Suisun Marsh. Photo by BCDC.

Local Assessments Section D:

SUISUN SLOUGH

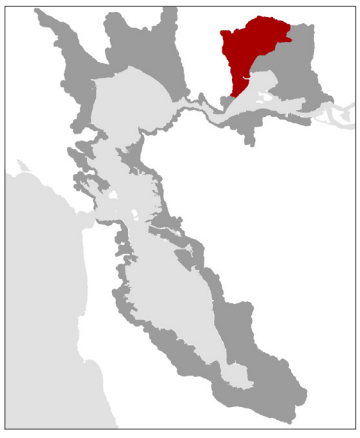
Operational Landscape Unit

JURISDICTIONS WITHIN THIS SECTION

Solano County

Suisun City

Fairfield



HOW TO USE THE LOCAL ASSESSMENTS

WHO IS THIS FOR?

Anyone interested in understanding their local shared vulnerabilities to flooding and sea level rise.

Local jurisdictions
- Cities
- Counties
- Special Districts
- Utilities Providers

Stakeholder Groups
- Non-profits/NGOs
- For-profits/Private Associations
- Interested Parties

General Public
- Residents

State/Regional
- Caltrans
- MTC/ABAG

HOW IS IT ORGANIZED?

Local assessments are organized by four regional systems assessed: Transportation, Vulnerable Communities, Priority Development Areas (PDAs), and Priority Conservation Areas (PCAs).

Each part of the local assessment provides varying levels of details at three scales: 1) Operational Landscape Unit (OLU), 2) Individual Descriptions, and 3) Shared Stories of Vulnerabilities in Focus Areas/Areas of Impact. This asessment can be reviewed in whole, or individual parts can be reviewed separately depending on interest and level of detail desired.

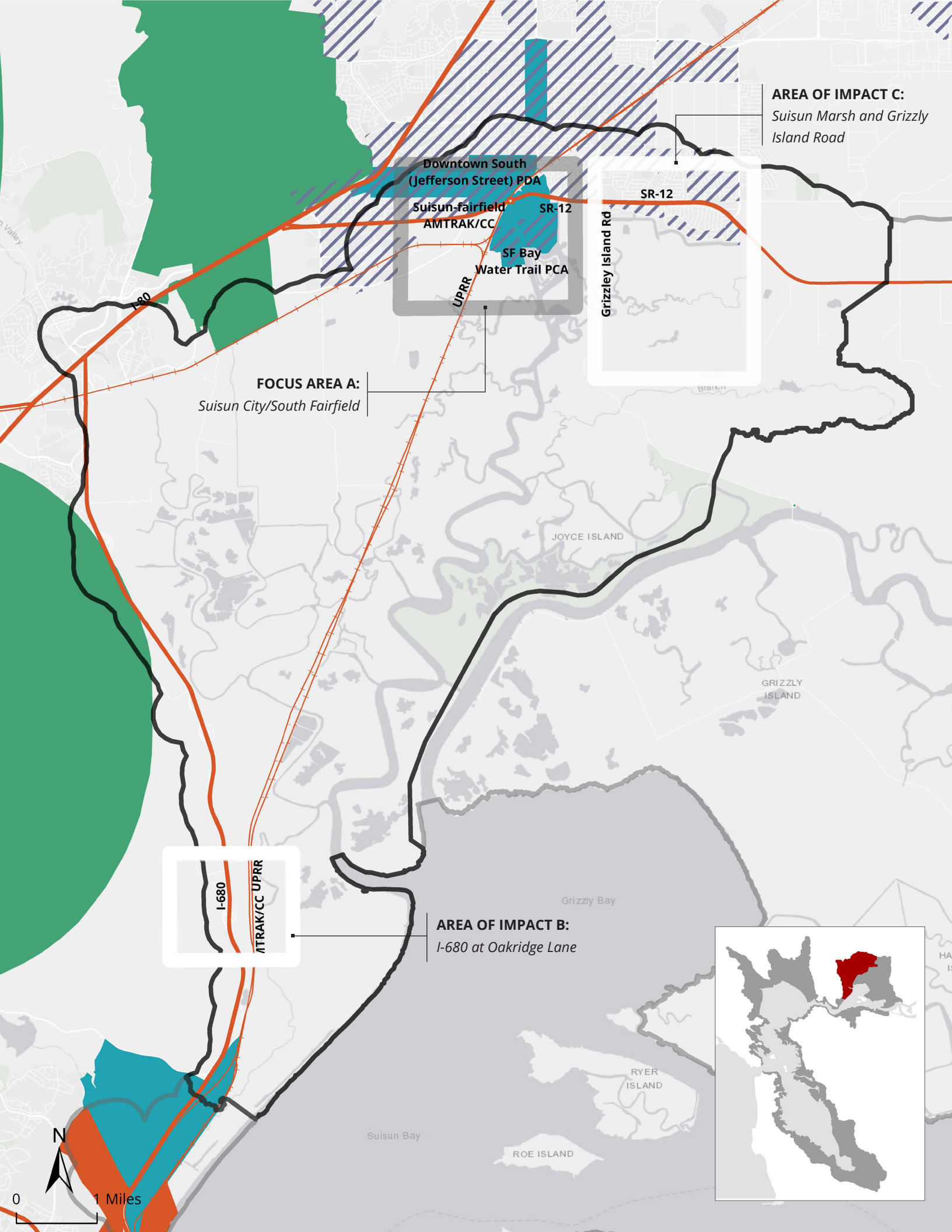
WHAT'S IN THIS ASSESSMENT?

Where are we in the region?

This OLU encompasses the central section of southern Solano County from I-680 in the west, SR-12 in the north, and Montezuma Slough in the east. This includes Suisun City, parts of Fairfield, parts of Benicia, parts of unincorporated Solano County, and much of the Suisun Marsh. The Suisun Marsh is the largest contiguous brackish (a mixture of fresh and sea water) wetland in the western United States. The lands and waters of this unique ecosystem also are home to a wide variety of plants, fish and wildlife that depend upon a careful balancing of fresh and saline waters for their survival. It is also an important stop on the Pacific Flyway, a major bird migratory route extending from Alaska to Patagonia, providing food and habitat for migratory birds.[1]

This OLU also includes large swaths of wetland surrounding Grizzly Bay including parts of the San Francisco Bay National Estuarine Research Reserve, Grizzly Island Wildlife Area (California Department of Fish and Wildlife), Rush Ranch Open Space (Solano Land Trust), Peytonia Slough Ecological Reserve (CDFW), and Hill Slough Wildlife Area (CDFW). Most of the land in the OLU are managed wetlands that support duck hunting activities. Other land uses within the OLU include high, medium, and low intensity development, cultivated crops, and grazing.

Approximate area of the suisun Slough OLU.
Map data © 2019 by Google & Image Landsat/Copernicus.

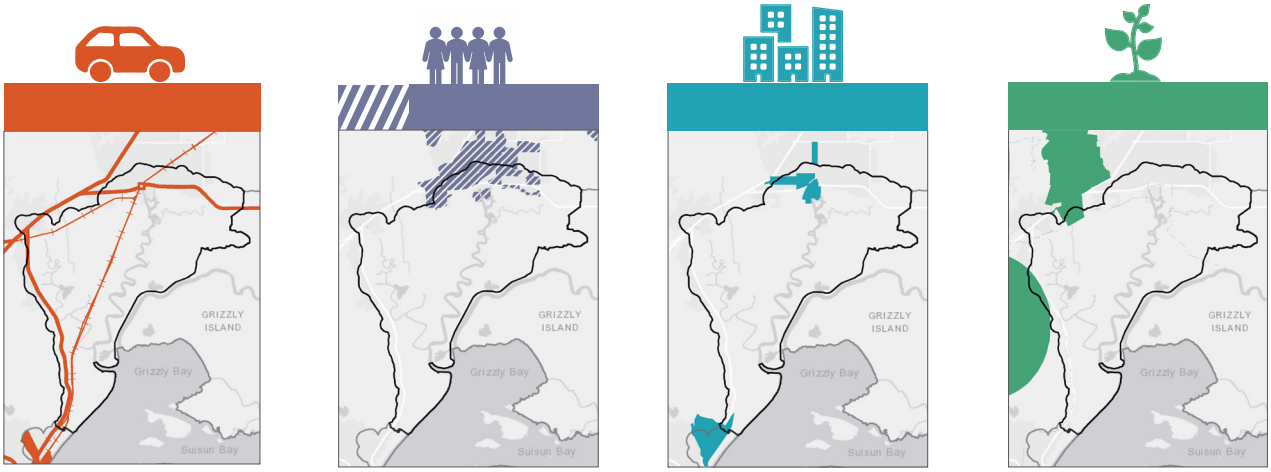

AREA OF IMPACT C:
Suisun Marsh and Grizzly Island Road
Downtown South (Jefferson Street) PDA
Suisun-fairfield AMTRAK/CC
SR-12
SF Bay Water Trail PCA
UPRR
I-80
Grizzley Island Rd
SR-12
FOCUS AREA A:
Suisun City/South Fairfield
JOYCE ISLAND
GRIZZLY ISLAND
I-680
AMTRAK/CC UPRR
AREA OF IMPACT B:
I-680 at Oakridge Lane
Grizzly Bay
RYER ISLAND
Suisun Bay
ROE ISLAND
N
0
1 Miles

What regional systems are here?

Operational Landscape Unit (OLU) boundaries were used to organize and help identify regionally significant assets that were co-located together (Methodology can be found in Section 3.0 Local Assessments).

The map on page 4 shows the entire OLU, including all the regional systems present. Colors are used throughout this document to help navigate across these four regional systems. Individual assets that were assessed as part of this local vulnerability assessment are listed in the bullets below and can also be found on the labels on the map (Figure 1d).

Figure 1d. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN BELOW:



TRANSPORTATION

- I-680
- SR-12
- Union Pacific Railroad
- Amtrak/Capital Corridor
- Grizzly Island Road
- Local Roads

VULNERABLE COMMUNITIES

- Fairfield & Suisun City Community

PRIORITY DEVELOPMENT AREAS (PDAs)

- Downtown South Jefferson Street PDA

PRIORITY CONSERVATION AREAS (PCAs)

- San Francisco Bay Water Trail PCA

What was assessed?

TRANSPORTATION

I-680. Map data © 2019 by Google.

I-680 • Interstate 680 is a four-lane, north-south highway in the North Bay and East Bay that serves a critical transit connection between southwest Solano County (Fairfield) south through Contra Costa and Alameda Counties inland through the hills and valleys of the California Coast Ranges. I-680 averages 74,500 vehicles[2] and 3,927 trucks[3] per day. Within this OLU, it is exposed at 36" TWL near Oakridge Lane in Benicia, at which point it is significantly flooded and transit connectivity is impacted.

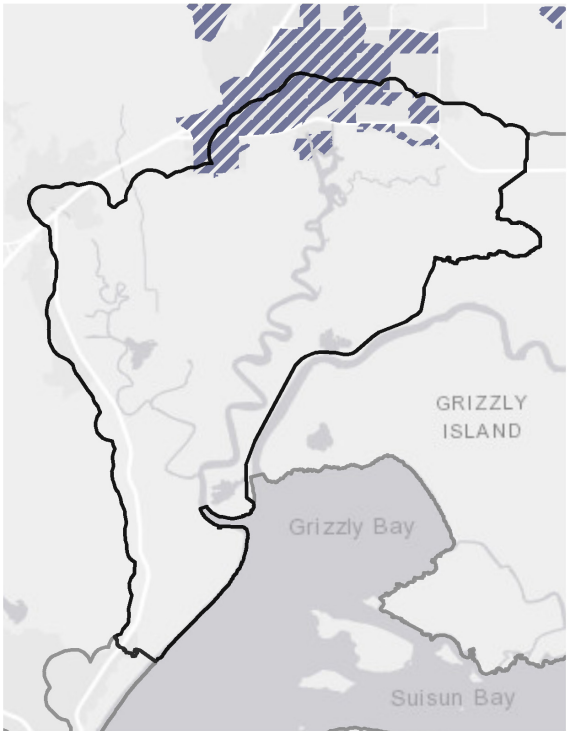
SR-12 • State Route 12 is a four-lane state highway that travels in an east–west direction from Sonoma to Solano counties. Within this OLU, it travels from I-80 through Suisun City and Fairfield before heading towards the Central Valley. It averages 25,500 vehicles[4] and 2,464 trucks[5] per day. It is a lifeline route, meaning it has been predefined as an emergency route necessary for disaster planning and economic recovery.[6] Flooding on east bound lanes east of Suisun city begins at 52" TWL, and both lanes are flooded at 66" TWL.

Union Pacific Railroad • The Union Pacific Railroad (UPRR) is an important heavy freight rail supporting the reliable movement of goods to markets across the Bay Area. The rail connects many Bay Area ports and connects to areas outside the region. Within this OLU, the UPRR runs southwest between Fairfield and Suisun City and down into Suisun Marsh, connecting the Bay Area ports to Sacramento and the Central Valley. In this OLU, it shares passenger rights with Capitol Corridor/Amtrak. It is first exposed at 36" TWL, with significant flooding impacts at 66" TWL.

Amtrak/Capital Corridor • Amtrak/Capital Corridor routes retain passenger rail rights on UPRR owned right-of-way in this OLU, connecting San Francisco to Sacramento and providing transit connections to transit services in Suisun City and Fairfield and Fairfield and Suisun Transit (FAST) routes. The parking lot is impacted at 24" TWL, access to the station itself is impacted at 36" TWL, and significant flooding impacts occur to the rail itself at 66" TWL.

Grizzly Island Road • Grizzly Island Road is a two-lane road that serves as the main access road to Suisun Marsh and provides access to the marsh for the management agencies and recreational users. It is first, and significantly, exposed at 12" TWL.

Local Roads • Cordelia and Main Street serve as main arterials through Suisun City and are exposed early. Cordelia is exposed at 24" TWL and Main Street is exposed at 36" TWL.



Fairfield and Suisun City. Map data © 2019 by Google.

Fairfield & Suisun City • For the purposes of this report, 10 block groups were assigned to a functional community called "Fairfield & Suisun City." The block groups that were assessed can be referenced in the appendix. This is a placeholder designation for a set of block groups that have a moderate, high, or highest social vulnerability ranking within the Fairfield and Suisun City area. We have provided some history and context for these areas, primarily gathered via desktop research, and in some cases stakeholder and community vetting. This should be considered a starting point. Before this is used for any planning purposes, this data should be ground-truthed and vetted with the communities considered. Similarly, block groups or communities with a similar vulnerability rank could and likely will have very different needs, considerations, and capacities that are critical to bring into the planning process.

Suisun City is in the south-central area of Solano county, is immediately adjacent to Suisun Marsh, the largest contiguous estuarine marsh remaining on the west coast of North America. It was established in the 1850s around the time of the California Gold Rush as a gateway between the foothills and the Bay Area for commerce and transportation.[7] It experienced rapid growth in the 1960s and 1970s as the suburban ring of the San Francisco Bay expanded into formerly rural Solano County.[8] The area includes housing, commercial, and industrial uses.[9]

Fairfield is in the south-central area of Solano County, immediately adjacent to Suisun City to the north. It is the county seat of Solano County, home to Travis

Air Force Base, and directly north of the Suisun Marsh. Fairfield has a diversified economy, with government, manufacturing, health care, retail, professional and commercial, recreational, and construction sectors.[10] It is connected through I-80, I-680, the Fairfield Transportation Center, Amtrak, and FAST bus service.

Ten block groups are considered moderate, high, or highest social vulnerability. Ten social vulnerability characteristics are exhibited in at least one block group in the 90th percentile, with two characteristics in the 70th percentile in the region (Figure 2d).

SOCIAL VULNERABILITY RANK:

- ☐ Low
- ☒ **Moderate**
- ☒ **High ***
- ☒ **Highest**

GENTRIFICATION AND DISPLACEMENT RISK:

- ☐ Ongoing Exclusion
- ☒ **Low Income - Not Losing Low Income Households ***
- ☐ At Risk of Gentrification and/or Displacement
- ☒ **Ongoing Gentrification and/or Displacement**

*In block groups considered, this ranking occurred most frequently.

Data Source: ART Bay Area Regional Community Vulnerability Indicators, BCDC (2018).

SOCIAL VULNERABILITY PERCENTILES IN FAIRFIELD & SUISUN CITY

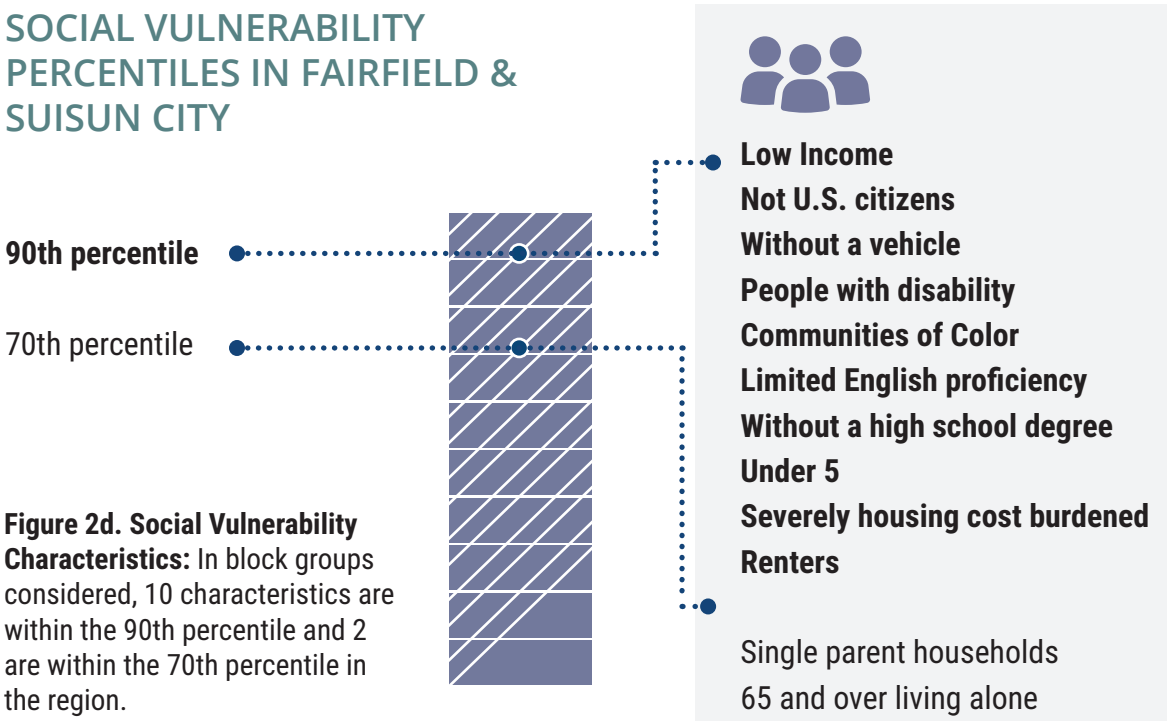


Figure 2d. Social Vulnerability Characteristics: In block groups considered, 10 characteristics are within the 90th percentile and 2 are within the 70th percentile in the region.

In this section, social vulnerability was used as the starting place for analysis. Contamination burden was assessed only for the block groups included in the functional community groupings. This means that there could be block groups that score in the moderate, high, or highest for contamination burden that were not ALSO in the designated functional community grouping that were not considered. In short, we only look at areas that have contamination burden if they are also ranked as socially vulnerable.

The following contamination burden is exhibited in at least one block group at in the 90th percentile (Figure 3d). Three characteristics are above the 90th percentile, with those in the 90th percentile bolded.

Residential areas in Fairfield are first impacted at 66" TWL. Residential areas of Suisun City are first impacted at 12" TWL.

Critical services and facilities that provide education, health care, community cohesion, and emergency services, will also be impacted by flooding. First exposure of assessed critical facilities begins at 24" TWL (Table 1d).

Total water levels (TWLs) are used to represent various combinations of temporary and/or permanent flooding that may occur with future sea level rise. Values in the table reflect potential risks to critical facilities in the absence of adaptation planning.

CONTAMINATION BURDEN RANK:

- [X] **Low ***
- [X] **Moderate**
- [ ] High
- [ ] Highest

*In block groups considered, this ranking occured most frequently.

CONTAMINATION BURDEN PERCENTILES IN FAIRFIELD & SUISUN CITY

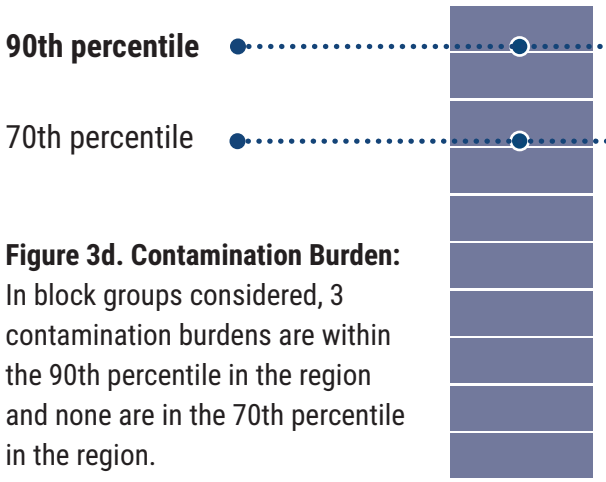


Figure 3d. Contamination Burden: In block groups considered, 3 contamination burdens are within the 90th percentile in the region and none are in the 70th percentile in the region.

Data Source: ART Bay Area Regional Community Vulnerability Indicators, BCDC (2018).

EXPOSURE OF CRITICAL SERVICES AND FACILITIES IN FAIRFIELD & SUISUN CITY

	Critical Facilities/Services Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Police and Fire Stations	City of Suisun Police Department (Civic Center Blvd, Suisun City)										
	Cordelia Fire Protection District (Cordelia Rd, Fairfield)										
	Suisun Fire Protection District Station (Jackson Street, Suisun City)										
Schools	Crystal Middle School (Whispering Bay Lane, Suisun City)										
	Sem Yeto High School (E Atlantic Ave, Fairfield)										
	Crescent Elementary School (Anderson Dr, Suisun City)										
	Armijo High School/824 Washington Street										
Faith	Mount Calvary Baptist Church—Suisun (Whispering Bay Lane, Suisun City)										
	Berean Baptist Church (Broadway Street, Fairfield)										

Table 1d. Critical Services and Facilities: First exposure of critical services and facilities. Blue bars represent when asset is first exposed to flooding.

Downtown South Jefferson Street PDA. Map data © 2019 by Google.

Downtown South Jefferson Street PDA • The Downtown South Jefferson Street PDA a Suburban Center located within downtown Fairfield, located between Pennsylvania Avenue to the west to Union Avenue to the east, and SR-12 to the south to Texas Street to the north. The PDA includes or is immediately adjacent to a wide variety of transit opportunities including I-80, SR-12, Amtrak's Capitol Corridor line (the Fairfield-Suisun Train Station is located just south of the PDA), and several Fairfield-Suisun Transit System (FAST) lines, including connection to BART.

Currently, the PDA consists primarily of older, single-family homes and small apartment buildings, but a "service commercial" strip exists along Union Avenue. A large PG&E substation also exists in the area. The vision for downtown this PDA is to expand commercial use to create a social, entertainment, and employment hub through a mixture of shopping, restaurants, entertainment, and cultural uses supported by higher density residential and office uses.[11]

Critical facilities that provide emergency services and utilities may be impacted by flooding. Several blocks of the PDA are first exposed at 66" TWL, with extensive inundation occurring by 108" TWL (Table 2d).

CURRENT AND FUTURE HOUSING AND JOBS IN THE DOWNTOWN SOUTH JEFFERSON STREET PDA

Residential Housing Units

Existing in 2010:	589
Projections for 2040:	1,235
Percent Growth:	110%

Job Spaces

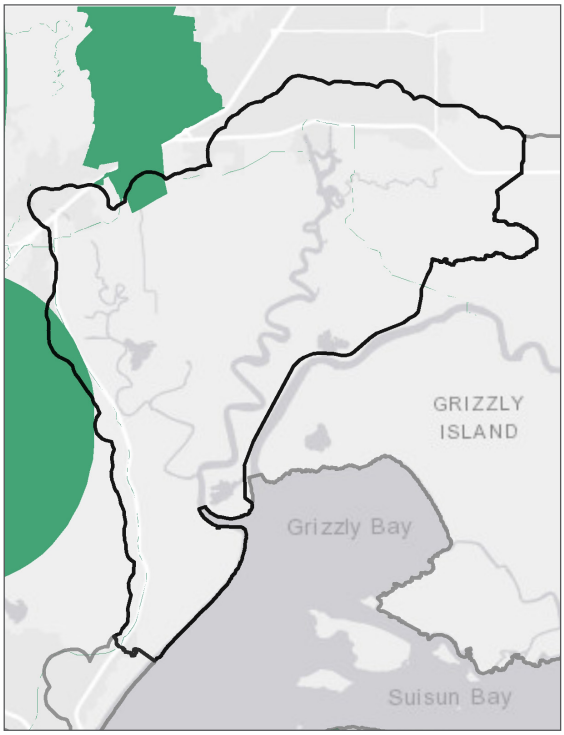
Existing in 2010:	3,842
Projections for 2040:	4,394
Percent Growth:	15%

Data Source: Plan Bay Area 2040, MTC/ABAG (2017).

EXPOSURE OF CRITICAL FACILITIES IN THE DOWNTOWN SOUTH JEFFERSON STREET PDA

	Critical Facilities/Services Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Police and Fire Stations	Suisun Fire Protection District Station (Jackson Street, Suisun City)										
Utilities	Solano County Cogeneration Plant (Delaware Street, Fairfield)										
	PG&E Substation (Ohio Street and Jefferson Street, Suisun City)										
	Natural Gas Pipelines (Throughout)										
	Solano Cogen Natural Gas Station										

Table 2d. Critical Services and Facilities: First exposure of critical services and facilities. "M" refers to minor impacts or impacts to access roads. Blue bars represent when asset is first exposed to flooding.



Two Water Trail boat launch sites in Suisun City. Map data © 2019 by Google

San Francisco Bay Water Trail PCA

• The The San Francisco Bay Area Water Trail is a network of launching and landings sites for non-motorized watercrafts (e.g. kayaks, stand-up paddleboards, wind and kite surf, etc.) around the San Francisco Bay and its major tributaries, including the San Joaquin River, Napa River, and Petaluma River.[12] Within this OLU, there are two Water Trail Designated Trailheads located in Downtown Suisun City[13] and the Suisun City Marina.[14] The trailheads are first exposed at 24" TWL, with significant access impacts at 36" TWL.

PCA DESIGNATION:

- ☐ Natural Landscapes
- ☐ Agricultural Lands
- ☐ Urban Greening
- ☒ **Regional Recreation**

FUNCTIONS/BENEFITS:

- **Recreation**
- **Economic Development**
- **Wildlife Habitat**

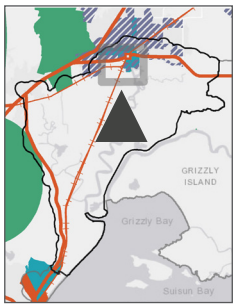
Data Source: MTC/ABAG Priority Conservation Areas Program (2017).

Suisun Marsh. Photo by BCDC.

OTHER IMPORTANT NATURAL ASSETS

Suisun Marsh • The Suisun Marsh comprises approximately 85,000 acres of tidal marsh, managed wetlands, and waterways in southern Solano County. It is the largest remaining wetland around San Francisco Bay and includes more than ten percent of California's remaining wetland area. The Marsh is also a wildlife habitat of nationwide importance. It plays an important role in providing wintering habitat for waterfowl of the Pacific Flyway and, because of its size and estuarine location, supports a diversity of plant communities. These provide habitats for a variety of fish and wildlife, including several rare and endangered species.[15]

Focus Area A:
Suisun City and South Fairfield



Location

This Focus Area is centered around the intersection of SR-12 and the Union Pacific Railroad (UPRR) tracks, including Downtown Suisun City and sections of Southern Fairfield. It is approximately 4 square miles (Figure 4d).

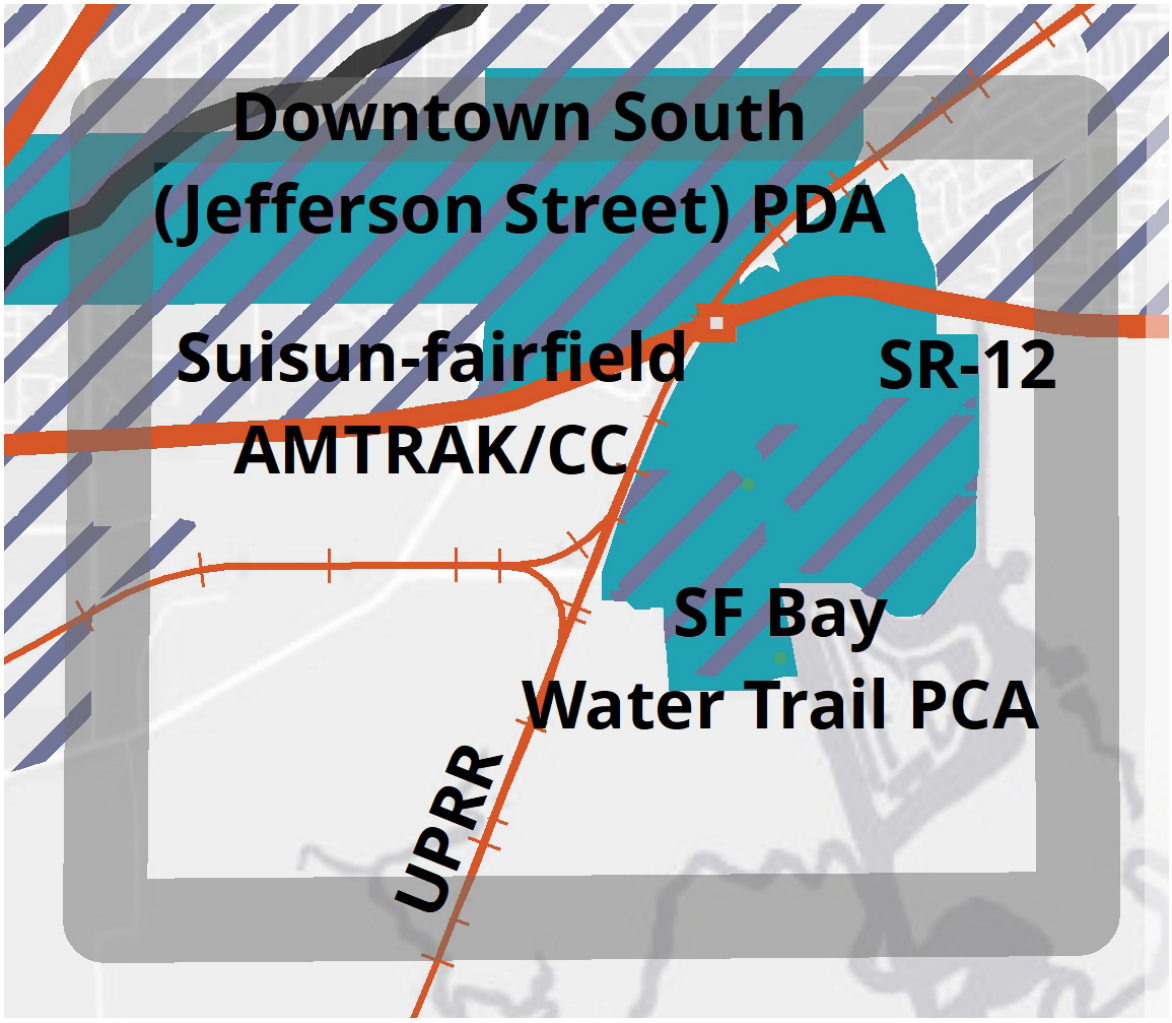


Figure 4d. Top: Identification of where Focus Area is within OLU. Bottom: Map of Focus Area containing regional systems. Individual assets assessed in this Focus Area are labeled on the map and listed on the following page.

SR-12 corridor. Map data ©2019 by Google.

Why shared stories of vulnerability?

This Focus Area was selected because it contains a variety of regional systems, including numerous transportation routes, a Priority Development Area, a Priority Conservation Area, the Suisun City and Fairfield communities, and the Suisun Marsh. Due to overlap and dependencies among these regional systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

Figure 4d. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS FOCUS AREA LISTED BELOW:

TRANSPORTATION

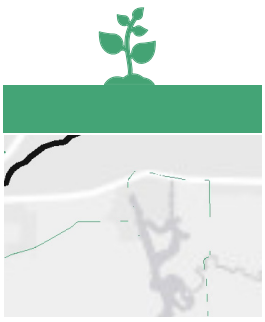
- SR-12
- Amtrak/Capital Corridor
- Union Pacific Railroad
- Local Roads

VULNERABLE COMMUNITIES

- Fairfield & Suisun City Community

PRIORITY DEVELOPMENT AREAS (PDAs)

- Downtown South Jefferson Street PDA



PRIORITY CONSERVATION AREAS (PCAs)

- San Francisco Bay Water Trail PCA

Shoreline today and into the future

SHORELINE TYPE STORY

What is the shoreline made up of now?

The shoreline in this Focus Area is characterized by mixed forms of shoreline protection, including berms, transportation infrastructure, wetlands, and embankments.[16]

SHORELINE DEVELOPMENT STORY

How will the shoreline change in the future?

This area is actively undergoing restoration and development activities, particularly surrounding the Suisun Marsh. There are a numbers activities that have recently been permitted by BCDC or have ongoing permit applications in progress.

The major potential shoreline changes include:

- **Wing's Landing Restoration Project (**Planned)
- **Suisun Marsh Public Access Study** (Active)
- **Levee Maintenance and Repair** (Planned)

Current and future flooding risk

OVERTOPPING STORY

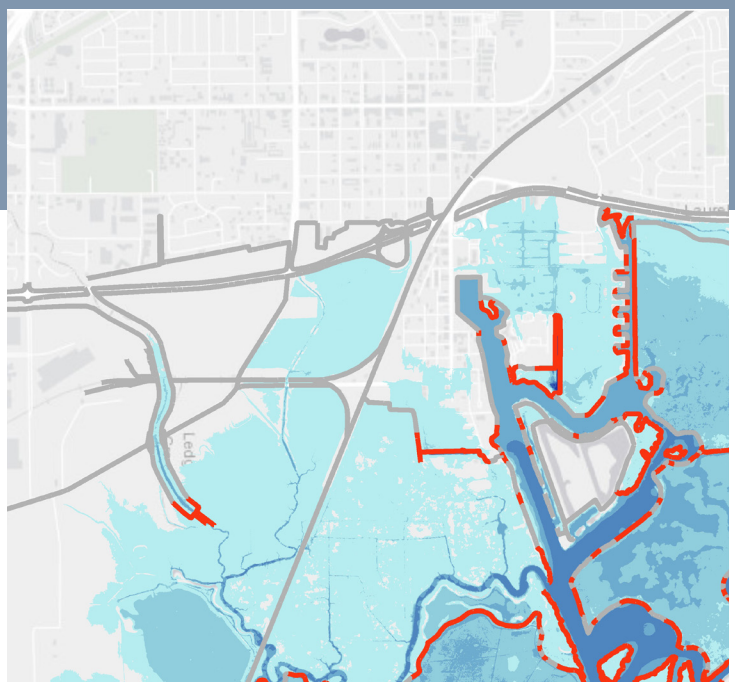
Where is water coming over the shoreline?

Much of the early overtopping occurs via wetlands south of Catamaran Way and west of Civic Center Blvd at 12" TWL (Figure 5d). The threshold for substantial flooding in the Suisun City area is 24" TWL, when the wetland/channel embankments immediately west of Whispering Bay Lane and east of Harbor Park Drive are overtopped. The threshold for overtopping in the Downtown Suisun City is 36" TWL, when the embankments immediately west of the southern end of Kellogg Street are overtopped, in addition to embankments at the northeast corner of Suisun Slough and at the intersection of Solano Street and Suisun Slough. At 48" TWL, the entire shoreline of Suisun Slough is overtopped. The threshold for overtopping into the Fairfield area is 66" TWL, when transportation structures and embankments between the Slough and Fairfield are overtopped.

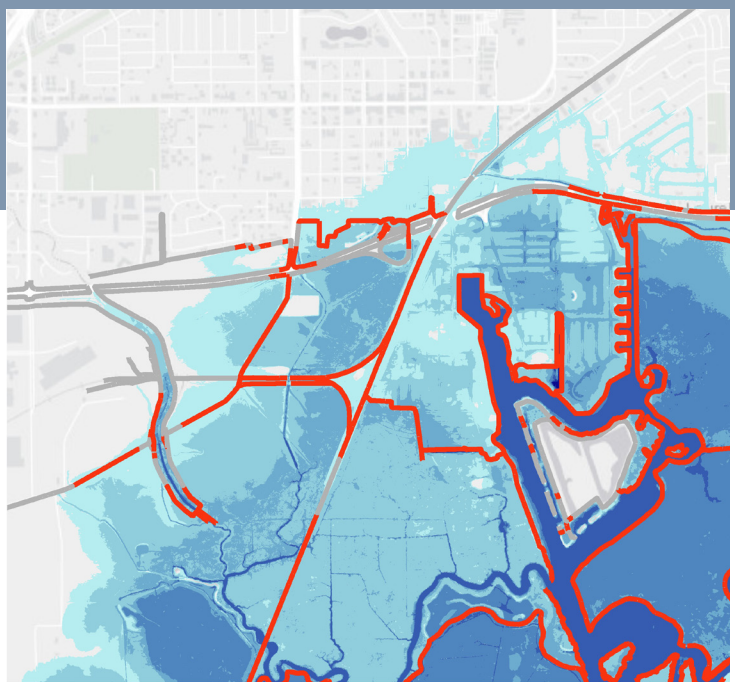
FLOODING EXPOSURE STORY

Where does flooding occur?

At 12" TWL, Grizzly Island Road is flooded which serves as the main access road to Suisun Marsh (Figure 6d). At 24" TWL, both Water Trail sites are flooded as well as 700 households. Nearly 75% of those households exposed are in areas designated as moderate, high, or highest social vulnerability in areas immediately west and east of the northern Suisun Slough. Also, at 24" TWL, many critical amenities are exposed including the Village II Apartments which contains 105 low income units. Mount Calvary Baptist Church, Crystal Middle School, and access to the Suisun City Police Department and other City Departments. The parking lot of the Suisun City/Fairfield Amtrak station is also flooded at 24" TWL. At 36" TWL, the Amtrak station itself begins to be flooded. Also at 36" TWL, local roads Cordelia and Main Street are exposed which serve as major arterials for moving in, out, and around Suisun City. At 52" TWL, lanes near Laurel Creek on SR-12 are flooded. Eastbound lanes of SR-12 east of Suisun City begin to flood at 52" TWL, with both lanes flooded at 66" TWL. At 66" TWL, all access to the Amtrak station is cut off and both rail and station are flooded. Also at 66" TWL, the Downtown South Jefferson Street PDA in South Fairfield is flooded.



24" TWL



66" TWL

OVERTOPPING AND FLOODING

No overtopping
Overtopping
Shallower depth of flooding
Deeper depth of flooding

Figure 5d. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds. Visit the Bay Shoreline Flood Explorer (explorer.adaptingtorisingtides.org) to see more TWLs.

FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

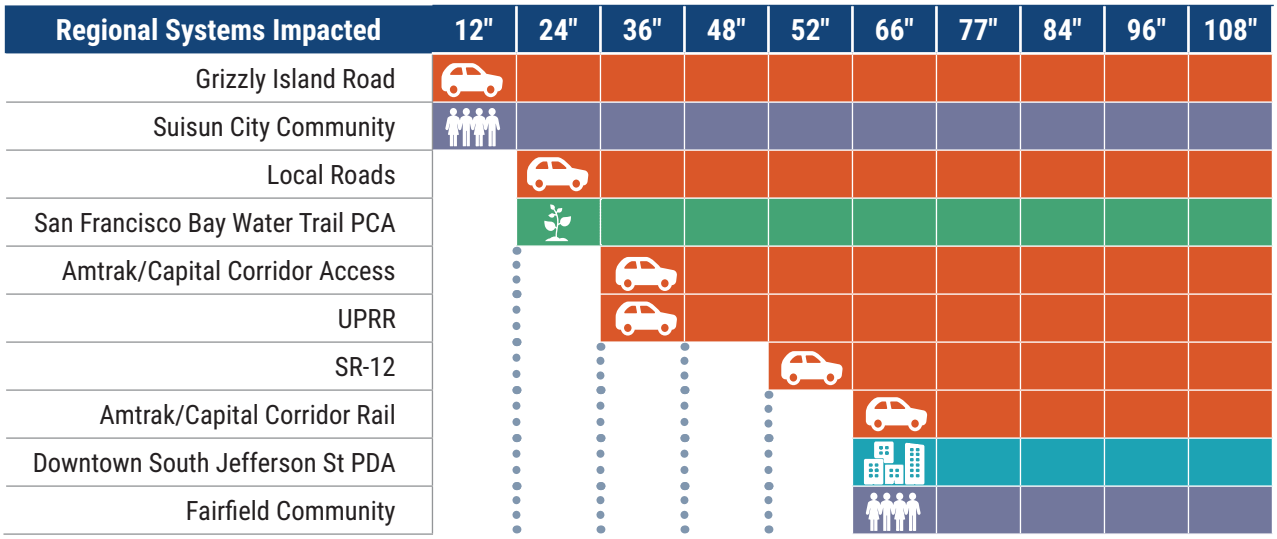


Figure 6d. First exposure of regional systems. Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.

Shared vulnerabilities to flooding

SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each focus area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.

1. Regional Transportation and Goods Movement

The function of the Suisun City/Fairfield Amtrak Station as a passenger rail stop on the inter-regional connection between the Bay Area and the Central Valley is vulnerable to sea level rise impacts if the station (building) and parking lot, supporting utilities infrastructure that are below grade, and vulnerable parts of the rail line elsewhere are damaged or disrupted. The UPRR owned rail line is also vulnerable to sea level rise and serves as a critical corridor for goods movement. A complex arrangement of shared ownership and operations of the station has led to a lack of accessible, detailed and well-coordinated information about the station's components, which in turn presents a challenge to sufficiently understanding vulnerabilities of the station.

2. Vulnerable Community, Housing, and Jobs Node

The function of residential homes and employment centers is vulnerable to flooding if Suisun Slough floods local roads and other critical assets to the community members in Suisun City and Fairfield. Suisun City has a high percentage of low-income citizens, renters and people with disabilities, which reduces their ability to prepare for and respond to flood events. Job centers and housing that provide locally significant employment opportunities are clustered along the Suisun Slough shoreline and vulnerable to flooding at early water levels. Workers from the Suisun City and Fairfield vulnerable communities commute to employment sites, and vulnerabilities in the local and regional transportation system could impact their ability to reach their jobs. Flooding that disrupts the transportation system could also disrupt critical supply chains that employment sites rely on, resulting in lost employee wages and reduced output and profit.

Amtrak at Suisun City station. Photo by Jack Snell is licensed under CC BY-ND 2.0

Shared consequences to flooding

SHARED CONSEQUENCE STORIES

This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.

Society and Equity • This Focus Area includes two communities considered to have among the highest social vulnerability in the region, presenting unique challenges with regards to flooding of housing, public transit, recreational areas, and job centers. Early impacts to these communities, at 24" TWL for residential households in Suisun City and at 66" TWL for the Fairfield community, are likely to have a disproportionately larger impact on these communities as they possess characteristics that may make it more difficult to respond to, or plan for, flood events. The large percentage of residents that are under 5, low income, without a vehicle, single parent households, renters, without a high school degree, people with a disability, not US citizens, and limited English proficiency present unique challenges in their ability to adapt to flooding impacts or re-locate in the event of permanent inundation In both of these cases, individuals and households do not control the shoreline and will have to coordinate with various owners to implement flood protection changes. Many residents of this area live without a vehicle, so impacts to transit lines in the area will have disproportionate impacts on these populations' ability to get to job centers.

Economy • The first major economic impacts from flooding in this Focus Area may come from disruptions to the Suisun City community, Water Trail sites, municipal buildings, a US Social Security office, Suisun City Building Department, Village II low-income apartments, Mount Calvary Baptist Church, Crystal Middle School and access to Suisun City Police Department and other City Departments co-located along the shoreline of Suisun Slough and flooded at 24" TWL. Loss of access and function to these job centers and government services could have large economic consequences for people working in the area. Flooding at SR-12 is likely to have major economic consequences as the route serves as a critical transit connection to I-80 and to employment centers in the Bay Area and Sacramento. The lack of redundancy to SR-12 also makes these impacts more severe to commuters who will have to take longer routes, likely leading to traffic congestions and increased vehicle miles traveled, which will increase greenhouse gas emissions. Additionally, interruption of passenger and heavy rail services at the Amtrak/Capital Corridor and UPRR line will have economic impacts due to disruption of regionwide goods movement, transit, and ability for workers to get to job centers in the greater Bay Area, Sacramento, and beyond. Flooding of the Downtown Jefferson Street PDA, which is slated for future housing and increased economic growth and job opportunity, will affect the ability of the PDA to function and meet the needs of its residents.

Environment • The Suisun Marsh is home to some of the last remaining intact wetlands and tidal marsh ecosystems in the region and serves to protect communities inland from storms and high tide events. As water levels rise, tidal marshes, as well as the ecosystem services they provide including habitat, recreation, flood protection, wave height reduction, and stormwater retention, among others, are likely to be lost without space for the wetlands to migrate or retreat inland. Loss of wetlands leads to loss of the ecosystem services they provide to residents nearby and across the region. The complex management of this area poses informational sharing and coordination vulnerabilities that pose a challenge with implementing adaptation.

FITTING INTO REGIONAL STORY

How are local areas contributing to Regional Hot Spots?

The regional scale analysis of ART Bay Area identified clusters of highest consequences around the region, called "Regional Hot Spots." These areas include places that contain the top five highest consequences in the region for 1) any transportation asset and 2) either a PDA or PCA, and 3) the presence of a vulnerable community block group at any given water level.

Regional Hot Spot at 24" TWL

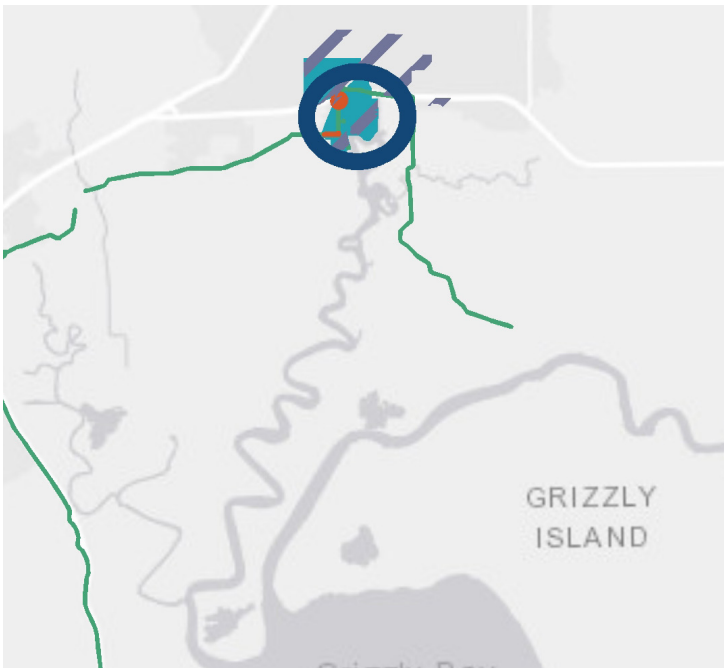


Figure 7d. Suisun City Hot Spot: From 24" TWL to 66" TWL, this Focus Area contains clusters of assets that have among the highest consequences of flooding in the region.

Datasets were identified for each regional system to provide a measure of consequence to quantify impacts in the event of flooding. A full list of consequences used for each regional system can be found in Chapter 2.1 Regional Hot Spots.

The Suisun City Focus Area is a Regional Hot Spot, meaning it contains a cluster of assets that have among the highest consequences of flooding in the region.

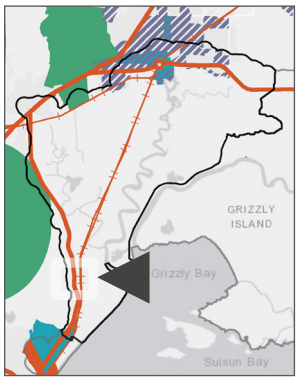
It becomes a Regional Hot Spot starting at 24" TWL, but falls off at higher TWLs (Figure 7d).

The Suisun City cluster is driven by the Downtown & Waterfront PDA (2010 and 2040 residential units, residential units growth, and job units growth), the Suisun-Fairfield passenger rail station, and social vulnerability and contamination.

Chapter 4 Regional Adaptation provides adaptation responses for regional issues.

Suisun City. Photo by Sharon Hahn Darlin is licensed under CC BY 2.0.

Area of Impact B:
I-680 at Oakridge Lane



Location

This Area of Impact is in the southwestern portion of the Suisun Slough OLU, along I-680 at Oakridge Lane in Benicia (Figure 11d).

Figure 11d. Top: Identification of where Area of Impact is within OLU. Bottom: Map of Area of Impact containing regional systems. Individual assets assessed in this Area of Impact are labeled on the map and listed on the following page.

I-680. Map data ©2019 by Google.

Why shared stories of vulnerability?

This Area of Impact was selected because it contains a variety of regional systems, including numerous transportation routes and the Suisun Marsh. Due to overlap and dependencies among these regional systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

Figure 11d. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS AREA OF IMPACT LISTED BELOW:

TRANSPORTATION

- I-680
- Union Pacific Railroad
- Capital Corridor/ Amtrak

VULNERABLE COMMUNITIES

- N/A

PRIORITY DEVELOPMENT AREAS (PDAs)

- N/A

PRIORITY CONSERVATION AREAS (PCAs)

- N/A

Shoreline today and into the future

SHORELINE TYPE STORY

What is the shoreline made up of now?

The shoreline in this area is a mix of wetlands and berms as the first line of defense, with the UPRR and additional embankments and berms serving as additional shoreline protection for I-680.[18]

SHORELINE DEVELOPMENT STORY

How will the shoreline change in the future?

There is one activity that has recently been permitted by BCDC or has an ongoing permit application in progress within this area.

The major potential shoreline changes include:

- **Pacific Flyway Interpretation Center** (Planned)

I-680. Photo by BCDC.

I-680. Photo ©2019 by Google.

Current and future flooding risk

OVERTOPPING STORY

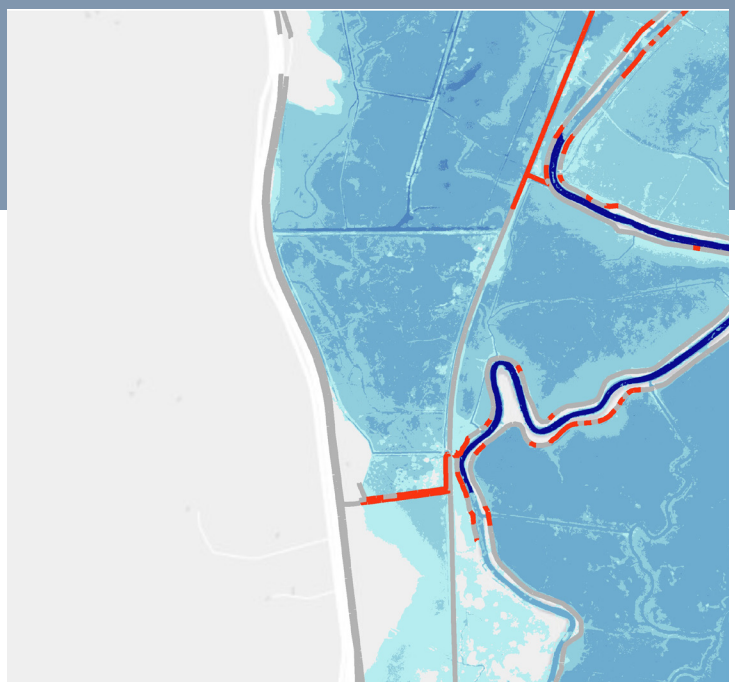
Where is water coming over the shoreline?

At 12" TWL, much of the wetlands and berms are overtopped (Figure 12d), as well as a one-mile segment of UPRR/Amtrak rail line within the marsh immediately east of the Oakridge Lane and I-680 intersection. At 24" TWL, most of the wetlands and berms east of the rail line are overtopped, as well as additional rail line segments and berms that are west of the rail between UPRR and I-680. At 36" TWL, an embankment along Goodyear Road immediately adjacent to the east of the freeway is overtopped. At 66" TWL, a small segment of I-680 overtops approximately .5 miles north of Oakridge Lane. At 96" TWL, the overtopping along I-680 extends in the north and begins just south of Oakridge Lane. At 108" TWL, significant portions of I-680 are overtopped.

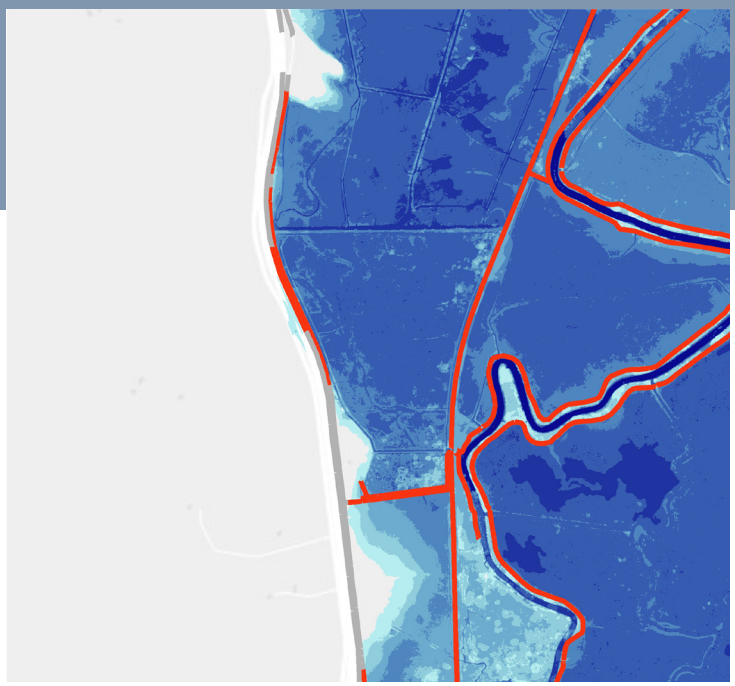
FLOODING EXPOSURE STORY

Where does flooding occur?

At 12" TWL, UPRR rail line is flooded between the Marsh and I-680. At 66" TWL, I-680 begins to be flooded north of Oakridge Lane (Figure 13d). This flooding increases as water levels increase.



12” TWL



66” TWL

OVERTOPPING AND FLOODING

No overtopping
Overtopping
Shallower depth of flooding
Deeper depth of flooding

Figure 12d. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds. Visit the Bay Shoreline Flood Explorer (explorer.adaptingtorisingtides.org) to see more TWLs.

FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

Regional Systems Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Suisun Marsh*										
UPRR										
Capital Corridor/Amtrak										
I-680										

Figure 13d. First exposure of regional systems. Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.

* Suisun Marsh is not a PCA, but was included in analysis as a regionally important natural asset.

Shared vulnerabilities to flooding

SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each focus area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.

1. Transportation And Complex Interdependencies

The function of I-680 and UPRR as major transportation and goods movement corridors is vulnerable to sea level rise impacts. The Suisun Marsh serves as flood protection to both UPRR and I-680, and UPRR serves as additional flood protection to I-680. This corridor serves as a critical artery between the Bay Area and the Central Valley, and if flooded would cause major impacts to local and regional transportation. This complex interdependency and management presents a challenge to sufficiently preparing for and responding to flood events and impacts.

Shared consequences to flooding

SHARED CONSEQUENCE STORIES

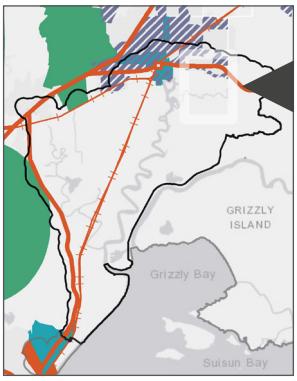
This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.

Society and Equity • Flooding of I-680 and the UPRR and Capital Corridor/ Amtrak rail line in this area will have a disproportionate impact on the ability for vulnerable community members in Suisun City and Fairfield to get to and from job centers throughout the region.

Economy • Flooding of I-680 will have major economic consequences as it carries thousands of people every day to and from employment centers throughout the region. The lack of redundancy makes these impacts more severe to commuters who will have to take longer routes, likely leading to traffic congestion and increase vehicle miles traveled which will lead to increased greenhouse gas emissions. In addition, interruption of passenger and heavy rail services at the Amtrak/Capital Corridor and UPRR line will have economic impacts due to disruption of regionwide goods movement, transit, and ability for workers to get to job centers in the greater Bay Area, Sacramento, and beyond.

Environment • This area contains some of the last remaining wetlands in the San Francisco Bay at Suisun Slough and loss of these habitats would impair the ability of these ecosystems to provide services such as stormwater retention, wildlife habitat and recreational opportunities. Additionally, loss of this nature-based flood protection would increase the height and cost of structural shoreline protection. Marshes provide habitat for threatened and endangered species. Storm event flooding makes these species more vulnerable to predation and can reduce reproductive success if nests are flooded. The presence of numerous contaminated sites also poses a risk to both these wetlands ecosystems and surrounding communities.

Area of Impact C:
Suisun Marsh and Grizzly Island Road



Location

This Area of Impact encompasses the Suisun Marsh in Southern Solano County, including Grizzly Island Road. Grizzly Island Road is east of Suisun City and serves as the main access road to Suisun Marsh for marsh management activities as well as recreation (Figure 14d).

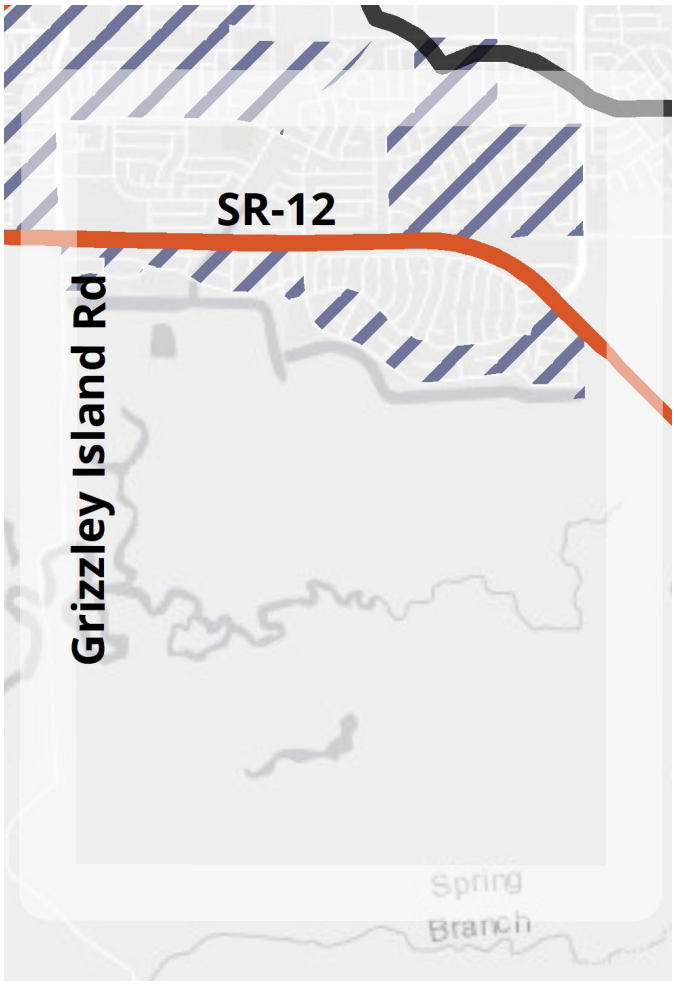


Figure 14d. Top: Identification of where Area of Impact is within OLU. Bottom: Map of Area of Impact containing regional systems. Individual assets assessed in this Area of Impact are labeled on the map and listed on the following page.

Why shared stories of vulnerability?

This Area of Impact was selected because it contains a variety of systems, including two transportation routes, the communities of Suisun City and Fairfield, and the Suisun Marsh. Due to overlap and dependencies among these systems in this area, the vulnerabilities of these systems to flooding and sea level rise are discussed together in shared stories of the shoreline, overtopping, and exposure to flooding as water levels rise. The goal of communicating shared vulnerabilities and consequences is to encourage multi-benefit solutions through collaborations and coordination.

Figure 14d. MAP OF REGIONAL SYSTEMS AND LIST OF INDIVIDUAL ASSETS ASSESSED WITHIN THIS AREA OF IMPACT LISTED BELOW:

TRANSPORTATION

- SR-12
- Grizzly Island Road

VULNERABLE COMMUNITIES

- Fairfield & Suisun City Community

PRIORITY DEVELOPMENT AREAS (PDAs)

- N/A

PRIORITY CONSERVATION AREAS (PCAs)

- N/A

Shoreline today and into the future

SHORELINE TYPE STORY

What is the shoreline made up of now?

The shoreline in this area is a mix of wetlands and berms, with embankments at the intersection of Grizzly Island Road and SR-12 and where it crosses Montezuma Slough.

SHORELINE DEVELOPMENT STORY

How will the shoreline change in the future?

This area is actively undergoing restoration and development activities. There are two activities that have recently been permitted by BCDC or have an ongoing permit application in progress.

The major potential shoreline changes include:

- **Hill Slough Restoration Project** (Under Construction)
- **Elevation of part of Grizzly Island Road** (Planned)

Grizzly Island Road. Photo ©2020 by Google.

Current and future flooding risk

OVERTOPPING STORY

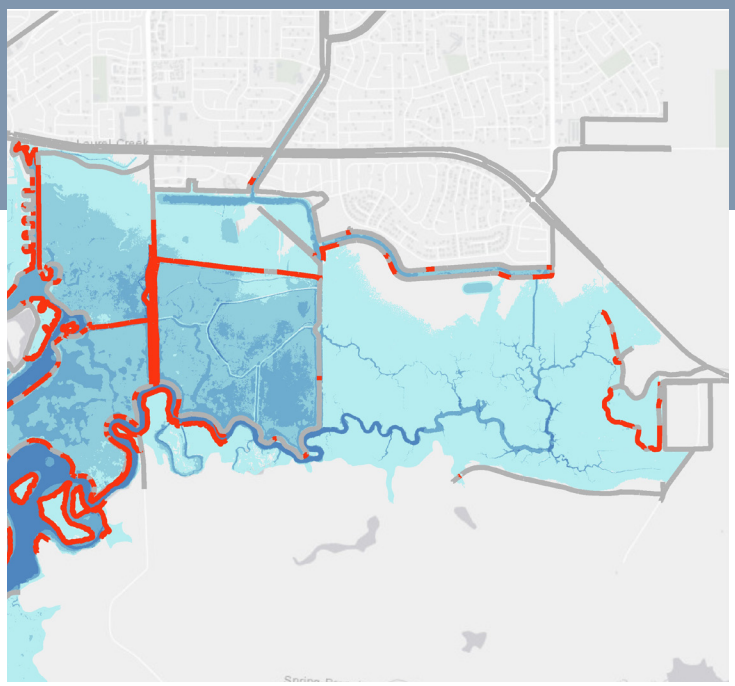
Where is water coming over the shoreline?

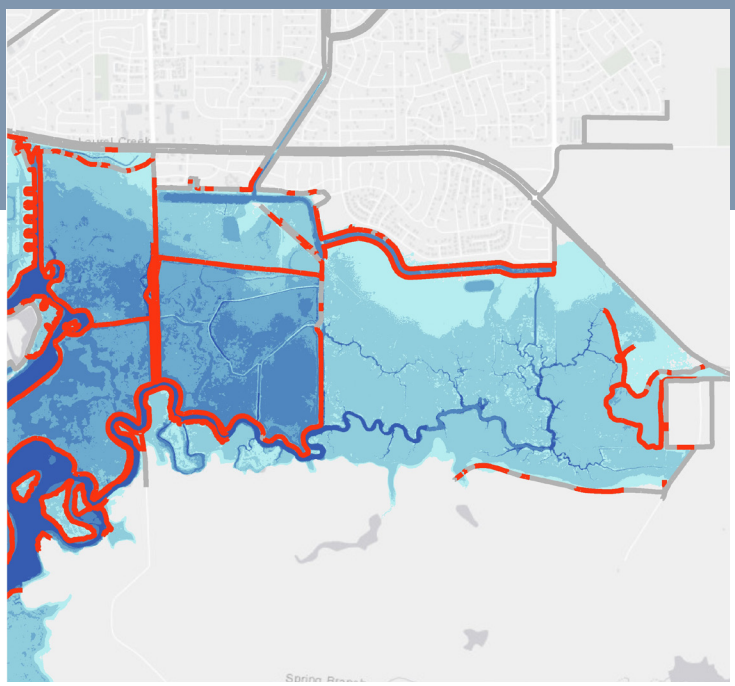
At 12" TWL, the marsh is flooded and berms between Gray Hawk Lane and Hill Slough are overtopped (Figure 15d). Berms further south, bordering the road on the southern side of Montezuma Slough are also overtopped at 12" TWL, with the most significant overtopping occurring in the southeastern portion of Suisun Marsh between Montezuma Slough and the end of the road. That portion of the road is entirely overtopped at 24" TWL. At 52" TWL, eastbound lanes of SR-12 that are critical to the approach to Grizzly Island Road are overtopped. By 84" TWL, the approach to Grizzly Island Road on SR-12 and most of the road, excluding a small segment from Hill Slough to Montezuma Slough, are overtopped.

FLOODING EXPOSURE STORY

Where does flooding occur?

At 12" TWL, 0.5 miles of the beginning of the Grizzly Island Road and between SR-12 and Hill Slough are flooded, as well as most of the road between Montezuma Slough and it's eastern dead end (Figure 16d). At 24" TWL, the entire road east of Montezuma Slough is flooded, and the flooding north of Hill Slough expands. At 52" TWL, SR-12 begins to flood as it approaches Grizzly Island Road from the west. At 77" TWL, the full road is flooded except a small segment from Hill Slough to Montezuma Slough, as is the approach from SR-12.





24” TWL **52” TWL**

OVERTOPPING AND FLOODING

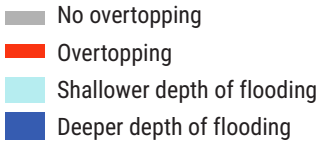


Figure 15d. Two total water levels selected that demonstrate first overtopping and/or significant flooding thresholds. Visit the Bay Shoreline Flood Explorer (explorer.adaptingtorisingtides.org) to see more TWLs.

FIRST FLOODING OF REGIONAL SYSTEMS ASSESSED

Regional Systems Impacted	12"	24"	36"	48"	52"	66"	77"	84"	96"	108"
Suisun Marsh*										
Grizzly Island Road										
Suisun City Community										
SR-12										
Fairfield Community										

Figure 16d. First exposure of regional systems. Individual assets within the four regional systems in this area are shown and colored bars represent when each asset is first exposed to flooding impacts.

* Suisun Marsh is not a PCA, but was included in analysis as a regionally important natural asset.

Shared vulnerabilities to flooding

SHARED VULNERABILITY STORIES

Vulnerability assessments were conducted on individual assets and then shared vulnerabilities were identified for regional systems within each focus area. The vulnerability statements below reflect shared stories of vulnerability. Our goal is to emphasize the interconnections among and across local systems, and encourage shared multi-benefits adaptation solutions.

1. Habitat and Flood Protection Benefits

Suisun Marsh is the largest remaining brackish marsh on the west coast of North America and studies show that approximately 1,000 feet of tidal marsh can reduce wave height and energy associated with extreme storm events by over 50%, where increased width increases the natural flood protection benefits and decreases the necessary height of the inland levee. Sea level rise will increase the depth, duration, and frequency that Suisun Marsh is flooded. The wildlife habitat and flood protection benefits that Suisun Marsh provides will not be sustained if the marsh drowns or becomes mudflat due to sea level rise.

The function of I-680 and UPRR as major transportation and goods movement corridors is vulnerable to sea level rise impacts. The Suisun Marsh serves as flood protection to both UPRR and I-680, and UPRR serves as additional flood protection to I-680. This corridor serves as a critical artery between the Bay Area and the Central Valley, and if flooded would cause major impacts to local and regional transportation. This complex interdependency and management presents a challenge to sufficiently preparing for and responding to flood events and impacts.

2. Complex Marsh Management

Suisun Marsh has multiple management objectives related to recreation, water management, and threatened and endangered species, requiring a complex permitting process to maintain the system and perform improvements. Suisun Marsh relies on levees, pumps, and tide gates to manage water levels and sea level rise will make it increasingly difficult to maintain these levels. As water levels change and topography doesn't, the inundation regime and hence the habitats and species therein will inevitably change. Current regulatory requirements may constrain possible adaptation actions.

3. Access to Recreation

Most of the land within the Suisun Marsh is managed wetlands that supports duck hunting activities and other forms of recreation. The marsh itself, as well as the access roads to reach these activities, are vulnerable to sea level rise.

Shared consequences to flooding

SHARED CONSEQUENCE STORIES

This section translates shared vulnerability statements into stories of shared consequences. The ART program considers consequences through frames of sustainability: Society and Equity, the Economy and the Environment.

Society and Equity • Flooding of Grizzly Island Road will cut off access to recreational activities within the marsh, disproportionately impacting surrounding vulnerable communities in Suisun City and Fairfield. Flooding of SR-12 within this focus are will also limit transportation east towards the Central Valley, limiting commuting options to job centers. Flooding of, or flooding of access to, subsistence hunting and fishing sites within the Suisun Marsh will negatively impact local community members who rely on these sites and the marsh to feed themselves or their families.

Economy • Recreation within the Suisun Marsh supports local and regional businesses. Lack of access to the marsh due to flooding will impact these businesses and the local economy.

Environment • The Suisun Marsh is the largest brackish water marsh on the West Coast of North America. It provides ecosystem services including flood protection, habitat, recreation, wave attenuation, and water filtration. Complex management structures are in place between agencies and private landowners to maintain the function of the marsh. Flooding of Grizzly Island Road and SR-12 will not only flood the marsh itself and impact ecosystem service delivery but will also limit the ability for management agencies to enter the marsh to perform their management responsibilities.

Endnotes

1 "Suisun Marsh Atlas" (California Department of Fish and Wildlife, 2019), https://www.wildlife.ca.gov/Regions/3/Suisun-Marsh/Atlas.
2 Caltrans, "2016 Vehicle Volumes (AADT)."
3 Caltrans, "2016 Truck Volumes (AADTT)."
4 Caltrans, "2016 Vehicle Volumes (AADT)."
5 Caltrans, "2016 Truck Volumes (AADTT)."
6 "Lifeline Routes."
7 "Welcome to Suisun City, Calif. – A Digital Suisun City Hall, and Community and Visitor Information Portal," accessed August 22, 2019, https://www.suisun.com/.
8 "U.S. Census Bureau QuickFacts: Suisun City City, California," accessed August 22, 2019, https://www.census.gov/quickfacts/fact/table/suisuncitycitycalifornia/IPE120217.
9 "Suisun City Council," accessed August 22, 2019, https://www.suisun.com/government/city-council/.
10 "U.S. Census Bureau QuickFacts: Fairfield City, California," accessed August 22, 2019, https://www.census.gov/quickfacts/fact/table/fairfieldcitycalifornia/PST045218.
11 City of Fairfield, "Heart of Fairfield Plan," April 2017, http://www.fairfield.ca.gov/civicax/filebank/blobdload.aspx?BlobID=15333.
12 "San Francisco Bay Area Water Trail."
13 "Downtown Suisun City – Trailhead Information," Facts and Figures, San Francisco Bay Area Water Trail, 2019, http://sfbaywatertrail.org/trailhead/downtown-suisun-city/.
14 "Suisun City Marina – Bay Water Trail," accessed August 23, 2019, http://sfbaywatertrail.org/trailhead/suisun-city-marina/.
15 "Suisun Marsh Habitat Management, Preservation and Restoration," accessed August 23, 2019, https://www.wildlife.ca.gov/Regions/3/Suisun-Marsh.
16 "San Francisco Bay Shore Inventory: Mapping for Sea Level Rise Planning GIS Data."
17 "San Francisco Bay Shore Inventory: Mapping for Sea Level Rise Planning GIS Data."
18 "San Francisco Bay Shore Inventory: Mapping for Sea Level Rise Planning GIS Data."