

APPENDIX C.

SOCIAL VULNERABILITY

This social vulnerability analysis supplements the Vulnerability Assessment Report. Sea level rise impacts will not be evenly distributed among population groups and it is important to identify the most vulnerable populations so that adaptation strategies can be developed in an equitable manner. This work is also consistent with new State Ocean Protection Council guidance on addressing environmental justice while planning for sea level rise.

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1. Executive Summary

Since 2015, the California Coastal Commission and the Ocean Protection Council have provided formal guidance to local jurisdictions that are planning for sea level rise adaptation regarding how to address social equity and environmental justice for vulnerable populations¹. As a first step toward incorporating environmental justice in sea level rise planning for Ventura County, this report identifies the demographics of the population in the unincorporated coastal zone, evaluates some vulnerable populations, and provides social adaptation strategy recommendations². By State definition³, the only disadvantaged communities in the unincorporated coastal zone of Ventura County are located in the Ormond Beach area and along the Santa Clara River. These are very small populations in low-density agricultural areas and therefore a more detailed social vulnerability analysis of the residential areas in the unincorporated coastal zone was conducted.

To further assess the social vulnerabilities to sea level rise in the unincorporated coastal zone, the following three vulnerable populations were selected: seniors, renters, and Hispanic residents. These populations were chosen based on data availability and previous studies that indicate that these populations have higher vulnerability to sea level rise hazards⁴. The analysis identified that there is a higher than average percentage of seniors and renters that could be exposed to sea level rise hazards and that there is lower than average percentage of Hispanic residents throughout the unincorporated coastal zone. Overall, there are about 4,700 residents in the unincorporated coastal zone, of which about 2,000 live in areas that could be exposed to coastal storms today⁵ and with the projected amount of sea level rise by 2030 (see Section 3.2). Other vulnerable groups (e.g. disabled, coastal visitors, homeless) were not quantitatively analyzed but should be considered in future studies. Four key recommendations are listed below:

- Develop a sea level rise retreat strategy with habitat restoration and public access in Ormond Beach that could reduce current environmental pollution and increase coastal recreational opportunities for the most vulnerable populations in the unincorporated County coastal zone.
- Initiate an “adopt a neighbor” campaign to help senior residents that are most vulnerable during a coastal emergency evacuation, particularly in the communities of the North and South Coasts.
- Provide education materials (including information on renter’s insurance) to residents of the coastal zone. These should also be made available in Spanish (especially in the Central Coast).
- Incorporate a coordinated population vulnerability analysis for all coastal jurisdictions in the county, possibly in the Ventura County Multi-Hazard Mitigation Plan.

¹ See the 2015 “California Coastal Commission Sea Level Rise Policy Guidance” and the “State of California Sea-Level Rise Guidance: 2018 Update.”

² Historical exposure to pollutants in marginalized is also an important component of environmental justice. Exposure to pollutants is addressed in Section. 2.1.

³ By “State definition,” this analysis refers to Senate Bill 535, which defines disadvantaged communities as the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations. See www.oehha.ca.gov/calenviroscreen/sb535 for more information on SB535.

⁴ While there are other populations that may be vulnerable to sea level rise hazards (e.g., income, race, disability), lack of data availability at a high spatial scale was a limiting factor for the analysis. Information for these other population groups is provided at a regional scale in section 2.2.

⁵ 1% annual chance coastal storms at current sea levels.

1.1 Background

Social vulnerability is the susceptibility of a population to harm from exposure to a hazard and includes the ability to prepare for, respond to, and recover from that hazardⁱ. Social vulnerability to sea level rise involves the study of populations exposed to sea level rise hazards by using demographic data to identify groups that may be at higher risk. Building resilient communities “requires increasing the capacity of communities and people to be able to withstand and recover from climate-related disruptions, and to be able to learn and adapt in the face of this change”ⁱⁱ. To do so, proactive planning and investments can be made to prepare the most vulnerable communities before sea level rise impacts occur, and response actions should be available when and where populations are most vulnerable. The first step in a social vulnerability analysis is to understand the demographics of the population exposed to sea level rise hazards. Given that this project is funded by the California Coastal Commission (“Coastal Commission”) and the State Coastal Conservancy for a Local Coastal Program update for the County of Ventura, the focus is on the residents of the unincorporated coastal zone in Ventura County. This assessment was designed to answer the question “*What are some of the groups that are most vulnerable to sea level rise hazards in the coastal zone?*”⁶

2. Identifying Vulnerable Populations: From the State to the Local Scale

There has been increasing State guidance directing local governments to consider social vulnerability and environmental justice issues in sea level rise planning. The 2015 Coastal Commission “Sea Level Rise Policy Guidance”, the 2017 Coastal Commission draft environmental justice policy, and the Ocean Protection Council’s “State of California Sea-Level Rise Guidance: 2018 Update” all have components that address environmental justice in coastal planning⁷. These guidance documents are primarily concerned with loss of affordable coastal access and recreation, unequitable impacts of adaptation strategies, and public engagement of marginalized communities. While local governments are to consider impacts on vulnerable populations regarding those issues, the State allows flexibility in how this guidance is to be implemented locally. There have been multiple methodologies developed to aid local governments in identifying vulnerable populations. Two State and one federal study are summarized below.

2.1 Social Vulnerability Summarized by State and Federal Agencies According to U.S. Census Tracts and Block Groups

Recent State sea level rise policy guidance recommends the prioritization of vulnerable populations when developing adaptation strategies to sea level rise. While there are State and federal definitions of vulnerable populations, it is important to evaluate these within a local context. In 2012, the California Energy Commission (CEC) conducted a statewide assessment of social vulnerability to various climate change-related hazardsⁱⁱⁱ. The study assessed the potential number of people affected by coastal flooding according to Census tract⁸ demographic information. Compared to other coastal

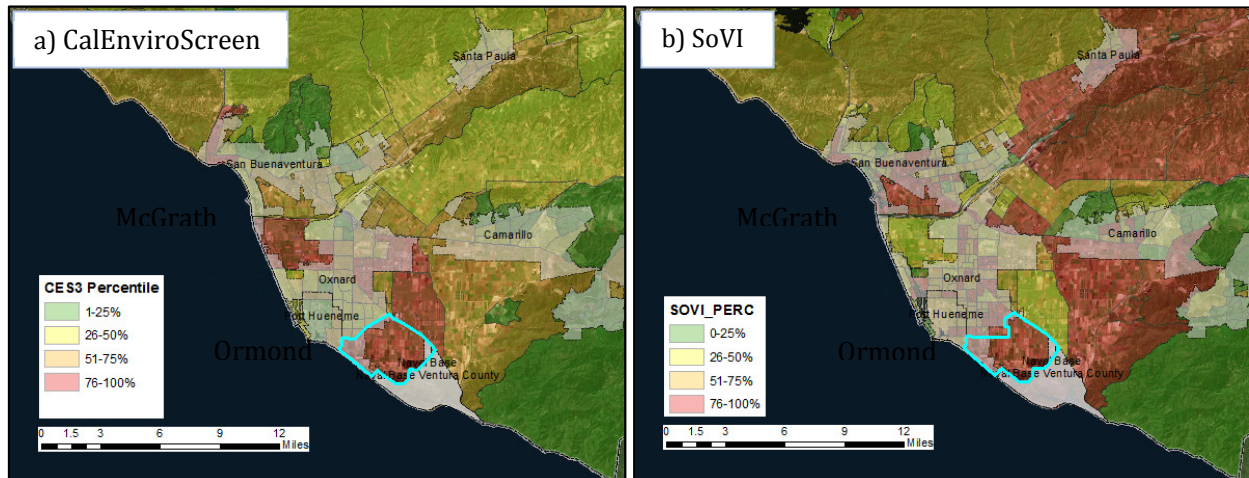
⁶ There are other climate change-induced hazards that will also affect the vulnerability of these populations and other vulnerable populations in surrounding jurisdictions. Other environmental hazards are discussed in the main body of the report (ES-16) and in Appendix A.

⁷ In addition to these sea level rise guidance documents, the 2018 Statewide climate change adaptation report *Safeguarding California* includes an entire chapter on environmental justice.

⁸ Census tracts are small geographic areas that usually have a population between 2,500 to 8,000 persons.

counties in Southern California, the CEC study found that Ventura County (including the cities within the County) has higher than average social vulnerability to coastal flooding. More than half of those potentially impacted live in Census tracts with high social vulnerability. The State analysis offers an effective big-picture image that allows for the comparison between California counties and may allow for prioritization of State-funded projects. However, for the purposes of local planning, a higher spatial analysis is needed.

Figure C-1. State and Federally-Defined Vulnerable Populations*



* Although the CalEnviroScreen (a) and SoVI (b) use different indicators and methods to identify vulnerable populations, the same color scheme is used for both for consistency. Red in both maps shows the vulnerable populations as defined by each metric.

Two online screening tools are often used to identify vulnerable populations at the regional level in California: CalEnviroScreen and the Social Vulnerability Index (SoVI). In April 2017, the State of California defined disadvantaged communities in order to target these areas for investment from the State’s cap-and-trade program (Senate Bill 535). According to SB535, disadvantaged communities are ranked within the top 25% of Census tracts from CalEnviroScreen, a screening tool that identifies communities disproportionately burdened by multiple sources of pollution and other variables that make them susceptible to harm and decrease their capacity to adapt.

In terms of sea level rise hazards, CalEnviroScreen can be a proxy to estimate social vulnerability. According to CalEnviroScreen, the disadvantaged communities in Ventura County are shown in red in Figure C-1a above, and there are two disadvantaged communities located in the unincorporated coastal zone (highlighted in bright blue). The low-density agricultural lands in Ormond Beach, and areas along the southern bank of the Santa Clara River both score high according to some of CalEnviroScreen’s 20 pollution indicators. The two areas have especially high exposure to pesticides (100% percentile), hazardous materials cleanup sites (greater than 90% percentile), and pollution (greater than 90% percentile). In addition, the screening tool shows that persons living near the southern bank of the Santa Clara River experience high rates of asthma, cardiovascular disease, and low birth rates. Whereas, the area around Ormond Beach has very low quality drinking water, poor educational attainment, and high exposure to solid waste.

Another readily available social vulnerability assessment tool is the SoVI developed by the National Agency of Toxic Substances and Disease Registry (Figure C-1b). Although the SoVI was developed to identify communities most vulnerable to human health stresses, it has often been used as a general

assessment of population vulnerability⁹. The vulnerable populations identified by the SoVI are shown in red in Figure C-1b above. The Ormond Beach area is the only place in unincorporated Ventura County that is identified as vulnerable by both CalEnviroScreen and the SoVI (Figure C-1, blue highlight). This area has the highest scores for the Minority Status/Language Theme and the Housing/Transportation Theme of the SoVI¹⁰. Ormond Beach generally consists of existing agricultural land uses and is sparsely populated (about 120 residents). There are wetland restoration and coastal access projects underway that could provide flood control and recreational opportunities for vulnerable resident populations. As Ormond Beach is designated as a disadvantaged community by the State, there may be opportunities to incorporate sea level rise adaptation strategies that benefit the local population in conjunction with other projects. This, however, will require interjurisdictional coordination with the City of Oxnard and the City of Port Hueneme.

While CalEnviroScreen and SoVI provide a regional analysis, they may not identify all vulnerable populations to specific hazards, such as sea level rise. The existing communities in the unincorporated coastal zone are not identified as vulnerable by State standards¹¹, but may have specific social vulnerabilities. Thus, a more detailed analysis was conducted to identify locally vulnerable populations that might not be obvious in all the data layers used for CalEnviroScreen or by the analysis at the lower spatial resolution.

2.2 Defining Vulnerable Populations to Sea Level Rise in Unincorporated Coastal Ventura County by Census Blocks

To assess the groups within unincorporated Ventura County that are more vulnerable to sea level rise hazards, it is necessary to use population data at a higher spatial resolution. One solution to remedy the challenge of spatial coarseness identified in the CalEnviroScreen and SoVI assessments is to use Census block demographic data¹². The Census data summarized at the block level is the most detailed demographic unit available, and therefore lends itself well to evaluating sparsely populated coastal communities for vulnerability to sea level rise hazards. The drawback of higher spatial resolution is that there is less information available at the block level. For example, there is no income or disability data at the block level, as these are deemed to be sensitive information at this scale and are not available from the Census Bureau. This assessment focuses on some populations (out of the demographic information available at the block unit from the 2010 Census) that may have higher vulnerability to sea level rise hazards.

According to the 2017 California Department of Public Health “Climate Change and Health Profile Report: Ventura County”^{iv}, the types of populations in flood-prone areas most affected by flood hazards are the elderly, children, and low-income populations. A 2015 study^v identified the following additional demographic characteristics that increase a population’s vulnerability to floods: age, race, ethnicity, immigration status, language ability, employment, land tenure, and health, among other

⁹ This SoVI was used in the social vulnerability analysis done by the County of Santa Barbara and the cities of Hermosa Beach and Los Angeles.

¹⁰ The SoVI ranks each Census tract on 14 social factors and groups them into four related themes: socioeconomic status, household composition, minority status/language, and housing/transportation. The minority status/language theme uses the variables “minority” and “speaks English less than well.” The housing/transportation theme uses the variables “multi-unit structures”, “mobile homes”, “crowding”, “no vehicle”, and “group quarters.”

¹¹ According to SB535.

¹² While there are only eight Census block groups and tracts in the unincorporated coastal zone, there are over 300 Census blocks that better follow jurisdictional and neighborhood boundaries.

factors. Of the demographic information available at the block level¹³, the following three were chosen as vulnerable populations for their demonstrated vulnerability to sea level rise hazards: seniors age 65 and over (Seniors), number of people who are living in rental housing units (Renters), and Hispanic residents (Table C-1). Each of these three populations is most vulnerable at a specific stage of a hazard¹⁴. Seniors may be most vulnerable during the response stage due to limited mobility, decreased access to information, and possible hearing limitations that may hinder them from receiving emergency warnings. Renters may be most vulnerable during the preparation and recovery stages due to limited control over their home infrastructures and potential lack of renters' flood insurance. Hispanics may be most vulnerable during the recovery stage due to potential language barriers that may limit easy access to recovery resources.

Table C-1. Populations Vulnerable to Sea Level Rise Hazards

Indicator	Description
Seniors	Total population (male and female) age 65 and over
Renters	Total population in rented accommodations
Hispanics	Total Hispanic population regardless of race

Seniors (65 and Over). Age is the leading demographic driver of social vulnerability to floods^{vi}. The elderly have decreased mobility and are more exposed to hazards during emergency evacuations. Emergency warning systems (especially digital media like Twitter and text alerts) may also not be effective in reaching this population. Many seniors also live on fixed incomes and may lack resources to recover from hazards if they suffer loss of property or belongings.

Renters. Land tenure is a vulnerability factor most common in developed areas prone to fluvial and coastal floods. Renters are most vulnerable during the mitigation and recovery stages of hazards. Renters' lack of autonomy over their residence generally decreases their ability to prepare the house for flooding, decreasing their ability to mitigate the hazard before it occurs. Renters are also less likely to have flood insurance coverage for their belongings compared to homeowners and may lack adequate resources to recover from a flood event^{vii}.

Hispanics. Race, class, ethnicity, and immigration status may present cultural and language barriers that impede access to disaster recovery resources. While these factors are highly interactive, the Hispanic population was included because it is the largest ethnic minority population in Ventura County^{viii} and they experience a disproportionate amount of poverty and have lower incomes compared to White/non-Hispanics. Countywide, Hispanic residents had an average per capita annual income of \$23,159 compared to \$41,974 for white non-Hispanic residents in 2016¹⁵ (Table C-2).

Although the vulnerable populations chosen for this detailed spatial analysis do not cover all social vulnerabilities to sea level rise hazards, they highlight some of the specific vulnerabilities of residents in the unincorporated coastal zone. Many other persons who live and work inland also visit beaches and use the coastline. Future studies should consider how other potentially vulnerable populations that use the coastline, such as the disabled, homeless, and low-income, could be affected. For now, some general countywide analysis is provided for these populations below:

¹³ Other demographic information available at the block level includes gender, race, family type, number of children, and urban/rural designation.

¹⁴ There are three hazard stages: preparation, response, and recovery.

¹⁵ Estimates based on 2016 American Community Survey 5-Year Estimate.

- According to the American Community Survey 5-Year Estimate of 2012-2016, about 6.7% of the population countywide have a disability¹⁶. If that proportion were uniformly distributed throughout the County, there would be over 250 residents with a disability in the unincorporated coastal zone.
- Every year, the Ventura County Continuum of Care Alliance conducts a homeless count. The 2018 Ventura County Homeless Count Report estimated that there are about 1,299 homeless persons in the entire county (cities and unincorporated areas) with about 77 in the unincorporated areas. Some of the homeless persons camp in streambeds near the coastal zone and may be exposed to sea level rise hazards.
- Table C-2 below summarizes the County’s average per capita income (including incorporated cities) roughly separated by location in terms of the coastal zone and ethnicity¹⁷. While white residents make on average 4% more in the coastal zone compared to the non-coastal zone, Hispanic residents make 20% less in the coastal zone compared to the non-coastal zone. There are some low-income, predominantly Hispanic communities found within the coastal zones in the cities of Oxnard and Port Hueneme. Residents with a lower annual income could have more difficulty recovering from a disaster. Countywide, Hispanic residents (\$23,159) make 45% less annually per capita than white, non-Hispanic residents (\$41,974).

Table C-2. Countywide 2016 Income Estimates by Coastal Zone and Ethnicity (2010 Census)

	Hispanic	White alone, Not Hispanic ¹⁸
Coastal zone	\$19,868	\$43,520
Non-coastal zone	\$23,434	\$41,845
Countywide	\$23,159	\$41,974

The remainder of this report focuses on the vulnerable populations for which there is data at the Census block level. While disability, homelessness, and income are important demographic factors, they cannot be carefully analyzed due to lack of data at the Census block level. Therefore, only the specific vulnerability of the populations identified above (seniors, renters, and Hispanic) will be analyzed in the following section.

3. Vulnerable Populations of the Unincorporated Coastal Zone and Potential Exposure with Eight Inches of Sea Level Rise

Sea level rise hazards can impact populations in direct and indirect ways over time. Some residents will be exposed to flooding, erosion, and debris damage to their homes while others will be indirectly impacted by damage to a school or the closure of roads. Storms and rising seas could also exacerbate environmental pollution burdens and hazards. The focus of this analysis is on location-based

¹⁶ The American Community Survey defines disability as having serious difficulty with hearing, vision, cognition, or ambulation for persons under the age of 65.

¹⁷ The data was taken at the block group level from the 2016 American Community Survey. Block groups do not follow jurisdictional boundaries. The separation between the coastal zone and non-coastal zone are therefore low-resolution estimates.

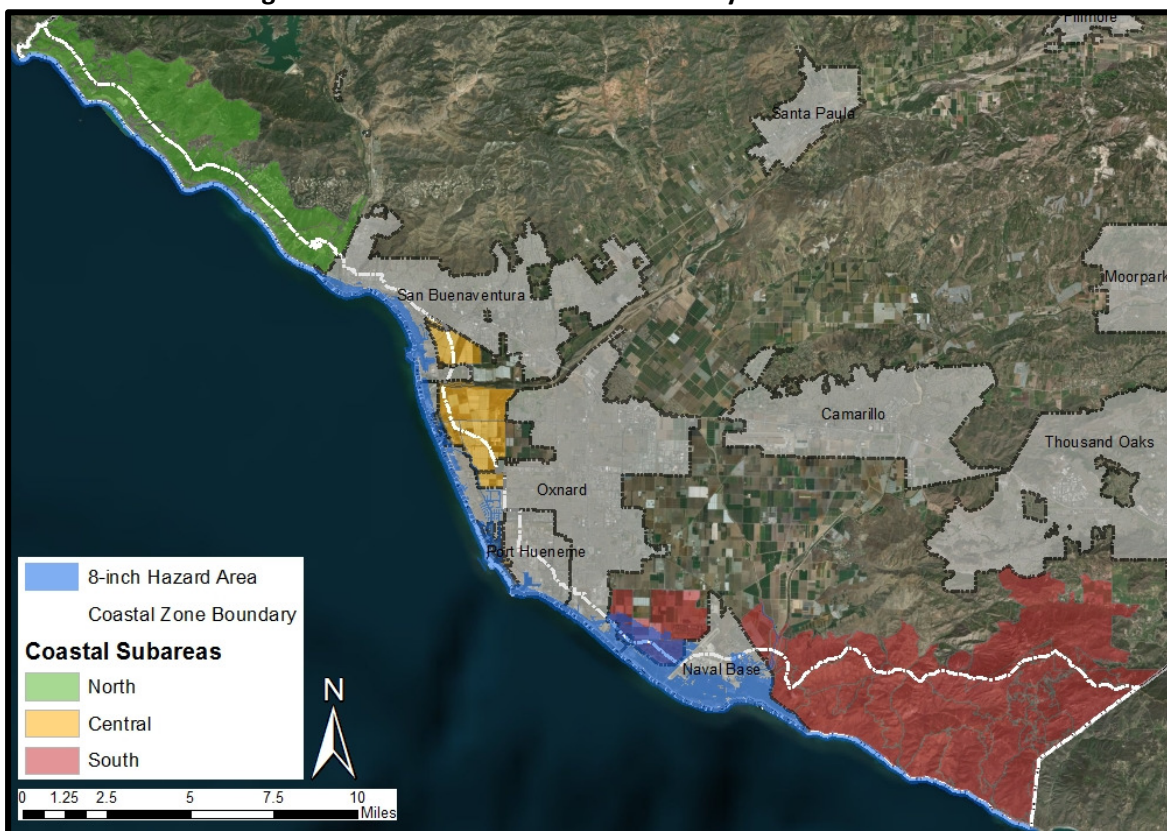
¹⁸ In the Census, people who respond to the question on race by indicating only one race are referred to as *race alone* population. White alone are respondents who marked only the “White” category. Hispanic origin is a separate Census question. Therefore, “White alone, Not Hispanic” are all those who marked only the “White” category in the race question and the “Not Hispanic” category in the ethnicity question.

vulnerability of populations that will be exposed to sea level rise hazards¹⁹. To this end, this section starts with the definitions of the sea level rise hazard area (SLR Hazard Area) and the Exposure Area (Sections 3.1 and 3.2), followed by a quantitative analysis of the impacted population (Section 3.3). This section concludes with a qualitative narrative on the potential vulnerabilities of these populations and how local governments could intervene to alleviate identified risks (Section 3.4).

3.1 Defining the Sea Level Rise Hazard Area

The SLR Hazard Area consists of the 329 Census blocks in unincorporated Ventura County located within 500 feet of the coastal zone²⁰ (Figure C-2). The SLR Hazard Area is separated into three coastal subareas: North Coast (green), Central Coast (orange), and South Coast (red). The subarea divisions are derived from the planning regions in the County’s Coastal Area Plan, but also extend beyond the coastal zone and include a 500-foot buffer to capture most of the coastal hazards associated with sea level rise. In some areas, the SLR hazard area extends farther inland due to the large size of the Census blocks.

Figure C-2. Sea Level Rise Hazard Area by Coastal Subarea



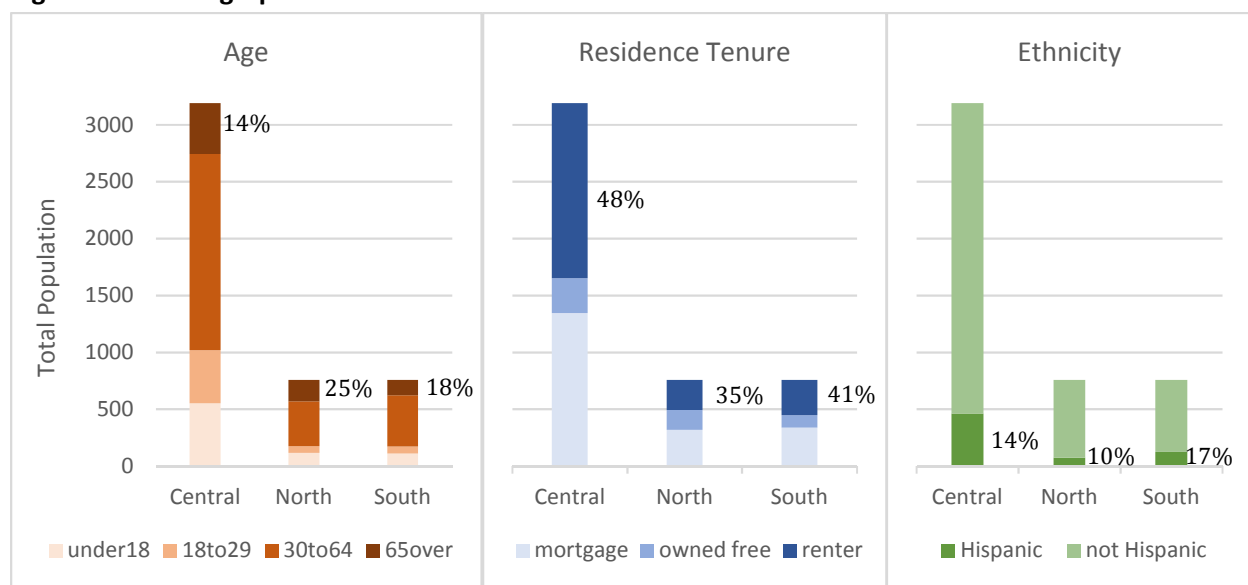
There are 4,703 residents and 2,895 housing units in the SLR Hazard Area. More than 65% of the population in the SLR Hazard Area lives in the Central Coast (3,190 of the 4,703 people). The North and South Coasts have about the same number of residents (~750 in each subarea). The demographic breakdown of the SLR Hazard Area is summarized according to the vulnerable populations in Figure

¹⁹ Location-based analysis relies on the population that resides in the area of study and does not include people who visit or work in the area.

²⁰ As defined by the Coastal Commission and mapped in the Ventura County Coastal Area Plan.

C-3 below. The left axis shows the total population in each subarea. For example, the Central Coast has more than 3,000 residents while the North and South Coasts have about 750 residents each. The colors in each bar graph show the demographic breakdown according to each vulnerable population metric. Age is shown in red (with the darkest red showing the proportion of seniors), residence tenure is shown in blue (with the darkest blue showing the proportion of renters), and ethnicity is shown in green (with the darkest green showing the proportion of Hispanics). The percentages in each chart show the percentage of the population in the subarea that falls into one of the categories of vulnerable populations (i.e., seniors, renters, Hispanic). For example, 14% of residents in the Central Coast are seniors, 41% of residents in the South Coast are renters, and 14% of residents in the North Coast are Hispanic. For comparison across demographics, the entire composition of the vulnerable population categories are shown. Age is shown in the brackets “under 18”, “18 to 29”, “30 to 64”, and “65 and over” (seniors). Residence tenure is shown as “mortgage”, “owned free”²¹, and “renter”. And ethnicity is shown in the binary “Hispanic” or “not Hispanic”.

Figure C-3. Demographic Breakdown of the Residents of the SLR Hazard Area



The Central Coast consists of the residents who live at Silverstrand, Hollywood Beach, and along the Santa Clara River. The Central Coast, being the most populated subarea, has the highest number of vulnerable residents with 446 seniors (14%), 1538 renters (48%), and 462 Hispanic residents (14%) living in the SLR Hazard Area. The North and South Coasts consist of interspersed communities and have similar demographics and total population when compared to one another. The age distribution in the two subareas are similar, with the North Coast having a slightly higher percentage of senior residents (25% compared to 18%). The South Coast, on the other hand, has a higher percentage of the other two vulnerable populations with 41% of South Coast residents being renters (compared to 35% in the North Coast) and 17% being Hispanic (compared to 10% in the North Coast). This demographic information could be useful in other coastal management plans in the County.

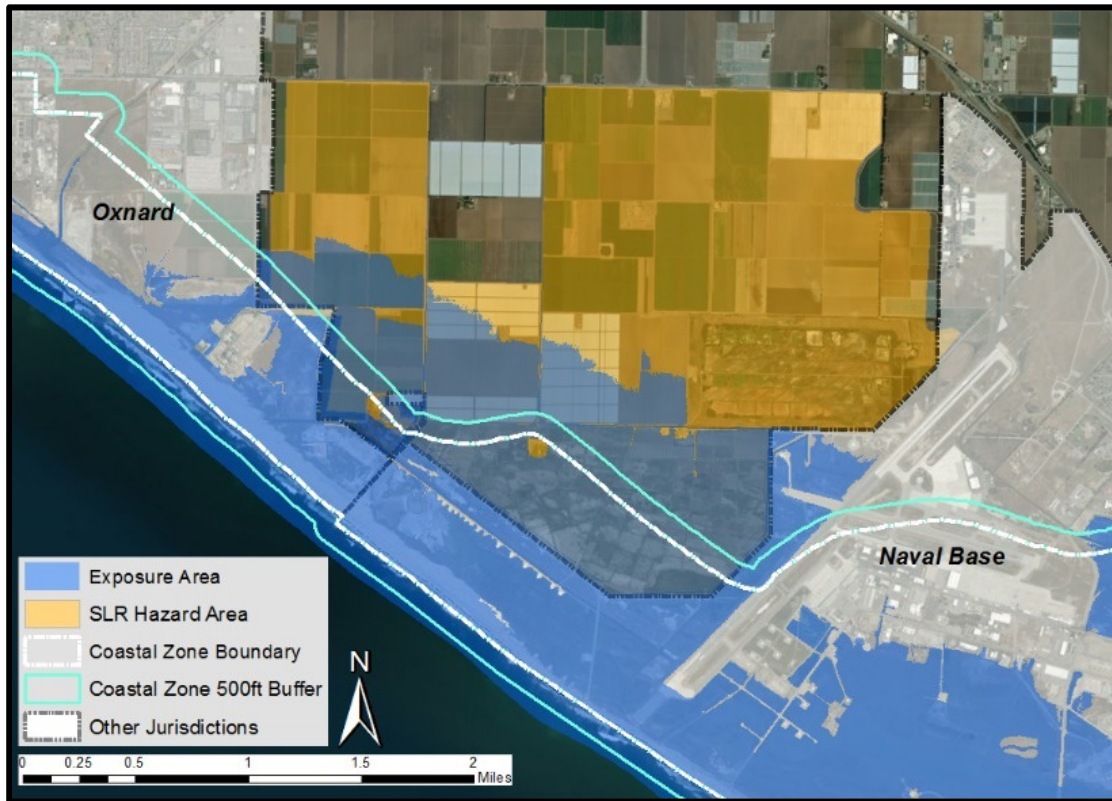
3.2 Exposure Area Calculation and Population Demographics

The Exposure Area is the part of the Census block that, according to the sea level rise models, could be exposed to eight inches of sea level rise and a large coastal storm (Figure C-4). To calculate the population in the Exposure Area, the population in each block was multiplied by the fraction of that

²¹ In real estate, owned free and clear means that there is no lien or mortgage.

block that is inundated with up to eight inches of sea level rise. For example, if 50% of the area of a 100-person block is inundated, the population in the Exposure Area is estimated to be 50 people. Eight inches of sea level rise was used for the population analysis because it is projected to occur by 2030, which is within the year 2040 planning horizon of the County’s General Plan Update.

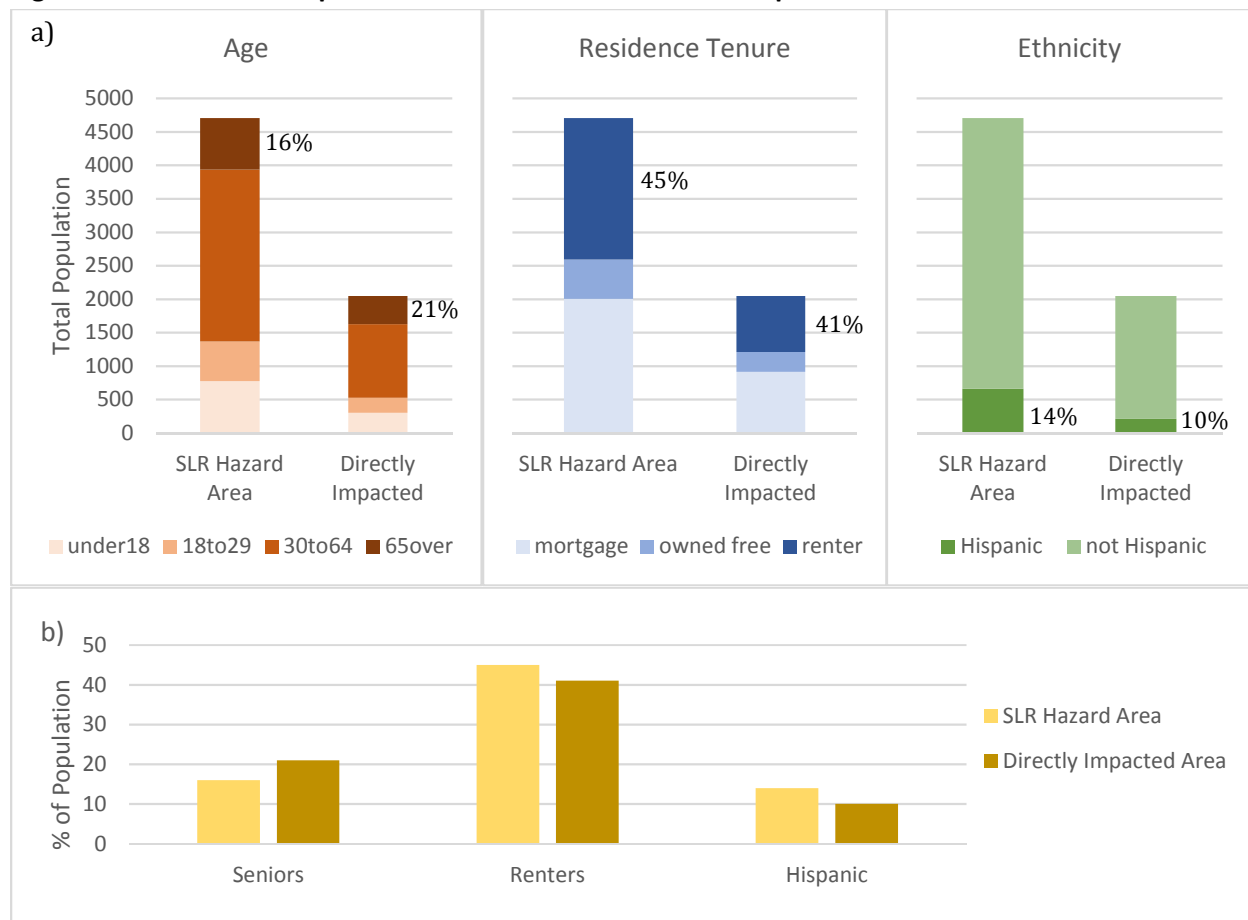
Figure C-4. Sea Level Rise Hazard Area and Exposure Area Illustration*



*The SLR Hazard Area (Census blocks) is shown in orange and the Exposure Area is shown in blue.

The demographics of the population in the Exposure Area (flooded with up to eight inches of sea level rise) are summarized in Figure C-5a. A total of 2,048 residents (or 44% of the population in the SLR Hazard Area) live in the Exposure Area. Comparing the population in the SLR Hazard Area to the population in the Exposure Area highlights that there is a higher proportion of seniors exposed to sea level rise hazards. Figure C-5b compares the proportional representation of each vulnerable population in the SLR Hazard Area and the Exposure Area. The light yellow shows the proportion of the population in the SLR Hazard Area who are from a vulnerable population and the dark yellow shows the proportion of the population in the Exposure Area who are from a vulnerable population.

Figure C-5. Vulnerable Population in SLR Hazard Area versus Exposure Area



While only 16% of the population in the SLR Hazard Area are seniors, 21% of the population in the Exposure Area fit that demographic. This indicates that within the SLR Hazard Area, a higher proportion of seniors live closer to the coast or closer to low-lying areas. The Hispanic population, on the other hand, is not disproportionately affected by sea level rise hazards. While 14% of the population in the SLR Hazard Area is Hispanic, only 10% of the population in the Exposure Area is Hispanic²². The proportional distribution of renters in the SLR Hazard Area and the Exposure Area are similar (45% in the SLR Hazard Area compared to 41% in the Exposure Area). Overall, the population in the Exposure Area has a higher proportion of seniors, lower proportion of Hispanics, and similar proportion of renters as the population in the SLR Hazard Area.

3.3 Population Demographics in the Hazard Area versus the Exposure Area

In the following subsections, the demographics of the SLR Hazard Area and the Exposure Area are discussed in more detail by subarea. The Central Coast is addressed first, as it has the highest population. The North and South Coasts are addressed together since they have similar demographic distributions and topography.

²² While this indicates low disproportionate burden of direct impacts, it may shed light on other social vulnerability factors in that living closer to the coast in California generally requires more financial stability.

3.3.1 Central Coast

Overall, the Central Coast accounts for 68% of the population in the SLR Hazard Area and 75% of the population in the Exposure Area. The Central Coast consists of the Silverstrand and Hollywood Beach communities, and the few Census blocks at the mouth of the Santa Clara River (Figure C-6). The population in the hazard area at the mouth of the Santa Clara River is about 30 residents and none are in the Exposure Area. Although the population along the Santa Clara River is not within the Exposure Area, it should be considered in more detail since it was one of the areas identified by CalEnviroScreen and SoVI. A third of the population in that area is Hispanic, half are renters, and a majority are between the ages of 30 and 64. CalEnviroScreen shows that this area has high indices of pesticides, water pollution, asthma, and cardiovascular disease. The area is composed of agricultural land that, although not vulnerable to coastal flooding, may be vulnerable to fluvial (river) flooding. Flooding of polluted sites could be a hazard to the residents who live in this area. Flood protection projects could address the special vulnerabilities of the residents in this area.

Figure C-6. Central Coast SLR Hazard Area

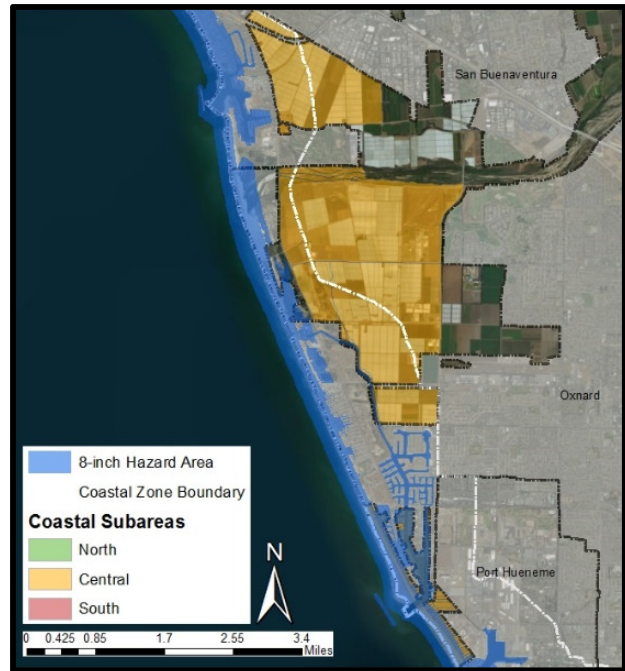
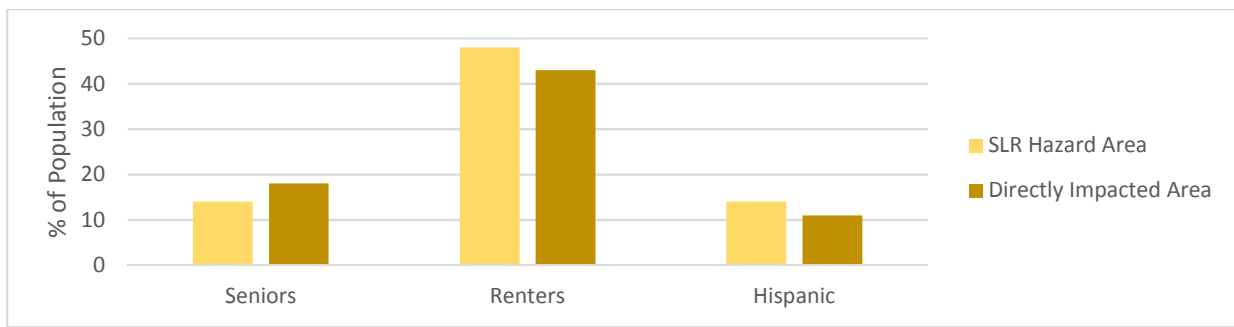


Figure C-7. Central Coast Vulnerable Population Representation in SLR Hazard Area versus Exposure Area



The more populated communities at Silverstrand and Hollywood Beach have about 1,545 residents in the Exposure Area (of the 3,190 in the hazard area). Of those in the Exposure Area, 18% are seniors, 43% are renters, and 11% are Hispanic (Figure C-7). The proportional distributions of the vulnerable populations are similar between those in the Exposure Area and those within the hazard area. In other words, at the scale of this analysis there are no vulnerable populations that would be disproportionately affected by sea level rise hazard on the Central Coast. By sheer number, renters are the most vulnerable in the Central Coast. More than 650 renters are within the Exposure Area with up to eight inches of sea level rise. The senior population includes more than 280 residents living in the Exposure Area. Lastly, while the Hispanic population has the lowest number, the 170 Hispanic

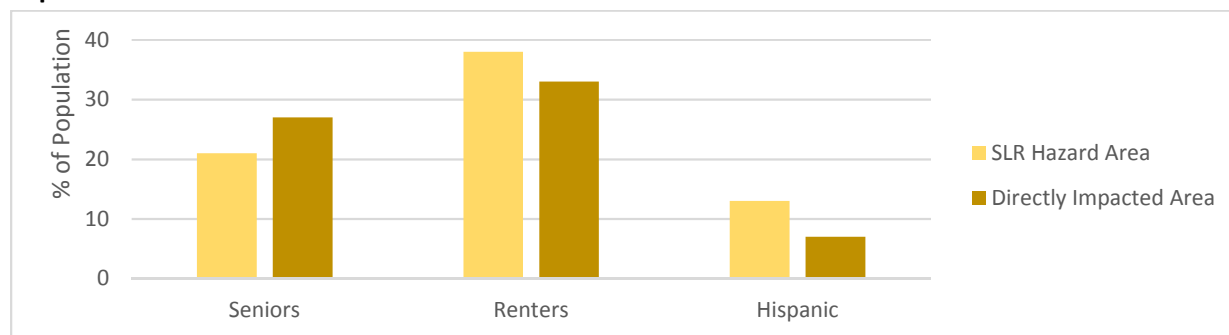
residents in the Exposure Area may be more vulnerable to indirect impacts than the other vulnerable groups.²³

3.3.2 North and South Coast

The North and South Coasts each have their unique communities and specific vulnerabilities, but they have very similar topographies, total populations, and demographic distributions. The population in the Exposure Area is therefore summarized in one figure for the North and South Coasts. An area of special consideration in the South Coast is the population near Ormond Beach. This is the only populated area within the SLR Hazard Area that coincides with both CalEnviroScreen and SoVI's definitions of vulnerable communities. As with the few Census blocks at the mouth of the Santa Clara River, Ormond Beach is primarily composed of agricultural land. According to CalEnviroScreen, this area has very high indices of pollution burden but low indices of population vulnerability. The pesticides and solid waste indices both scored in the top 90% percentile. Flooding could expose the residents of this area to pesticides and solid waste. The area inland of the Ormond Lagoon will be severely flooded with sea level rise. The population in these three blocks is composed almost entirely of Hispanics and renters. Although the total population in this area is roughly 120 people, engagement with this community should be targeted to the Hispanic majority. Flood hazard awareness should be incorporated into community safety and awareness programs for this area.

Of the 1,513 residents in the North and South Coasts in the SLR Hazard Area, about 500 are in the Exposure Area (about 33%). Of the population in the Exposure Area, 27% are seniors, 33% are renters, and 7% are Hispanic residents (Figure C-8 below). The senior population is disproportionately represented in the Exposure Area. There are more than 130 senior residents in the Exposure Area, with a majority in the North Coast. The North and South Coasts also have more than 160 renters and 35 Hispanic residents in the Exposure Area. Given the steep topography of these coastal subareas and the interspersed communities, emergency warning alerts may not effectively reach all vulnerable residents. In an age where most up-to-date information is shared through digital means and social media, some seniors may lack access to important communication tools.

Figure C-8: North and South Coasts Vulnerable Population Representation in SLR Hazard Area versus Exposure Area



This quantitative analysis describes how the vulnerabilities of these populations are manifested and where equitable adaptation strategies may best be implemented. The vulnerable populations addressed here are most susceptible to limited mobility during evacuation, limited resources for recovery, and limited resources for flood hazard preparation. The following narrative discussions are centered around these themes.

²³ Potential non-location-based (indirect) impacts are discussed in Section 4.

3.4 Vulnerability Narratives and Social Adaptation Strategy Options

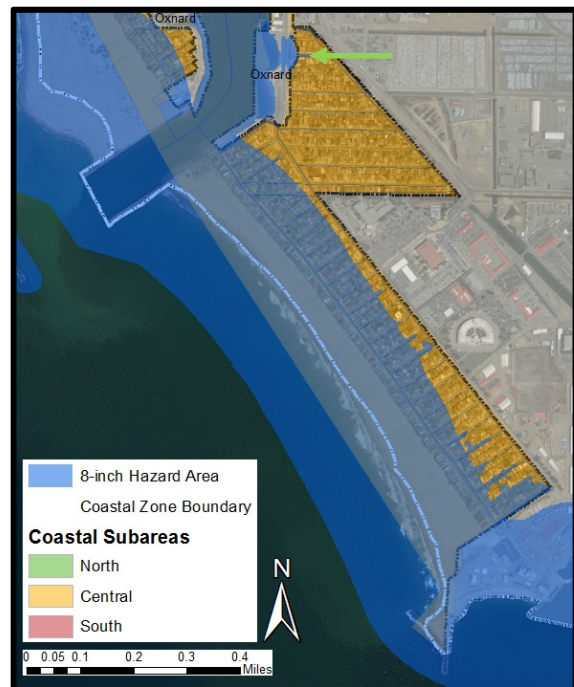
While the charts above show the total number of residents that may be impacted with up to eight inches of sea level rise, it is important to discuss their vulnerability in terms of narratives to help develop potential social adaptation strategies. The three themes discussed below closely match the vulnerable populations chosen. The emergency evacuation narratives address the vulnerabilities of the senior population, while the flood recovery and flood hazard preparation narratives address the vulnerabilities of the renter and Hispanic populations.

Emergency Evacuation. Of critical concern in the Central Coast is the flooding of crucial evacuation routes and choke points that could constrain the evacuation process. Main evacuation routes out of both Hollywood Beach and Silverstrand are at risk of flooding with up to eight inches of sea level rise. Victoria Avenue (the only outlet from Silverstrand) already has nuisance flooding at high tides (Figure C-9, green arrow). It is highly likely that an adaptation strategy will have to be implemented at this location in the near term. There are more than 400 senior residents in the Hollywood Beach and Silverstrand communities that should be considered in evacuation planning. In case of an emergency, this population will likely need more time and resources to be evacuated. Evacuation of the Central Coast communities will also be affected by the evacuation of neighboring cities. Continued coordination between jurisdictions is crucial to address emergency operations²⁴.

The North Coast consists of various small communities interspersed between Highway 101 and the ocean. Highway 101 may be flooded at various points in the North Coast with eight inches of sea level rise. Flooding at these points may isolate the communities and trap the residents during an evacuation. For example, the community at Rincon Point may be isolated from the rest of the County if Highway 101 is flooded. With the existing seawalls along Highway 101 in the North Coast, it is unlikely that the freeway will be flooded to an extent that prevents evacuation in an emergency. In the South Coast, most of the population is located in the Solromar community. As with the North Coast, it is unlikely that the Pacific Coast Highway will be flooded to an extent that prevents evacuation. More worrisome than the impacts on evacuation routes in the North and South Coasts is the direct impact to the residential units in the region. More than 280 people may have their homes flooded with up to eight inches of sea level rise in the North and South Coasts. Populations with decreased mobility (e.g. seniors) may have difficulty evacuating their homes even if the evacuation routes are unimpeded. Emergency plans should take these populations into account.

The Ventura County Multi-Hazard Mitigation Plan (MHMP) is the main set of policies governing emergency planning in the County of Ventura. While the 2015 Draft MHMP includes a section on climate change and briefly mentions sea level rise, it does not consider vulnerable populations. Future updates to the MHMP would benefit from conducting a population vulnerability analysis for

Figure C-9. Silverstrand Evacuation Hazard



²⁴ The 10 cities of the County participate in the County's Hazard Mitigation Plan (2010).

the entire county. As the MHMP is coordinated between the County and its cities, it would be a good place to insert a comprehensive population vulnerability analysis.

Flood Recovery. While the National Flood Insurance Program (NFIP) requires homeowners to purchase flood insurance in areas of high flood risk, federal law does not cover all the populations in the SLR Hazard Area. There are two main reasons why the NFIP does not address all those at risk of flooding with sea level rise: (1) The Federal Emergency Management Agency (the agency that manages the NFIP) does not take climate change and sea level rise into account when creating the digital flood insurance rate maps; and (2) renters are not required to purchase flood insurance. During the recovery stage, renters are highly vulnerable because they may not have their belongings insured. In the North and South Coasts, 33% of the population in the Exposure Area are renters; and in the Central Coast, 43% of the population are renters. Local assistance efforts after a flood will have to take into account that many of these people may not have flood insurance. Renters are the most vulnerable during the recovery stage. The County should provide information on renter's flood insurance to residents of the hazard area and emphasize its importance. In the Central Coast, information on flood recovery should also be provided in Spanish to accommodate the more than 450 Hispanic residents. The same may not be necessary in the North and South Coasts.

Flood Hazard Preparation. The first stage of disaster is the preparation before a hazard. The impacts of a disaster can be mitigated if the population is prepared even before the impacts occur. Flood hazard preparation can help mitigate the impacts of floods by encouraging homeowners to prepare their properties for floods and prepare at-home emergency protocols. Community involvement in government projects is one way to increase flood hazard awareness. Materials prepared for community members should be targeted towards the vulnerable populations. For example, in the North and South Coasts, education efforts should be targeted towards the elderly and renter population. This can be done through infographics about best practices during evacuation (targeted for the elderly) or information on renters' insurance. In the Central Coast, it is important that these materials be also available in Spanish to accommodate for the larger Hispanic population, perhaps in collaboration with a Spanish radio broadcasting station.

4. Coastal Zone Workers and Visitors

A location-based social vulnerability analysis does not consider the populations that work or visit the coastal zone. For example, there are a few commercial parcels and many agricultural parcels within the SLR Hazard Area that may function as work sites for residents from other parts of the County. Workers in the service industries may be directly vulnerable to flooding during work hours. Indirect impacts could increase the vulnerability of workers to financial impacts if access to a work site is disrupted for a period of time. Even more significant, if a business suffers losses or damage from sea level rise hazards, employees may be let go to cover costs or because the business cannot operate. The worker population also includes the farm workers in the SLR Hazard Area. Agriculture parcels are primarily located near Ormond Beach and McGrath Park in the Central Coast. Impacts to farm workers may be significant and more work can be done to address sea level rise hazards with farm workers and employers²⁵. It would also be helpful for State guidance documents to address in more detail how workers in the coastal zone may be affected by sea level rise.

A second vulnerable population not addressed through a location-based analysis includes the visitors to the SLR Hazard Area. The SLR Hazard Area contains several recreation areas including public beaches, County parks (Faria and Hobson), a hotel (Cliff House Inn), and temporary housing

²⁵ Agricultural workers may also be socially vulnerable due to their immigration status. While there are no estimates for the coastal zone, Ventura County as a whole is home to about 182,987 immigrants (about 22% of population) and an estimated 14,000 undocumented farmworkers (CAUSE 2011).

accommodations (e.g. Airbnb). The Coastal Commission is especially invested in equitably protecting public access and recreation to California’s coastal resources through sea level rise policies. State guidance is currently focused on how to address environmental justice in development of sea level rise adaptation projects and through community engagement but provides no clear guidance on how local governments should assess the vulnerabilities of populations that live outside of the coastal zone (and therefore outside the jurisdiction of Local Coastal Programs). While the vulnerability of populations outside the coastal zone was not evaluated, the County’s Local Coastal Program has regulations in place that protect coastal public recreation and access^{ix}. The vulnerability of public access and recreation to sea level rise were also evaluated in the main body of this report . Unincorporated County beaches draw over two million visitor days per year. In the North and South Coasts, existing beaches are largely protected by 18 miles of coastal armoring and will be narrowed by rising high tides (ES-13). Coastal access points and various sections of the California Coastal Trail are vulnerable to coastal erosion and flooding under existing conditions (Appendix A). Public access and recreation vulnerabilities can be addressed during the adaptation strategies and policies phase of sea level rise planning. Adaptation strategies adopted at the planning level should consider existing social vulnerabilities and inequities and protect public coastal access for all.

5. Recommendations to Address Identified Social Vulnerabilities

Addressing environmental justice issues in sea level rise planning is a challenging task. The work done in this social vulnerability assessment has allowed for a better understanding of the population demographics of the coastal zone and how specific populations could be impacted by sea level rise. It is important that environmental justice and social vulnerability be addressed at every stage of sea level rise planning (following State guidance). A few conclusions and recommendations can be drawn from the work done above:

- Ormond Beach and the Santa Clara River are the two vulnerable communities in the unincorporated coastal zone, according to state and federal definitions (Section 2.1). The recommendations for this area include:
 - Coordinate climate action and disadvantaged communities funding opportunities towards restoration of Ormond Beach to provide the most disadvantaged population with coastal recreational opportunities.
 - Further study the impacts of sea level rise hazards on hazardous sites and oil wells in this area to protect the potentially exposed population.
 - Funding may be available to pilot resilience projects in these disadvantaged communities.
- There is a high proportion of seniors living in the coastal zone who may have limited mobility during evacuation warnings (Section 3). The recommendations from this conclusion include:
 - Analyze evacuation routes and accessibility for seniors and residents with limited mobility.
 - Initiate an “adopt a neighbor” campaign in the scattered communities in the North and South coasts to connect senior residents with their neighbors.
 - Implement early warning systems that are cognizant of seniors’ limited mobility and potential lack of connection to modern means of communication (e.g. social media).
- Almost half of all residents of the coastal zone live in rented accommodations (Section 3). They may have less control over preparing their homes for flooding and less resources to recover from loss of belongings. The recommendations from this conclusion include:
 - Provide renter’s flood insurance flyers and educate renter residents in the coastal zone on sea level rise hazards.

- Encourage landlords to consider how to prepare their properties for sea level rise hazards.
- The Hispanic population may face institutional and structural barriers to access resources to prepare for, respond to, and recover from sea level rise hazards. About 14% of residents in the hazard area in the unincorporated Central Coast are Hispanic (Section 3.2). The recommendations for this population include:
 - Outreach materials should be made available in Spanish (especially in the Central Coast).
 - The County should coordinate with community groups that have relationships with the Hispanic community during recovery from a hazard event to bridge the gap between local government and potentially marginalized communities.
- It is important for local governments to assess population vulnerabilities that are relevant to the region of study and the specific hazard being addressed. Vulnerabilities to one hazard and within a specific jurisdiction may overlap. The recommendations from this conclusion include:
 - Coordinate with other County agencies to conduct population vulnerability analysis for other specific hazards and existing environmental pollution burdens.
 - Utilize the MHMP as a platform to initiate a population vulnerability assessment of all coastal jurisdictions in the county.
- Though the vulnerability of visitors to the coastal zone was not addressed, coastal access and recreation are very important issues in equitable sea level rise planning. The recommendations from this conclusion include:
 - Revise coastal access and recreation regulations to consider the potential impacts of sea level rise hazard on visitors from vulnerable communities.
 - Develop adaptation strategies that consider the disproportionate impacts on coastal access and recreation resources.
- Future studies should consider other vulnerable populations like the disabled, homeless, institutionalized, and low-income. Local governments in coordination with neighboring jurisdictions. would benefit from a statewide study that establishes methodology and guidance on assessing the vulnerabilities of these populations relevant to small coastal communities.
- Ventura County (incorporated and unincorporated areas) has high social vulnerability to coastal flooding compared to other coastal counties in California (Section 2.1). State funding to address social vulnerability to sea level rise should be targeted towards the most vulnerable counties.
- Sea level rise hazards will impact communities across jurisdiction boundaries. It is important that strategies for vulnerable communities are coordinated across neighboring jurisdictions.

6. References

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