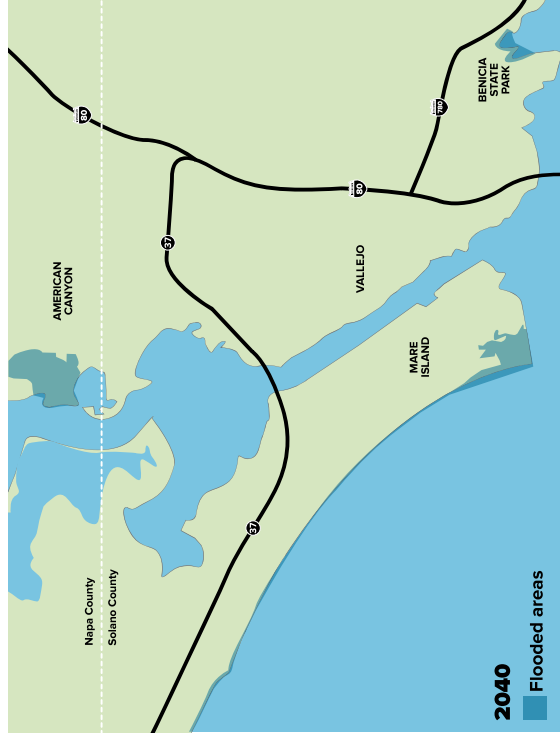
SUSTAINABLE SOLANO

Green infrastructure, food systems, community engagement, and workforce development. sustainable-solano.org

VALLEJO PEOPLE'S GARDEN

Sustainable gardening and community wellness. vallejopeoplesgarden.org

SHRINKING MARE ISLAND



"VALLEJO IS NOT A WEALTHY COMMUNITY. I DON'T WANT TO CHARGE SOMEONE \$10 EVERY DAY; YOU'RE TALKING \$200 A MONTH. THAT COULD BE BUYING FOOD, PAYING RENT."

— Vallejo Mayor Bob Sampayan

(Several designs for a new highway have been proposed, including a sprawling, pedestrian-friendly "Grand Bayway," but none have moved forward so far.)

And it would be pricey—early estimates place the cost for the project at \$5 billion. That doesn't include expenses already paid to shore up the highway, including \$10 million in emergency repair work in 2017 and another \$6.7 million in repairs and improvements in 2019.

"It's a very big project," says Anne Richman, executive director of Transportation Authority of Marin. "The corridor is 21 miles, so you're talking about a massive structure with a lot of environmental challenges. There will have to be a variety of funding from state, federal, and regional governments."

MORE MONEY, MORE PROBLEMS

Of course, getting the funding is one thing. Spending it is another.

In June 2018, voters approved Regional Measure 3 to raise Bay Area bridge tolls through 2025, which is expected to generate an estimated \$4.5 billion in revenue for transportation projects throughout the region, including Highway 37. However, the money "is currently tied up in litigation," says Richman, and it is unclear when it will become available.

Further complicating the situation is the issue of who is ultimately responsible for the roadway. Highway 37 spans three separate counties—Solano, Marin, and Sonoma—and involves dozens of local, regional, state, and federal governments and agencies.

And then there are the private entities—businesses and individuals who own property surrounding or intersected by the highway. Any project will have to navigate a labyrinthine bureaucracy of fundraising, environmental reviews, proposals, and negotiations.

While officials are hopeful construction can begin within the next decade, Page isn't holding his breath.

"I've given up predicting," he says, adding ruefully. "I've gotten my staff to promise to push me out in my wheelchair for the groundbreaking."

Regardless of the timeline, the question remains: Where will the money come from?

So far, officials have considered several options: a transit tax, a four-county tax, funding

from regional measures. Another possibility is to implement a toll: in February, State Senator Bill Dodd of Napa introduced legislation to make Highway 37 the ninth toll bridge in the Bay Area.

Sampayan is not a fan of a new toll. "Vallejo is not a wealthy community," he says. "I don't want to charge someone \$10 every day; you're talking \$200 a month. That could be buying food, paying rent."

For his part, Shilling offers a radical solution: California should treat the highway like a utility. "The state should own this problem," he says. "California is spending \$50 billion to fix potholes, fill in cracks, and add some buses. It would be better to take that entire \$50 billion and invest it in the coastline. That will return on investment a hundredfold."

THE ROAD FORWARD

Without action, flooding on Highway 37 will continue to disrupt the Bay Area—residents commuting to work in San Francisco, tourists traveling to Wine Country, big rigs delivering goods throughout the region. Local businesses will be impacted; the livelihood of hundreds of thousands in the Carquinez region will be threatened. And time is running out.

"It's a system vulnerability," says Shilling. "It puts the entire transportation network of the Bay Area at risk."

However, progress is being made. Last year, the California Transportation Commission approved a \$10 million environmental review of a section of the highway—an integral step in implementing a permanent solution—while state and regional agencies proceed with improvements to the existing roadway.

"It's a priority corridor for us," says Richman. "We're really excited about the potential long-term opportunities."

And despite the dire projections and sometimes-maddening process, Sampayan remains hopeful. He points to Vallejo and neighboring cities' commitment to reducing their carbon footprint and addressing the impact of climate change on the region—and to those who are making change happen at the local level.

"It's the people," he says. "We have people— young people, old people—who want to make change, and who are making sure we follow through on protecting our world." •

THE HARD NUMBERS

SEA LEVEL RISE IN THE BAY AREA

LAST 450 YEARS:

18 INCHES

NEXT 80 YEARS:

136 INCHES*

*Projection by California Ocean Protection Council

EFFECTS OF FLOODING ON HIGHWAY 37

46,000

DAILY COMMUTERS ON HIGHWAY 37

40+

NUMBER OF DAYS OF FLOODING SINCE 2016

\$10 MILLION

COST OF REPAIRS FOR FLOODED SECTIONS IN WINTER OF 2016–2017

\$5 BILLION

ESTIMATED COST TO REPLACE EXISTING ROADWAY