**Table 30:** Estimated Impacts on Riverside County Fire Stations in a 1% Annual Chance Flood Scenario

| Agency | Number of Buildings | Replacement Cost ($1,000) | # Buildings w/ replacement cost data | No. Non-Functional Buildings | Restoration Time (Days) | Mean Building Damage | Economic Loss ($1,000) |
|---|---|---|---|---|---|---|---|
| Cathedral City FD | 3 | $10,500 | 3 | 0 | 360-480 | 0.0% | $0 |
| Corona FD | 7 | $23,170 | 7 | 2 | 480 | 7.0% | $385 |
| Hemet FD | 5 | $15,360 | 5 | 1 | 480-630 | 6.2% | $604 |
| Murrieta FD | 4 | $9,530 | 4 | 0 | 0 | 0.0% | $0 |
| Norco FD | 2 | $4,750 | 2 | 0 | 480 | 0.0% | $0 |
| Palm Springs FD | 5 | $6,115 | 5 | 0 | 360-480 | 0.0% | $0 |
| Pechanga FD | 2 | $5,430 | 2 | 0 | 0 | 0.0% | $0 |
| Riverside County FD | 95 | $249,411 | 95 | 3 | 360-480 | 1.0% | $740 |
| Riverside FD | 17 | $11,875 | 17 | 1 | 480 | 4.5% | $60 |
| Other Agencies | 4 | $10,600 | 4 | 0 | 0 | 0.0% | $0 |
| USFS | 12 | $19,752 | 12 | 1 | 480 | 4.4% | $205 |
| **TOTALS** | **156** | **$366,493** | **156** | **8** | **360-630** | **2.9%** | **$1,994** |

**Table 31:** Estimated Impacts on Riverside County EOCs in a 0.2% Annual Chance Flood (Levees Intact) Scenario

| County | No. of Buildings | Replacement Cost ($1,000) | No. Non-Functional Buildings | Restoration Time (Days) | Mean Damage | Economic Loss ($1,000) |
|---|---|---|---|---|---|---|
| Riverside | 43 | $310,273 | 4 | 360-480 | 1.7% | $5,113 |

**Table 32:** Estimated Impacts on Riverside County Police Facilities in a 0.2% Annual Chance Flood (Levees Intact) Scenario

| Agency | Number of Buildings | Replacement Cost ($1,000) | # Non-Functional Buildings | Time to Restore (Days) | Mean Damage | Economic Loss ($1,000) |
|---|---|---|---|---|---|---|
| Riverside County Sheriff | 30 | $491,973 | 2 | 360-480 | 1.2% | $796 |
| Other Agencies | 21 | $183,326 | 0 | 360-480 | 0.0% | $0 |
| **TOTALS** | **51** | **$675,299** | **2** | **360-480** | **0.2%** | **$796** |

**Table 33:** Estimated Impacts on Riverside School Districts in a 0.2% Annual Chance Flood Scenario

| Category | District Name | Number of Facilities/ Sites* | No. of Buildings | Replacement Cost ($1,000) | # Buildings w/ replacement cost data | # Non-Functional Buildings | Restoration Time (Days) | Mean Damage | Economic Loss ($1,000) |
|---|---|---|---|---|---|---|---|---|---|
| K-12 (default data) | | 151 | **152** | $219,600 | 152 | 31 | 480 | 5.2% | $2,232 |
| K-12 (providing data) | Alvord USD | 26 | **525** | $274,026 | 525 | 8 | 360-480 | 1.4% | $583 |
| | Banning USD | 11 | 186 | $92,169 | 180 | 30 | 360-480 | 2.7% | $892 |
| | Beaumont USD | 20 | 209 | $179,231 | 208 | 36 | 360-480 | 4.7% | $6,424 |
| | Coachella Valley USD | 30 | 707 | $271,777 | 691 | 128 | 360-480 | 2.3% | $4,392 |
| | Corona-Norco USD | 49 | 855 | $718,384 | 855 | 128 | 360-480 | 2.0% | $6,792 |
| | Desert Center USD | 2 | 25 | $13,438 | 25 | 0 | 0 | 0.0% | $0 |
| | Desert Sands USD | 33 | 681 | $519,732 | 655 | 212 | 360-480 | 2.0% | $16,475 |
| | Hemet USD | 29 | 621 | $294,809 | 620 | 81 | 360-480 | 2.0% | $5,681 |
| | Jurupa USD | 29 | 547 | $285,015 | 547 | 8 | 360-480 | 1.3% | $330 |
| | Lake Elsinore USD | 29 | 539 | $0 | 0 | 116 | 360-720 | 7.1% | $0 |
| | Menifee Union SD | 13 | 213 | $116,628 | 211 | 0 | 0 | 0.0% | $0 |
| | Moreno Valley USD | 36 | 639 | $361,250 | 639 | 31 | 480 | 6.0% | $1,451 |
| | Murrieta Valley USD | 18 | 470 | $299,250 | 470 | 0 | 0 | 0.0% | $0 |
| | Nuview Union SD | 5 | 79 | $38,186 | 79 | 7 | 360-480 | 1.2% | $901 |
| | Palm Springs USD | 31 | 493 | $414,806 | 492 | 150 | 360-360 | 3.3% | $7,922 |
| | Palo Verde USD | 9 | 121 | $83,907 | 121 | 0 | 0 | 0.0% | $0 |
| | Perris SD | 12 | 175 | $98,885 | 174 | 13 | 360-480 | 3.1% | $1,315 |
| | Perris Union High SD | 13 | 226 | $202,431 | 221 | 12 | 360-480 | 2.6% | $5,405 |
| | Riverside Co Office of | 167 | 326 | $149,923 | 159 | 66 | 360-480 | 4.4% | $2,013 |
| | Riverside USD | 47 | 1,015 | $497,272 | 1,015 | 22 | 360-480 | 1.8% | $941 |
| | Romoland SD | 5 | 63 | $46,793 | 63 | 0 | 0 | 0.0% | $0 |
| | San Jacinto USD | 16 | 213 | $130,375 | 213 | 62 | 360-480 | 1.6% | $5,380 |
| | San Jacinto Valley | 1 | 13 | $1,105 | 13 | 1 | 360-480 | 0.4% | $14 |
| | Temecula Valley USD | 32 | 643 | $548,085 | 642 | 0 | 0 | 0.0% | $0 |
| | Val Verde USD | 25 | 386 | $388,179 | 384 | 0 | 0 | 0.0% | $0 |
| | Yucaipa-Calimesa | 1 | 11 | $23,878 | 11 | 0 | 0 | 0.0% | $0 |
| CCD (providing data) | Desert CCD | 1 | 75 | $84,687 | 74 | 62 | 360-480 | 4.1% | $4,130 |
| | Mt. San Jacinto CCD | 2 | 73 | $96,439 | 73 | 30 | 360-480 | 4.5% | $2,155 |
| | **Palo Verde CCD** | 5 | 12 | $37,440 | 12 | 0 | 0 | 0.0% | $0 |
| | **Riverside CCD** | 4 | 98 | $138,142 | 98 | 0 | 0 | 0.0% | $0 |
| **TOTALS** | | **852** | **10,39** | **$6,625,842** | **9,622** | **1,234** | **360-720** | **3.3%** | **$75,428** |

**Table 34:** Estimated Impacts on Riverside County Hospitals in a 0.2% Annual Chance Flood Scenario

| Hospital Size[20] | Supervisorial District | No. of Hospital Sites | Number of Buildings | Number of Licensed Beds | Replacement Cost ($1,000) | No. Buildings w/ replacement cost data | # Non-Functional Buildings | Restoration Time (Days) | Mean Damage | Economic Loss ($1,000) |
|---|---|---|---|---|---|---|---|---|---|---|
| Medium | 1st | 1 | 7 | 122 | $36,575 | 7 | 0 | 0 | 0.0% | $0 |
| Large | | 2 | 5 | 406 | $0 | 0 | 0 | 360-540 | 0.0% | $0 |
| Medium | 2nd | 0 | | | | | | | | |
| Large | | 2 | 8 | 533 | $0 | 0 | 0 | 0 | 0.0% | $0 |
| Medium | 3rd | 3 | 5 | 297 | $98,000 | 5 | 0 | 540 | 0.0% | $0 |
| Large | | 1 | 10 | 433 | $200,792 | 10 | 0 | 0 | 0.0% | $0 |
| Medium | 4th | 2 | 11 | 196 | $7,474 | 5 | 0 | 540 | 0.0% | $0 |
| Large | | 2 | 25 | 656 | $0 | 0 | 0 | 540 | 0.0% | $0 |
| Medium | 5th | 2 | 5 | 178 | $20,778 | 4 | 0 | 0 | 0.0% | $0 |
| Large | | 1 | 1 | 439 | $0 | 0 | 0 | 0 | 0.0% | $0 |
| **TOTALS** | | **16** | **77** | **3,260** | **$363,619** | **31** | **0** | **360-540** | **0.0%** | **$0** |

Note: In Riverside County, there are no hospitals which would be categorized by HAZUS as "Small" (<50 Licensed acute care beds)

- **Effects on Infrastructure:** A slow-rising flood situation will progress through a series of stages, beginning with minor rainfall and evolving to a major event such as substantial flooding. Once flooding begins, personnel will be needed to assist in rescuing persons trapped by floodwaters, securing utilities, cordoning off flood areas, and controlling traffic. These actions may overtax local agencies, and additional personnel and resources may be required. It is anticipated that existing mutual aid resources would be used as necessary to augment local resources.

  Many essential public and quasi-public facilities and hazardous materials sites are located within the 100- or 500-year flood zones of Riverside County. As of the writing of the Safety Element of the County's General Plan, these included 14 of the County's 39 airports; 4 of 18 hospitals; 47 of 109 police stations, fire stations, and emergency operation centers; 92 of 380 schools; 446 of 1,306 highway bridges; and 695 of 1,978 hazardous materials sites.

- **Effects on Agriculture:** As the historical events in Riverside County show, effects on agriculture can be devastating. Flooding can damage crops, livestock, and dairy stock. In addition to the obvious impacts on animals and crops, flooding can have deleterious effects on soil and the ability to reinvigorate the agricultural activities affected once the flood waters recede.

*Risk Assessment Conclusion*

Flooding due to heavy precipitation or dam failure is a potential hazard in Riverside County, with the resultant possibilities for damage to property and loss of life. Severe flooding can be particularly costly. In a relative sense, flooding due to precipitation does not present the degree of danger posed by other hazards such as major earthquakes. If there is flooding due to dam failure, the danger could be cataclysmic.

*Relationship to Other Hazards - Cascading Effects*

Fire can breakout because of dysfunctional electrical goods. Hazardous materials can also get into floodways, causing health concerns and polluted water supplies.

### 5.3.10 Civil Disorder

**Severity: 3**

**Probability: 2**

**Risk Score: 1.13**

**OA Jurisdictions Affected by Civil Disorder**

- All incorporated cities of Riverside County

*Hazard Definition*

Civil disorder or unrest is usually triggered by dramatic political or social events. Every major metropolitan area in California has experienced and is at risk for, civil disorder. The most significant civil unrest incident in the State was the 1992 Los Angeles Civil Disturbance that resulted in 53 deaths, over 2,300 injuries and over $800 million in damages. This event also precipitated simultaneous, but smaller, incidents throughout California and the country.

Civil disorder is an incident intended to disrupt community affairs and threaten the public safety. Civil disorder includes riots, mob violence, and any unlawful demonstration resulting in police intervention and arrests. Civil Unrest is generally associated with controversial political, judicial, and/or economic issues and events.

*History*

Riverside County is not a place where there has been a lot of historic civil disturbance events of noticeable magnitude. There are locations within Riverside County where large public gatherings take place. These locations have the potential for unstable conditions, possibly affecting the ability of a jurisdiction in the County to provide sufficient law enforcement and fire protective services.

**May 1, 2017** – "May Day" protest in Riverside to oppose President Trump's actions against undocumented workers, LGBT rights, fair wages, Black Lives Matter, refugees and immigrants.

**January 31, 2017** – Protests held in Riverside to protest President Trumps Travel restrictions from seven primarily Muslim countries.

**January 21, 2017** – Thousands marched in Downtown Riverside for Woman's rights.

**November 10, 2016** – UC Riverside students marched in an anti-Trump rally.

**May 7, 2016** – Trump supporters rally in Temecula approximately 350 people attended.

**July 13, 2012** – Rally against violent crimes at the Riverside Public Library.

**January 31, 2012** – Union Strike at various locations in Riverside County.

**December 2, 2011** - Protests at all of the main entrances to the Mission Inn where Buster was holding a re-election fundraiser.

**November 6, 2011** - There was an "Occupy" protest near City Hall, and 8 protesters were arrested.

**November 22, 2011** - 200 to 300 students gathered at UCR's bell tower at the center of campus to protest. (Occupy UC Riverside).

**April 15, 2010** - Riverside County Tax Day Tea Parties' Protest Rally (Tea Party).

**January 13, 2009** - The Riverside County Board of Supervisors today temporarily suspended an ordinance it passed last week to limit protests outside a large Church of Scientology compound near Hemet. Protesters show up about once a month outside Golden Era Productions, home to 500 Scientologists, on Gilman Springs Road.

**December 2004** - A demonstration at county administrative buildings that was part of a nationwide protest sponsored by the American Family Rights Association.

*Risk Assessment*

During a Civil Unrest incident that affects Riverside County, there are certain critical facilities within the County that may be more at risk than others. These critical facilities include venues for musical concerts and sporting events, facilities where legal and illegal demonstrations are held, and any other facilities with events that attract large numbers of people. All of these situations create significant traffic congestion and the potential for disruptive behavior.

- **Effects on people and housing.** The effects of a Civil Unrest are varied and usually based on the type, severity, scope, and duration of the disturbance. Effects may include illegal assemblies, injuries, and even loss of life.

- **Effects on commercial and industrial structures**. Effects may include traffic congestion or gridlock, illegal assemblies, disruption of utility service, and property damage.

- **Effects on infrastructure.** Effects may include traffic congestion or gridlock, disruption of utility service, and property damage.
- **Effects on agriculture.** Effects may include traffic congestion or gridlock, disruption of goods transportation services, and property damage.

*Risk Assessment Conclusion*

The overall risk of civil unrest in Riverside County is low.

*Relationship to Other Hazards – Cascading Effects*

Civil Unrest may lead to a fire, destruction of property, disruption of power, injury to persons, and even loss of life. It also has the potential to affect first responder response times by traffic blocking protesting techniques.

### 5.3.11 Drought

**Severity: 3**

**Probability: 3**

**Risk Score: 1.13**

**OA Jurisdictions Affected by Drought**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

*Hazard Definition*

A drought is a long period of extremely dry weather when there is not enough rain for the successful growing of crops or the replenishment of water supplies.

Drought is a gradual phenomenon. Normally, one dry year does not constitute a drought in California but rather serves as a reminder of the need to plan for droughts. California's extensive system of water supply infrastructure (reservoirs, groundwater basins, and interregional conveyance facilities) generally mitigates the effects of short-term dry periods for most water users.

Drought can have secondary impacts. For example, drought is a major determinant of wildfire hazard, in that it creates greater propensity for fire starts and larger, more prolonged conflagrations fueled by excessively dry vegetation, along with reduced water supply for firefighting purposes. Drought is also an economic hazard. Significant economic impacts on California's agriculture industry can occur as a result of short and long term drought conditions; these include hardships to farmers, farm workers, packers, and shippers of agricultural products. In some cases, droughts can also cause significant increases in food prices to the consumer due to shortages.

Past experience with California droughts tells us that drought impacts are felt first by those most dependent on or affected by annual rainfall – agencies fighting forest fires, ranchers engaged in dryland grazing, rural residents relying on wells in low yield rock formations, or small water systems lacking a reliable water source.

The driest single year in California's measured hydrologic history is 1977.

California's last major statewide drought was 2014-2017. On April 17, 2017, Governor Jerry Brown issues EO B-40, officially ending the drought state of emergency.

Climate scientists studying California weather patterns find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies.

*California Progress as of 2017:*

In January 2014, with California facing one of the most severe droughts on record, Governor Brown proclaimed a State of Emergency due to drought conditions beginning in 2012 through 2016. An interagency Drought Task Force was convened to monitor drought impacts and advise on actions to be taken if drought conditions worsened. The Drought Task Force also developed a plan for the provision of emergency food supplies, financial assistance and unemployment services in communities that suffer high levels of unemployment due to drought conditions.

In September 2014, Governor Brown issued an Executive Order authorizing Cal OES to provide California Disaster Assistance Act (CDAA) funding for local government assistance to provide emergency water supplies to households without water for drinking and/or sanitation purposes.

In April 2017, Governor Brown lifted the Executive Order Proclaiming a drought, however, he retained prohibition on wasteful practices.

The Drought Contingency Plan (DCP) contains strategies and actions that state agencies have taken or may take to prepare for, respond to, and recover from droughts. Its purpose is to minimize drought impacts by improving agency coordination and enhancing monitoring and early warning capabilities, water shortage impact assessments, and preparedness, response, and recovery programs. The DCP identifies an integrated, regional approach to addressing drought, drought action levels, and appropriate agency responses as drought conditions change. It calls for coordination and clearly defined roles and responsibilities of federal, state, and local agencies, and timely dissemination of information to decision-makers.

Five levels of drought response are identified. These range from Level 1, representing an: Abnormally Dry period (calling for raising awareness), to Level 3, a Severe Drought (requiring mandatory conservation in some communities and emergency actions), to Level 5, an Exceptional Drought (water supplies may be cut off and maximum response). A Governor's emergency drought proclamation may be initiated at Level 3.

Drought can be defined according to meteorological, hydrological, or agricultural criteria.

Meteorological drought is usually based on long-term precipitation departures from normal, but there is no consensus regarding the threshold of the deficit or the minimum duration of the lack of precipitation that makes a dry spell an official drought.

Hydrological drought refers to deficiencies in surface and subsurface water supplies. It is measured as stream flow, as well as lake, reservoir, and ground water levels.

Agricultural drought occurs when there is insufficient soil moisture to meet the needs of a particular crop at a particular time. A deficit of rainfall over cropped areas during critical periods of the growth cycle can result in destroyed or underdeveloped crops with greatly depleted yields. Agricultural drought is typically evident after meteorological drought but before a hydrological drought.

Socioeconomic drought associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather- related supply shortfall. This may also be called a water management drought.

*History*

Riverside County chronically experiences drought cycles. Drought causes stress on the County's ability to provide water to the community. In addition, drought conditions can cause extensive weakening of trees in forested areas causing them to become highly vulnerable to disease and insect infestation. Many trees have weakened and died, creating a severe fire hazard. Furthermore, wildland brush areas were dry, presenting wildfire risk.

**Figure 36:** California's drought level first week of March 2011-2015

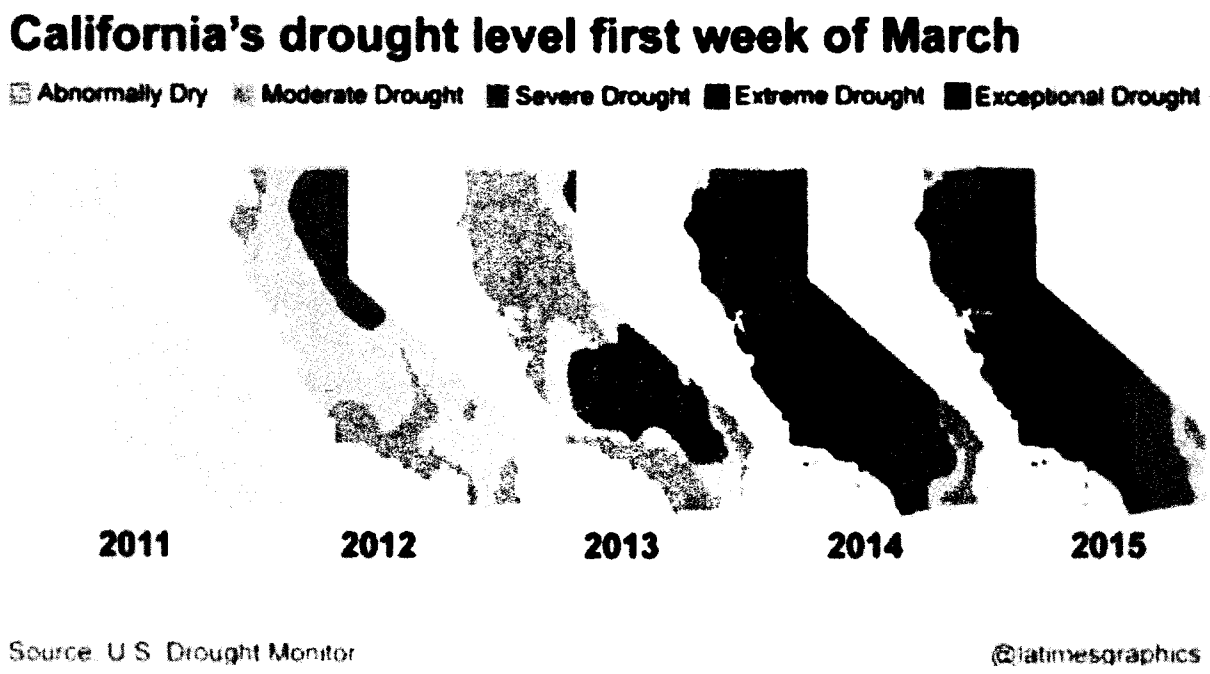
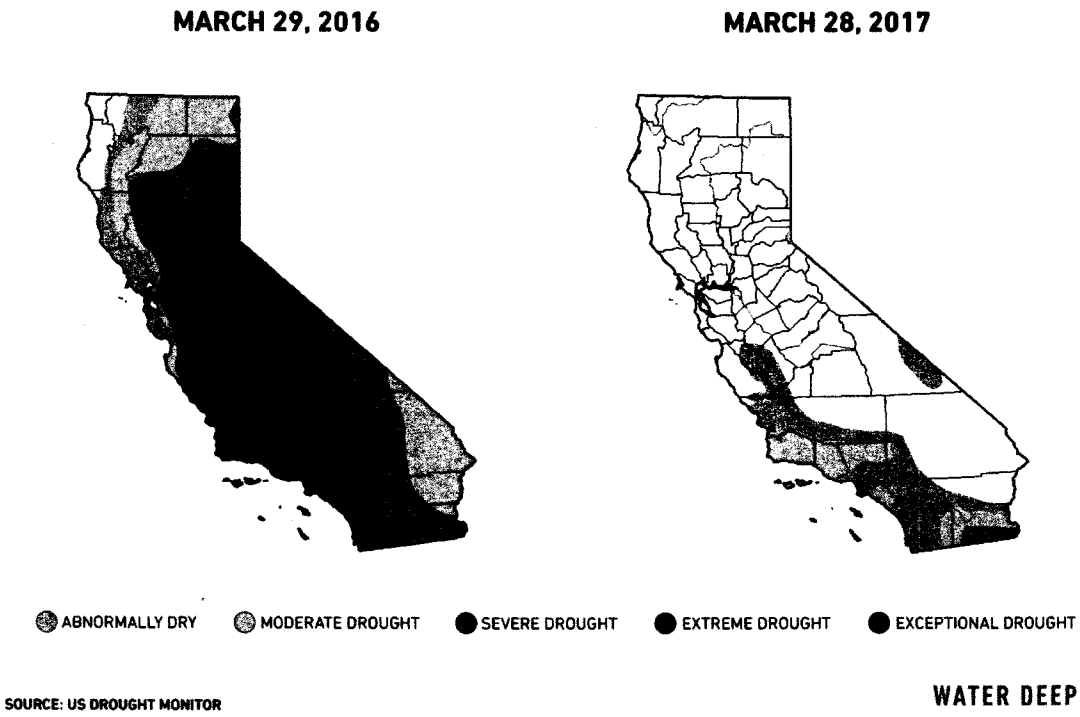



**Figure 37:** California's drought level March 2016-2017



### *Drought Risk Assessment*

The Department of Water Resources produces a California Water Plan every five years that not only includes a statewide water budget but also regional watershed water budgets. These water budgets are based on California Department of Finance population projections and indicate clearly that demand for water will exceed supply in 2020 whether or not a drought condition exists at that time. The largest average-year shortages are forecasted for the South Coast Region, which heavily relies on imported water. Future average-year shortages in the South Coast Region reflect forecasted population growth plus lower Colorado River supplies as California reduces its use of Colorado River water to the State's basic apportionment.

Although a drought in and of itself is not a direct threat to property and life, the impact on the County's agricultural industry and home development can be monumental. The costs to the County for the current drought in terms of fire damage and forest management have been in the millions. This is a chronic problem for Riverside County and accounts for significant indirect costs, loss of property and threat to human life.

### *Relationship to Other Hazards – Cascading Effects*

Drought can increase the severity of other hazards. For example, drought can lead to an increase in dead vegetation when can increase fire hazards. It can also lead to increased insect infestations.

Figure 38: U.S Drought Monitor – California

***U.S. Drought Monitor***

# California

**July 18, 2017**

***(Released Thursday, Jul. 20, 2017)***

**Valid 8 a.m. EDT**

*Drought Conditions (Percent Area)*

| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| **Current** | 75.69 | 24.31 | 8.24 | 1.06 | 0.00 | 0.00 |
| **Last Week** 07-11-2017 | 76.46 | 23.54 | 8.24 | 1.06 | 0.00 | 0.00 |
| **3 Months Ago** 04-18-2017 | 76.54 | 23.46 | 8.24 | 1.06 | 0.00 | 0.00 |
| **Start of Calendar Year** 01-03-2017 | 18.07 | 81.93 | 67.61 | 54.02 | 38.17 | 18.31 |
| **Start of Water Year** 09-27-2016 | 0.00 | 100.00 | 83.59 | 62.27 | 42.80 | 21.04 |
| **One Year Ago** 07-19-2016 | 0.00 | 100.00 | 83.59 | 59.02 | 42.80 | 21.04 |

*Intensity:*

- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

*The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.*

*Author:*

Richard Heim
NCEI/NOAA

**http://droughtmonitor.unl.edu/**

### 5.3.12 Nuclear/Radiological Incident

**Severity: 4**

**Probability: 1**

**Risk Score: 1.00**

**OA Jurisdictions Affected by Nuclear Incidents**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

***Hazard Definition***

*Radiological Accidents*

Radioactive materials are routinely transported in California. These materials include the medical and industrial sources described below, as well as wastes that have radioactive components. Many of the radioactive waste shipments come from research and cleanup efforts at national laboratories.

Radiological accidents that result in the release of radioactive materials may result in long-term health risks and contamination of the state resources, including air, water supply, groundwater, and agricultural lands.

*Profiling Radiological Accident Hazards*

Due to strict regulation of nuclear power plants in the United States, significant nuclear power incidents that can cause harm to the public have a low probability of occurrence, and none have occurred in California. Even though the probability of a catastrophic event involving a nuclear power plant is extremely low and these plants are extremely well protected, the consequences of a severe accident or a successful terrorist attack on a nuclear power plant that results in a release of radioactive materials could be very significant.

State and local governments having jurisdiction within ten miles of an operating nuclear power plant must plan, train, and conduct emergency exercises annually in accordance with federal regulations. Detailed emergency plans are maintained by each affected agency. Four Emergency Classification Levels (ECLs) have been established in federal regulations to characterize the severity of the emergency and the response actions

required. The ECLs must be used as the foundation for emergency response planning, training and exercises.

*Planning Zones*

A series of zones have been established around each nuclear power plant to clearly identify the required activities in the event of an accident. Although three specific zones are identified, efforts to protect public health and safety and the environment are made without regard to whether particular areas are inside or outside of these zones:

- The Emergency Planning Zone is an approximate 10-mile radius around the plants. Plans for this zone are in place to protect people, property, and the environment from the effects of exposure to a radioactively contaminated plume.

- The Ingestion Pathway Zone covers an approximate 50-mile radius around the plant. In this zone, plans are in place to mitigate the effects of radioactive contamination to agriculture, and food processing and distribution.

There are three general situations that could affect Riverside County, namely:

1. A situation involving nuclear weapons, which is discussed in the Terrorism section of this LHMP (Section 5.3.7);

2. A situation involving the transportation of nuclear materials; and

3. An incident involving the San Onofre Nuclear Generating Station (SONGS).

As will be discussed in the Terrorism section of this LHMP, the possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the United States would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a "dirty bomb", a bomb that is used to distribute nuclear-contaminated materials. It would have less of an effect than a "traditional" nuclear bomb, but the terror effect on the population would be great.

A nuclear incident could be initiated by a transportation emergency, either accidental or intentional. See the Transportation Emergencies section of this LHMP (Section 5.3.14).

SONGS is located on the Pacific Coast in northwestern San Diego County, approximately 4 miles southeast of the City of San Clemente. Surrounding San Onofre is a Basic Emergency Planning Zone, approximately 10 miles in radius within which certain precautionary actions must be taken and specific precautionary plans must be prepared.

This zone does not include any portion of Riverside County. Beyond this zone is an area that could be affected by radioactive fallout being deposited in such a manner as to detrimentally affect the human food chain, which includes all of Riverside County. This area is identified as the Ingestion Pathway Zone. Specifically, the primary threat is that of radioactive iodine 131 being deposited upon fodder consumed by dairy cows and subsequently appearing in milk in the public marketplace.

*History of Events*

Fortunately, Riverside County has not experienced a nuclear accident.

*Risk Assessment*

Transportation of nuclear and/or irradiated materials is of growing concern. A severe transportation incident could require the evacuation of a large number of people, major rerouting of traffic systems, and an expensive decontamination process for the area involved. Ancillary problems associated with such an incident are discussed in the sections of this LHMP dealing with Hazardous Materials and with Transportation Incidents.

*Radiological Waste Transportation*

Since 1989, the staff of the Energy Commission has represented California on two western state groups: the Western Governors' Association WIPP Transportation Advisory Group and the Western Interstate Energy Board's High-Level Radioactive Waste Committee. Both groups work with the U.S. Department of Energy and other state regional groups to develop accident prevention and emergency response plans for major federal non-classified shipments of radioactive waste. Staff also coordinates the California Nuclear Transport Working Group that develops and updates accident prevention and emergency response plans for federal shipments of transuranic waste to the Waste Isolation Pilot Plant (WIPP) in New Mexico.

To mitigate disaster, federal regulations require that:

- radiological materials transported by train use special packaging based on the hazard of the shipment
- there are extensive worker training and documentation
- vehicle and packages of radioactive materials are inspected
- The waste travels via specific, controlled routes.

*More information about radiological waste transportation can be found on Cal OES's* radiological *transportation website.*

A detailed discussion of radiation hazards and their effects on humans along with a description of the operation of a nuclear power generating facility and the hazards posed thereby are contained in the State of California Nuclear Power Plant Emergency Response Plan and in other documents.

The State Nuclear Power Plant Emergency Response Plan assigns to the County of Riverside responsibility for certain actions to protect the public and the environment within Riverside County from the effects of an accident. The plan also lists the support and assistance available from various State and Federal organizations.

- **Effects on people and housing.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on commercial and industrial structures.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on infrastructure.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.
- **Effects on agriculture.** Depending on levels of radiation exposure, the effects could range from minimal to devastating.

*Risk Assessment Conclusion*

The nearest plant to Riverside County is San Onofre, which is a three tower facility in San Diego County. In 1992 the site retired Tower 1. Towers 2 and 3 remained operational until 2012. In March of 2015 SoCal Edison was granted permission to decommission towers 2 and 3 and permanently close the site. The estimated date for full closure of the power plan is December 31, 2031.

The County is far enough away from nuclear power plants that cataclysmic exposure is not likely. There is the possibility of Riverside County being used as a major evacuation route from a nuclear plant accident. This would tax the County's response resources. The radiation from an accident would, of course, negatively affect the area.

*Relationship to Other Hazards – Cascading Effects*

Cascading effects of a nuclear incident could include contaminated water, air, and soil. It could also impact first responders and the 911 system.

### 5.3.13 Extreme Weather

**Severity: 3**

**Probability: 2**

**Risk Score: 0.75**

**OA Jurisdictions Affected by Extreme Weather**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

*Hazard Definition*

Extreme weather hazards in Riverside County include:

- Extreme Heat
- Severe Cold
- Wind Event
- Fog Event
- Agricultural Event

Climate Change can impact weather patterns within the County. Climate changes can increase or change effects of weather. Some changes may include reduced water supply, increased temperatures, decreased precipitation and increased wildfire risks.

The National Climate Data Center (NCDC) receives Storm Data from the National Weather Service. The National Weather service receives their information from a variety of sources, which include but are not limited to: county, state and federal emergency management officials, local law enforcement officials, SKYWARN spotters, NWS damage surveys, newspaper clipping services, the insurance industry and the general public.

Storm Data Disclaimer:

Storm Data is an official publication of the National Oceanic and Atmospheric Administration (NOAA) which documents the occurrence of storms and other significant weather phenomena having sufficient intensity to cause loss of life, injuries, significant property damage, and/or disruption to commerce. In addition, it is a partial record of other significant meteorological events, such as record maximum or minimum temperatures or precipitation that occurs in connection with another event. Some information appearing in

Storm Data may be provided by or gathered from sources outside the National Weather Service (NWS), such as the media, law enforcement and/or other government agencies, private companies, individuals, etc. An effort is made to use the best available information but because of time and resource constraints, information from these sources may be unverified by the NWS. Therefore, when using information from Storm Data, customers should be cautious as the NWS does not guarantee the accuracy or validity of the information.

**Table 35:** Storm Data Table (4/30/1950 to 8/7/2017)

| Type | # of Events | [illegible] | [illegible] | Deaths | Injuries |
|---|---|---|---|---|---|
| Drought | 26 | N/A | N/A | N/A | N/A |
| Dust Storm | 26 | 405 K | 100 K | 0 | 77 |
| Flood | 246 | 88.405 M | 5.200 M | 7 | 26 |
| Fog | 18 | 25K | 0 | 0 | 21 |
| Funnel Cloud | 26 | 0 | 0 | 0 | 0 |
| Hail | 30 | 131.5 K | 10 K | 0 | 2 |
| High Winds | 227 | 65.579 M | 36.705 M | 8 | 71 |
| Lightning | 30 | 254.5 K | 10.1K | 1 | 6 |
| Precipitation | 25 | 40.400 M | 0 | 0 | 26 |
| Snow and Ice | 57 | 1.386 M | 0 | 4 | 102 |
| Strong Winds | 19 | 999 K | 0 | 1 | 2 |
| Temp Extremes | 25 | 1.330 M | 1.175 M | 31 | 39 |
| Thunderstorm Winds | 119 | 4.980 M | 10 K | 0 | 0 |
| Tornado | 24 | 21.537 M | 0 | 0 | 4 |

| Type | # of Events | Property Loss | Crop Loss | Deaths | Injuries |
|---|---|---|---|---|---|
| Wild and Forest Fire | 161 | 190.892 M | 1.247 M | 1 | 131 |
| **Totals** | **1,329** | **2.229 B** | **174.429 M** | **53** | **507** |

Note: Figures in the chart above were gathered from NOAA's Storm Event Database and may not be a complete listing of previous hazard occurrences.

Riverside County's weather has a history of extremes. There are basically three weather regions in the County, each with its own type of weather and each with a different impact on the County. In some cases, the high temperatures in the desert are harmful to the public, but beneficial to agriculture. In other cases, a steady rainfall that raises the water table can be good for the County, yet too much rain will cause flooding and a disruption in the production of agricultural goods.

*Average Climates across the County*

The Weather Tables portray the averages for several areas across the County of Riverside. The cities included are Riverside, Idyllwild and Blythe. These cover the Desert, Mountain and Valley Regions, and are clear examples of the weather extremes within the county.

## Riverside Climate

**Climate Riverside - California** °C | °F

| | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|
| Average high in °F: | 68 | 68 | 71 | 76 | 80 | 87 |
| Average low in °F: | 43 | 44 | 46 | 49 | 54 | 57 |
| Av. precipitation in inch: | 2.32 | 2.4 | 1.69 | 0.67 | 0.2 | 0.08 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |

| | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
| Average high in °F: | 94 | 95 | 91 | 83 | 74 | 67 |
| Average low in °F: | 62 | 62 | 59 | 53 | 46 | 42 |
| Av. precipitation in inch: | 0.04 | 0.08 | 0.16 | 0.47 | 0.83 | 1.38 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |

Source: http://www.usclimatedata.com/climate/riverside/california/united-states/usca1695

## Idyllwild Climate

**Climate Idyllwild - California** °C | °F

| | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|
| Average high in °F: | 56 | 56 | 59 | 64 | 72 | 80 |
| Average low in °F: | 30 | 30 | 31 | 35 | 41 | 47 |
| Av. precipitation in inch: | 4.88 | 5.35 | 3.78 | 1.81 | 0.43 | 0.16 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |
| Average snowfall in inch: | 8 | 8 | 6 | 3 | 1 | 0 |

| | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
| Average high in °F: | 86 | 86 | 81 | 71 | 62 | 55 |
| Average low in °F: | 54 | 54 | 49 | 41 | 34 | 29 |
| Av. precipitation in inch: | 0.67 | 0.79 | 0.83 | 1.22 | 2.52 | 3.7 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |
| Average snowfall in inch: | 0 | 0 | 0 | 0 | 2 | 4 |

Source: http://www.usclimatedata.com/climate/idyllwild/california/united-states/usca0506

## Blythe Climate

**Climate Blythe - California** °C | °F

| | Jan | Feb | Mar | Apr | May | Jun |
|---|---|---|---|---|---|---|
| Average high in °F: | 68 | 73 | 80 | 88 | 97 | 105 |
| Average low in °F: | 40 | 44 | 49 | 55 | 63 | 69 |
| Av. precipitation in inch: | 0.55 | 0.59 | 0.39 | 0.08 | 0.04 | 0.04 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |

| | Jul | Aug | Sep | Oct | Nov | Dec |
|---|---|---|---|---|---|---|
| Average high in °F: | 109 | 108 | 102 | 90 | 76 | 66 |
| Average low in °F: | 78 | 77 | 69 | 57 | 46 | 39 |
| Av. precipitation in inch: | 0.24 | 0.43 | 0.43 | 0.2 | 0.24 | 0.59 |
| Days with precipitation: | - | - | - | - | - | - |
| Hours of sunshine: | - | - | - | - | - | - |

Source: http://www.usclimatedata.com/climate/idyllwild/california/united-states/usca0506

### 5.3.13.1 Extreme Heat

*Overview*

Extreme heat can be described as overly hot temperatures that are sustained to the extent that human and animal overexposure can cause heat illness and death. Heat illness is a major cause of preventable morbidity in regions characterized by high ambient temperatures.

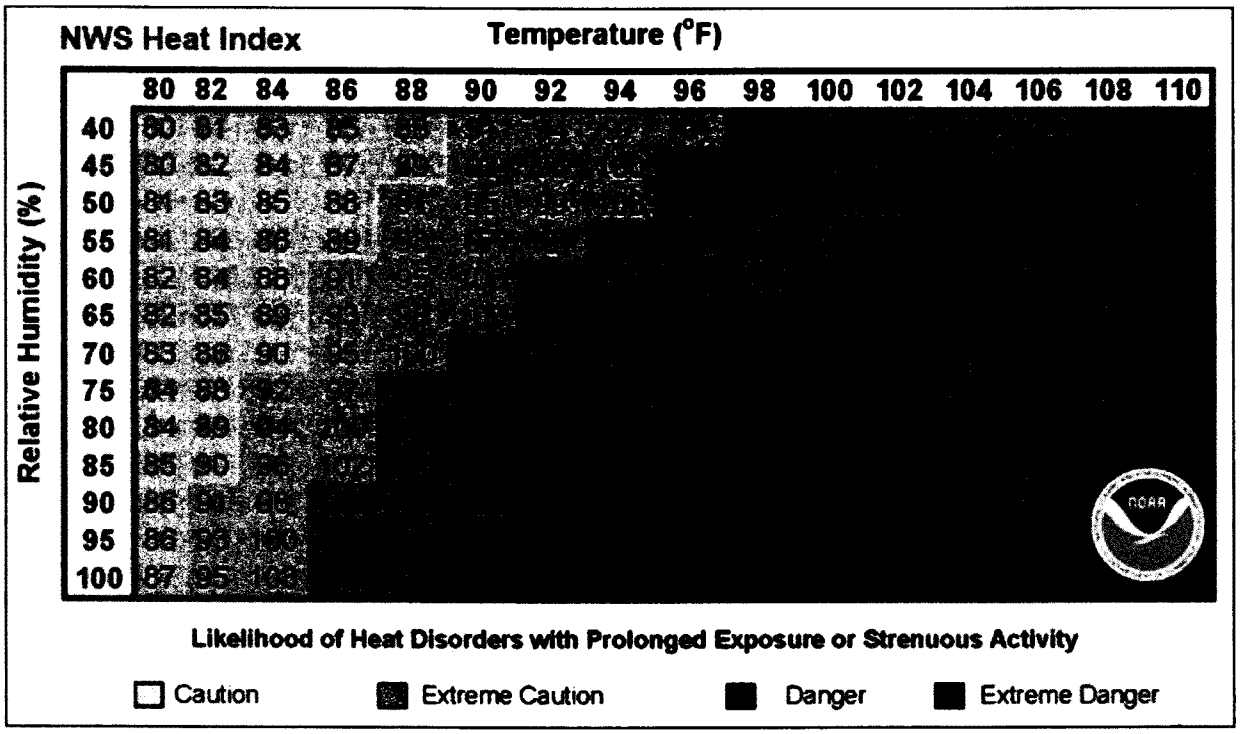
Riverside County has a wide range of temperatures, from freezing in some areas during the winter months to extremely hot temperatures for long periods of time during the summer in the deserts and other areas. In 2011 Riverside County and several other counties were impacted by a power outage during a period of high temperatures. The State Hazard Mitigation Plan addresses the issue of Extreme Heat Hazards, and this information has been included in this LHMP.

The figure on the next page illustrates the Heat Index (HI) as a function of heat and relative humidity. The Heat Index describes how hot the heat-humidity combination makes the air feel. As relative humidity increases, the air seems warmer than it actually is because the body is less able to cool itself via evaporation of perspiration. As the Heat Index rises, so do health risks.

Specifically:

- When the Heat Index is 90°F, heat exhaustion is possible with prolonged exposure and/or physical activity.
- When it is 90° to 105°F, heat exhaustion is probable with the possibility of sunstroke or heat cramps with prolonged exposure and/or physical activity.
- When it is 105° to 129°F, sunstroke, heat cramps or heat exhaustion is likely, and heatstroke is possible with prolonged exposure and/or physical activity.
- When it is 130°F and higher, heatstroke and sunstroke are extremely likely with continued exposure. Physical activity and prolonged exposure to the heat increase the risks.

**Figure 39:** The National Weather Service (NWS) Heat Index




Source: http://www.nws.noaa.gov/os/heat/heat_index.shtml

The National Weather Service (NWS) will initiate its Heat Index Program Alert procedures when the high temperature is expected to exceed 105° to 110° (depending on local climate) for at least two consecutive days.

*Extreme Heat and infrastructure*

Extreme heat can not only result in loss of life and injury but it can also cause damages to infrastructures. According to the 2017 update Draft of the Safeguarding California Plan, highway systems can be affected by extreme heat by roads buckling and rutting.

*Profiling Extreme Heat Hazards (from the 2013 SHMP)*

"Heat waves do not cause damage or elicit the immediate response that floods, fires, earthquakes, and other disasters do. They have, however, claimed many lives in comparison with other disasters. For example, the 1989 Loma Prieta Earthquake resulted in 63 deaths while the 1992 Northridge Earthquake was responsible for the loss of 55 lives. The catastrophic 2003 Southern California Firestorms resulted in 24

deaths. However, according to the 2013 SHMP, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave is said to have resulted in 946 deaths. The 2013 SHMP also states that the July 2006 heat wave in California caused the deaths of at least 136 people over a 13-day period (6 deaths were still under investigation in 2007). Another source, the Spatial Hazard Events and Loss Data for the United States (SHELDUS), estimates that approximately 47 heat events occurred in California between the years 1960 and 2008. Adjusted to 2008 dollars, SHELDUS reports that severe heat events in California caused roughly $1.8 million in property damage and $531.7 million in crop damage. From 2012 to 2014 there were 159 fatalities related to extreme Heat events within California.

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." Despite this history, however, not a single heat emergency was formally proclaimed at the state level or declared as a federal disaster between 1960 and 2008. Though no formal explanation exists for this seeming contradiction, scholars have written about the exclusion of heat events as declared disasters. For example, Eric Klinenberg, author of an account of a heat wave which killed 739 people in the City of Chicago in July 1995, suggests that the hidden nature of social vulnerability combined with the inconspicuous nature of heat events (unlike earthquakes, floods, wildfires, tornados, etc.) prevent them from being declared as legitimate disasters.61 Further, although heat events can have a devastating effect on agriculture, heat-caused property damage over the last 48 years has been relatively small.

*Treating Heat as a "Legitimate Disaster" (from the 2013 SHMP)*

These facts raise several issues. First, since the primary goal of the SHMP is to significantly reduce the loss of life and injuries in the state of California, heat is considered a legitimate disaster type. Though heat does not cause much economic damage or damage to the built environment, the number of people it has killed underscores the importance of mitigating its impacts. Second, heat events highlight the importance of thoughtful social vulnerability analyses. While changes to the built environment can greatly alter vulnerability to different hazards, social vulnerability and resiliency are especially important during heat events. For example, socially isolated elderly persons are especially vulnerable. Any mitigation efforts aimed at reducing heat losses will focus on ways to reduce social isolation as well as changes to the built environment. Third, heat events illustrate how seemingly unrelated phenomena combine to create a disaster. For example, the increased use of air conditioners during heat waves can lead to power outages, which makes the events even more deadly. Upgrading water and power infrastructure, then, is a form of heat disaster mitigation.

Situational and physical characteristics help to identify vulnerable populations that may not comfortably or safely access and use disaster resources. Specifically, when discussing heat related emergency preparedness, the following groups could be considered vulnerable or at greater risk in a heat emergency:

- Infants and small children under age three
- Women who are pregnant
- Elderly people (age 65 and older)
- Homeless
- The obese
- The bedridden
- Mentally ill
- Those with cognitive disorders
- Those with medical conditions (e.g., heart disease, diabetes, high blood pressure)
- Those requiring life-saving medications (e.g., for high blood pressure, depression, insomnia)
- Individuals with drug or alcohol addictions
- Those with mobility constraints
- People who are non-ambulatory
- Those under extreme working conditions
- The poor
- People who are socially isolated
- Non-English speakers who may not have access to information

Animals, including domestic pets, livestock, and poultry are also susceptible to extreme heat. For example, dogs and cats are in danger of heat stroke in temperatures of 110°F. The heat wave of 2006 resulted in 15 reported pet deaths and more than 25,000 cattle, and 700,000 fowl heat-related deaths.

**Table 36:** 1991 -2013 Heat Deaths in California

| | < 1 | 1-4 | 5-9 | 10-14 | 15-19 | 20-24 | 25-44 | 45-64 | 65-84 | 85+ | *Total* |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **1991** | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 5 | 5 | 0 | ***17*** |
| **1992** | 0 | 0 | 0 | 1 | 2 | 0 | 8 | 3 | 2 | 1 | ***17*** |
| **1993** | 0 | 1 | 0 | 0 | 0 | 1 | 1 | 3 | 6 | 0 | ***12*** |
| **1994** | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 7 | 9 | 0 | ***23*** |
| **1995** | 0 | 0 | 0 | 0 | 0 | 1 | 6 | 5 | 3 | 2 | ***17*** |
| **1996** | 0 | 1 | 0 | 0 | 0 | 0 | 5 | 8 | 7 | 0 | ***21*** |
| **1997** | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 | 1 | ***7*** |
| **1998** | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 2 | 2 | 0 | ***9*** |
| **1999** | 0 | 2 | 0 | 0 | 0 | 0 | 5 | 3 | 8 | 1 | ***19*** |
| **2000** | 2 | 0 | 1 | 0 | 0 | 2 | 10 | 9 | 8 | 3 | ***35*** |
| **2001** | 0 | 3 | 0 | 0 | 0 | 0 | 3 | 8 | 4 | 1 | ***19*** |
| **2002** | 2 | 1 | 0 | 0 | 0 | 1 | 12 | 4 | 3 | 1 | ***24*** |
| **2003** | 1 | 0 | 0 | 0 | 1 | 3 | 12 | 6 | 6 | 0 | ***29*** |
| **2004** | 1 | 2 | 0 | 0 | 0 | 1 | 9 | 8 | 6 | 1 | ***28*** |
| **2005** | 0 | 1 | 1 | 2 | 0 | 2 | 13 | 7 | 5 | 5 | ***36*** |
| **2006** | 1 | 0 | 0 | 0 | 0 | 3 | 22 | 48 | 38 | 10 | ***122*** |
| **2007** | 2 | 1 | 0 | 0 | 2 | 2 | 14 | 13 | 4 | 4 | ***42*** |
| **2008** | 0 | 0 | 0 | 0 | 1 | 1 | 5 | 15 | 3 | 4 | ***29*** |
| **2009** | 1 | 0 | 0 | 0 | 1 | 2 | 8 | 15 | 7 | 5 | ***39*** |
| **2010** | 1 | 0 | 0 | 0 | 1 | 1 | 5 | 9 | 4 | 1 | ***22*** |
| **2011** | 0 | 0 | 0 | 0 | 0 | 1 | 3 | 8 | 4 | 1 | ***17*** |
| **2012** | 0 | 0 | 0 | 0 | 1 | 2 | 17 | 13 | 7 | 4 | ***44*** |
| **2013** | 1 | 0 | 0 | 1 | 2 | 2 | 10 | 14 | 11 | 2 | ***43*** |
| *Total* | ***12*** | ***12*** | ***2*** | ***4*** | ***11*** | ***28*** | ***187*** | ***213*** | ***155*** | ***47*** | ***671*** |

*Current as of June 2017
Source: CDPH Vital Statistics Death Statistical Master Files
Prepared by: California Department of Public Health, Safe and Active Communities Branch
Report generated from http://epicenter.cdph.ca.gov on: August 07, 2017

### 5.3.13.2 Severe Cold

*Overview*

Riverside County generally experiences a Mediterranean or Desert climate. When temperatures suddenly drop it can potentially lead to loss of life in humans and livestock, as well as severely damage crops.

When temperatures drop below freezing that is the most dangerous time for crops. When water freezes it expands, this effect causes damage to a plants structure and may cause it to die.

*Identifying Freeze Hazards (2013 SHMP)*

Sustained temperatures below freezing in California's generally mild weather regions can cause life loss and health risks to vulnerable populations. Although infrequent, freezes can severely affect California agriculture. Freezing temperatures occurring during winter and spring growing seasons can cause extensive crop damage.

Secondary impacts of freeze disasters can include major economic impacts on farmers, farm workers, packers, and shippers of agricultural products. Freezes can also cause significant increases in food prices to the consumer due to shortages.

Freezing spells are likely to become less frequent in California as climate temperatures increase. If emissions follow higher pathways, freezing events could occur only once per decade in a sizable portion of the state by the second half of the 21st century. While fewer freezing spells would decrease cold-related health effects, too few freezes could lead to increased incidence of disease as vectors and pathogens do not die off (CNRA 2009).

### 5.3.13.3 Wind Event

*Overview*

Windstorms are a hazard for many of the participating.

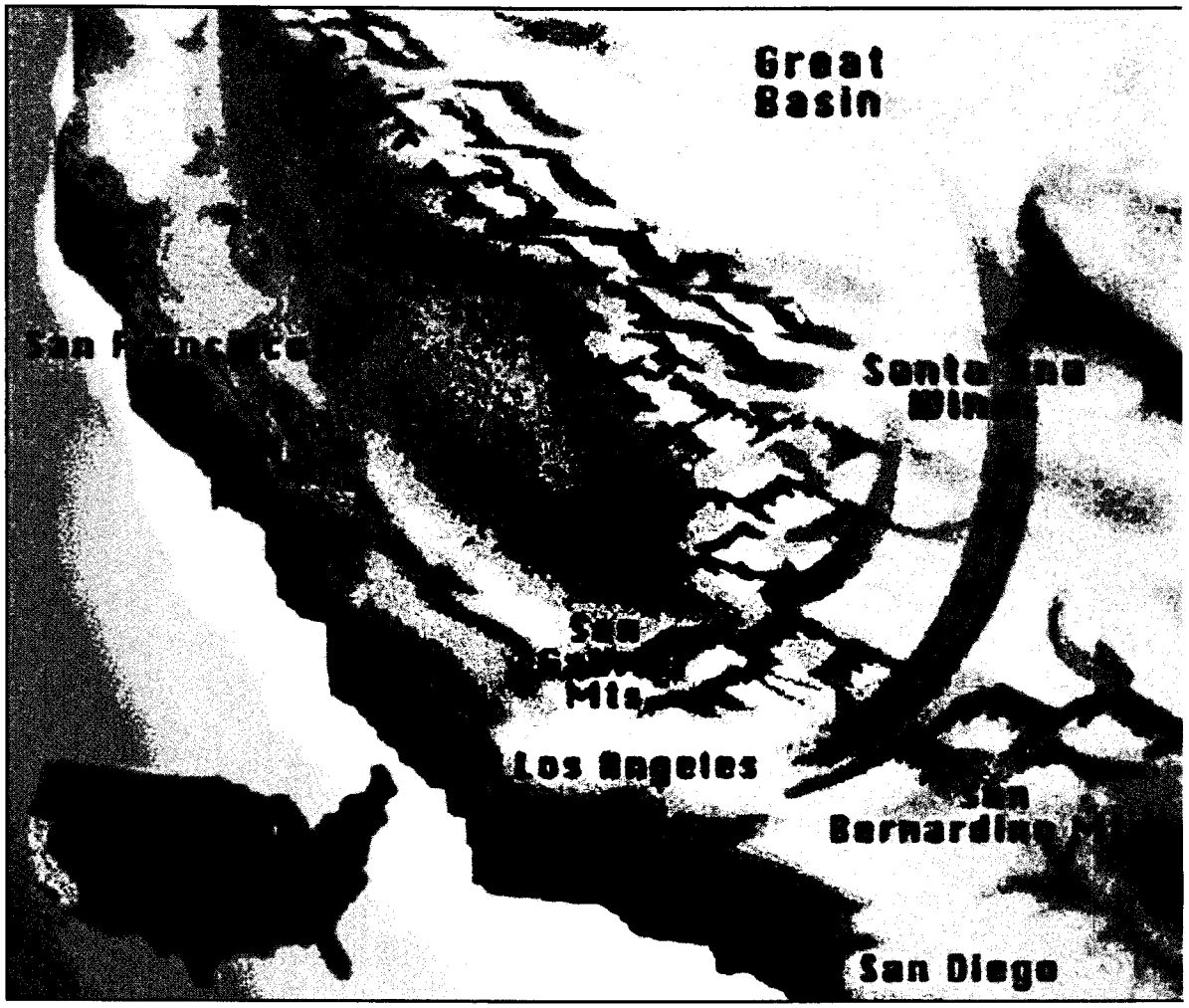
Santa Ana Winds have caused large amounts of damage and increased the fire damage level dramatically. Santa Ana Winds are generally defined as warm, dry winds that blow from the east or northeast (offshore). These winds occur below the passes and canyons of the coastal ranges of Southern California and in the Los Angeles basin. Santa Ana winds often blow with exceptional speed in the Santa Ana Canyon (the canyon from which it derives its name). Forecasters at the NWS in Oxnard and San Diego usually place speed minimums on these winds and reserve the use of "Santa Ana" for winds greater than 25 knots.

The complex topography of Southern California combined with various atmospheric conditions creates numerous scenarios that may cause widespread or isolated Santa Ana events. Commonly, Santa Ana winds develop when a region of high pressure builds over the Great Basin (the high plateau east of the Sierra Mountains and west of the Rocky Mountains including most of Nevada and Utah). The clockwise circulation around the center of this high pressure area forces air downslope from the high plateau. The air warms as it descends toward the California coast at the rate of 5 degrees F per 1000 feet due to compressional heating. Thus, compressional heating provides the primary source of warming. The air is dry since it originated in the desert, and it dries out even more as it is heated.

Santa Ana winds commonly occur between October and February with December having the highest frequency of events. Summer events are rare. Wind speeds are typically north to east at 35 knots through and below passes and canyons with gusts to 50 knots. Stronger Santa Ana winds can have gusts greater than 60 knots over widespread areas and gusts greater than 100 knots in favored areas. Frequently, the strongest winds in the basin occur during the night and morning hours due to the absence of a sea breeze. The sea breeze which typically blows onshore daily can moderate the Santa Ana winds during the late morning and afternoon hours.

The following maps and photos show the direction of the Santa Ana winds as they travel from the stable, high-pressure weather system called the Great Basin High through the canyons and towards the low-pressure system off the Pacific. Riverside County is in the direct path of the ocean-bound Santa Ana winds.

Figure 40: Direction of Santa Ana Wind Patterns




Source: http://www.theweatherprediction.com/weatherpapers/049/

*Risk Assessment*

The Santa Ana Winds pose several different types of threats.

1. By themselves, the winds pose a threat to the health of the people and to structures in the County.

a. Health risks relate primarily to breathing problems caused by the blowing dust and plant pollen.

b. Structural issues relating to the winds range from roofs being blown off to trees falling onto buildings.

2. The winds increase the threat and/or severity of fires in the urban areas

a. Wind-blown flames will spread more rapidly when pushed by high Santa Ana Winds.

3. Santa Ana Winds dry out brush and forest areas and increase the speed of a fire.

4. Santa Ana Winds cause power lines to arc, resulting in fires
5. Santa Ana Winds can either cause trees to fall on power lines or power lines to break, causing power outages.

*Wind Erosion*

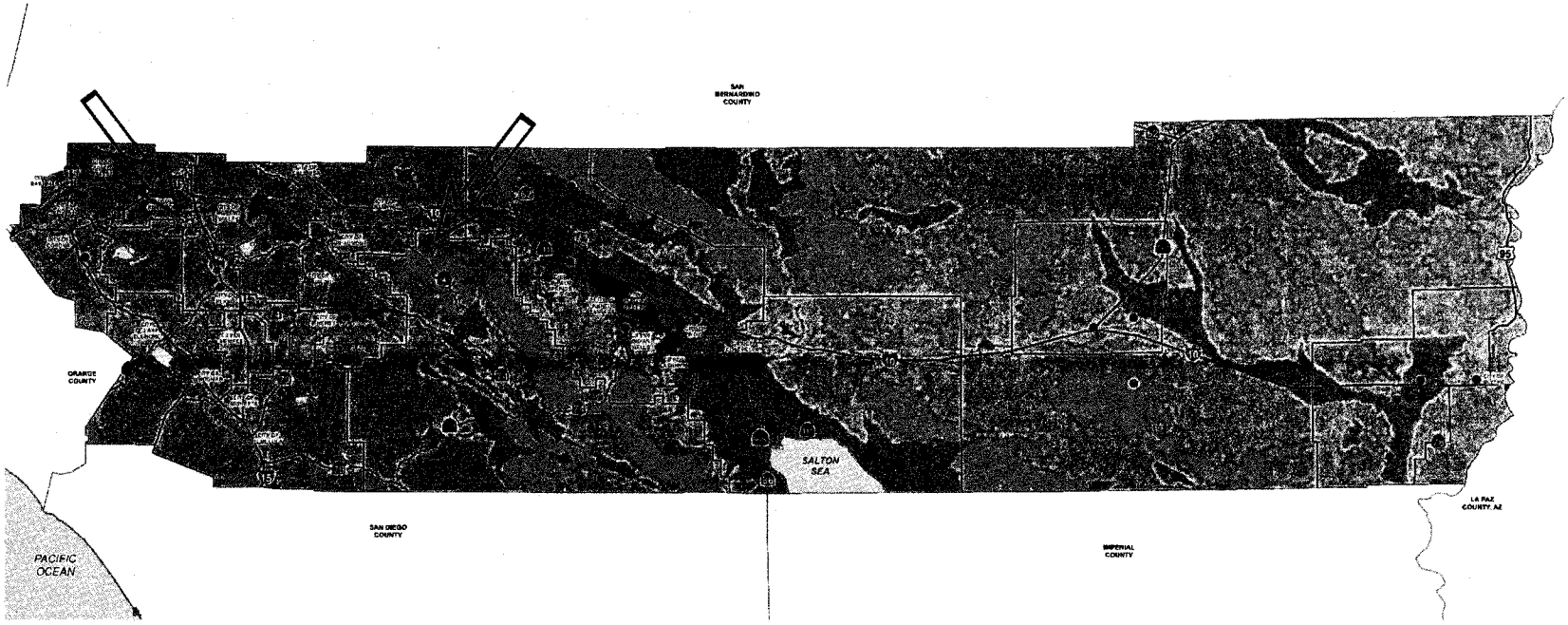
Soil erosion is also a natural on-going process that transports, erodes and displaces soil particles through a transport mechanism, such as flowing water or the wind. Loose texture and steep slopes primarily result in high wind erosion potential in soils. Wind erosion is most severe in arid regions, where sandy or loamy sediments are un-vegetated and exposed to severe wind conditions.

In addition to the problems caused by the Santa Ana Winds, wind erosion is a serious environmental problem attracting global attention. Soil movement is initiated as a result of wind forces exerted against the surface of the ground. Dust particles in the air create major health problems. Atmospheric dust causes respiratory discomfort, may carry pathogens that cause eye infections and skin disorders and reduces highway and air traffic visibility. Dust storms can cause additional problems. Buildings, fences, roads, crops, trees and shrubs can all be damaged by abrasive blowing soil.

The wind and wind-blown sand are an environmentally-limiting factor throughout much of Riverside County. Approximately 20 percent of the land area of Riverside County is vulnerable to "high" and "very high" wind erosion susceptibility. The Coachella Valley, the Santa Ana River Channel in northwestern Riverside County, and areas in and around the Cities of Hemet and San Jacinto are zones of high wind erosion susceptibility. Human intervention can accelerate the natural erosion process. For instance, typical consequences of development increase erosion potential from the removal of vegetative cover and reduction of overall permeable area. These activities can lead to increased water runoff rates and concentrated flows that have greater potential to erode exposed soils. The effects of excessive erosion range from nuisance problems that require additional maintenance, such as increased siltation in storm drains, to instances of more severe damage, where water courses are down-cut and gullies develop. These processes can eventually undermine adjacent structures or topography. Human activities that disturb soils in arid regions increase wind erosion potential. Many of the desert areas are also susceptible to blowing sand, a severe

form of wind erosion that damages property and accumulates soil on roadways. The majority of the soils within the district exhibit moderate to high erosion potential, which can be compounded by development.

**Map 34:** Riverside County Wind Erosion Map




Data Source: Earth Consultants International (2003)

*Figure S-8*

**WIND EROSION SUSCEPTIBILTY AREAS**

### 5.3.13.4 Fog Event

*Overview*

Fog forms from air being cooled to the point where it can no longer hold all of the water vapor it contains. For example, rain can cool and moisten the air near the surface until fog forms. A cloud-free, humid air mass at night can lead to fog formation, where land and water surfaces that have warmed up during the summer are still evaporating water into the atmosphere. This is called radiation fog. A warm moist air mass blowing over a cold surface also can cause fog to form, called advection fog.

Fog can have a devastating effect on transportation. Nighttime driving in the fog is dangerous and multi-car pileups have resulted from drivers using excessive speed for the conditions and visibility. Fog contributes to transportation accidents and is a life safety hazard. These accidents can cause multiple injuries and deaths and could have serious implications for human health and the environment if a hazardous or nuclear waste shipment were involved. Dense fog may also delay emergency response vehicles.

This hazard does not occur regularly but has had an impact on the highways.

### 5.3.13.5 Agricultural Event

*Overview*

Agriculture in Riverside County must be considered from two standpoints, namely, both as a product producer/exporter and a major economic provider to the County of Riverside. In 2014, Riverside County ranked in the top fourteen leading agricultural counties in California, with an agricultural production value of $1.36 billion. Major agricultural industries include milk, nursery products, citrus and avocado, grapes, vegetables and hay.

Riverside County is divided into two general agriculture regions (Desert and Western Riverside County), with the San Bernardino National Forest acting as a natural dividing line.

*Desert - Coachella Valley & Palo Verde Valley*

Agriculture is the second largest industry in the Desert Valleys and is primarily crop- related. Over 61% of Riverside County's crop production is grown in the Coachella and Palo Verde Valleys. In addition to crop production, many supporting industries, such as packing and distribution, are located in the desert

area. The Coachella Valley produces 95% of all dates grown in the United States and the annual fruit crop exceeds 40 million pounds. The Desert's list of agriculture-related products includes:

- Vegetable & Melon Crops (Bell Peppers, Lettuce, Corn, Watermelon, etc.)
- Nursery Stock
- Turf/Sod Producers
- Field Crops (Hay, Cotton, Wheat, etc.)
- Citrus
- Tree & Vine Crops (Table Grapes, Dates)

*Western Riverside County (WR)*

Agriculture in the Western Riverside County region is an ever-changing industry. With the large increase in housing in this area of the County over the past few years, there has been a reduction of several agriculture-related industries. This reduction is primarily in the poultry and dairy industries. The Western Riverside County list of agriculture-related products includes:

- Dairy Cattle
- Nursery Stock
- Beef Cattle
- Poultry and Eggs
- Citrus Crops
- Tree and Vine Crops (Avocado, Wine Grapes)
- Field Crops (Wheat, Hay, Green Chop)
- Vegetable Crops (Potatoes, etc.)
- Fish Hatcheries (for domestic and international distribution)

Statistics for Riverside County Agriculture

**Table 37:** USDA statistics for Riverside County Agriculture for 2012 show the following:

| | |
|---|---|
| Payroll | $16 million |
| Farms | 3,440 |
| Farm Acreage | 344,044 |
| Crop Value Production | $1.03 billion + |
| Livestock, poultry value including production | $146 million + |
| Dairy cows | 42,954 |
| Sheep and Lambs | 36,846 |
| 20 week old and older layers | 4,127,452 |
| Wheat for Grain Acreage | 6,400 |

United States Department of Agriculture, National Agricultural Statistics Service reports listed the following as the Top 5 commodities in 2015.

**Table 38:** Top 5 Commodities

| | |
|---|---|
| Milk Products | $165,124 million |
| Table Grapes | $143,988 million |
| Nursery Stock | $137,707 million |
| Lemons | $120,557 million |
| Hay | $81,760 million |

*History*

**Table 39:** Agriculture-related disasters in Riverside County:

| Riverside County Agriculture Disasters | | | | |
|---|---|---|---|---|
| **Year** | **Disaster** | **Commodity** | **Damages** | **Region** |
| 1979-80 | Wind | Avocado and Citrus | $40,000.00 | |
| 1979-80 | Rain/Floods (El Nino) | Olive Trees (4,200) | $319,494.00 | WR. |
| 1979-80 | Rain/Floods | Sugar beets, Barley & | $182,711.00 | WR. |
| 1979- | Rain/Floods | Potato Crop | $2,000,000.00 | WR. |
| 1979-80 | Rain/Floods | Dairy and Livestock | $211,900.00 | WR. |
| 1982-1983 | Rain/Floods (El Nino) | All agriculture | | Countywide |
| 1990 * | Insect Infestation-Med- fly | Fruit | | Countywide |
| 1990-91 | Freezing temperatures | Citrus, avocados, | $15,450,000.00 | Countywide |
| 1990- | Drought | | | WR |
| 1991 | Insect Infestation-white fly | Melons, squash, cucumbers, | | WR, Desert |
| 1992- | Rain/Flood | | | |
| 1993-94 | Insect Infestation-Med- Fly | Fruit | | WR |
| 1996 | Plant disease-Karnel Blunt | Wheat | | WR/Blythe |
| 1997-98 | Rain/Flood (El Nino) | Wheat | $167,000.00 | WR |
| 1997-98 | Rain/Flood (El Nino) | Livestock & Dairy | $4,100,000.00 | WR |

| | | | | |
|---|---|---|---|---|
| 1999 | Freezing temperatures | Citrus | $1,630,000.00 | Countywide |
| *1999-2002 ** | *Insect spread disease - (Pierce's Disease)* | *Wine Grapes* | *$16,000,000.00* | *WR* |
| *2001-July ** | *Rain/Floods-Desert Storm* | *Misc. land & irrigation damage* | *~ $1,000,000.00* | *CV* |
| 2002-2003 | Drought | Dairy farms, dry land crops, etc. | | Countywide |
| 2002 | High Winds/Freeze | Avocado & Citrus Crops | $8,586,000.00 | WR |
| 2002-03 | Animal Disease-END | Poultry - 300,000 birds in So. Calif. | | WR |
| 2003-04 | Wildfire | Nursery, various | | WR |
| 2004-05 | Severe Storms – Excessive Moisture | All Agricultural Commodities | | Countywide |
| 2005 | Severe Storms – Excessive Moisture | All Agricultural Commodities | | Countywide |
| 2006 | Excessive | Livestock | | WR |
| 2007 | Winter Storms | All Agricultural | | Countywide |
| 2007 | Wildfires | Avocados | | WR |
| 2007 | Below Normal Temperatures, Winter Storms | All Agricultural Commodities | | Countywide |

| | | | | |
|---|---|---|---|---|
| 2007 | Hail | All Agricultural | | Countywide |
| 2007 | Drought | Grain Crops, Livestock | $3.8 Million + | WR |
| 2008 | Wildfires | All Agricultural | | WR |
| 2009 | Drought | Grain Crops, Livestock | $5.0 Million + | WR |
| 2010 | Earthquake | Agricultural Buildings | | Coachella Valley |
| 2010 | Winter Storms – Flooding, Debris Flow, | All Agricultural Commodities | | Countywide |
| 2013-2016 | Drought | Crops damaged due to | | County Wide |

*Denotes a locally declared disaster

### Risk *Assessment*

When considering Agriculture the County factored in both crops and animals/livestock. Both groups have a three day window before serious damages occur (aside from physical damages that may happen due to earthquake or floods).

#### *Animals*

Most beef and dairy ranches, chicken ranches, swine farms, and other agricultural animal facilities usually only have a 2-to-3 day supply of feed on-site. Most of the large feed providers in the County do not have more than a 3-to-5 day supply. Restocking of feed supplies is done primarily by rail to the feed providers and then by truck to the local ranches.

In addition to providing feed for the animals, the impact on the dairy farms would be immense. The time factor for the dairy farms would be almost immediate. Not being able to move milk to the milk house was a major concern. Dairy cows have to be milked and without the ability to transport the milk off property, that milk has to be disposed of in some way so as not to contaminate the soil or create a positive host for insects.

#### *Crops*

Although many crops are time sensitive and there is a limited amount of storage space in local packing houses, transportation issues vary based on the time of year and crop season.

*Water Related Hazards*

Many crops are not as water-dependent as animals are, though some ground and vine crops have a very short lifespan without an adequate supply. Short-term water supplies can be provided to animals through the use of water trucks; however, water trucks cannot support large crop areas with an adequate level of water.

Water-related issues included:

1. Local water supply (wells, holding ponds, etc.) contamination occurring either naturally or from man-made causes
2. Loss of water supply due to pipeline or aqueduct damage from an earthquake.

*Hazmat Incidents – On-Property and Off-Property*

The definition for an On-Property Hazmat incident relates to the improper use of chemicals, crop-dusting accidents or errors, accidental chemical spills into the ground, and other similar incidents. Off-Property Hazmat events relate to the typical transportation Hazmat incident. Both groups (animal-related and crop-related) were very concerned about the impact of an On-Property event. There was a higher level of concern about the impact of an Off-Property event for animals than for crops. Both groups rated the probability of either type of event occurring as low.

*Transportation Events*

Transportation events were listed as either short-term (less than 3 days) or long-term (over 3 days) and included:

1. Railroad accidents interrupting the delivery of products into the County;

2. Railroad accidents interrupting the movement of products out of the County;

3. A railroad or trucking strike; and

4. A disruption in transportation lines due to an earthquake, flood, fire, or another event.

Both animals and crops viewed the 3-day point as critical from both an economic and operational standpoint, with the crop group indicating that the 3-day window could be reduced based on whether or not it was picking season.

*Insect infestation and Disease to Crops and Vines*

There is an ever-changing potential for damage to local crops and vines from disease and insect infestation. The County has been attacked by a wide variety of pests, insects, and diseases, and because of the diversity of the types of crops in the County, maintaining a pro-active approach has been difficult. Studies and history show that should there be a disease outbreak or contamination of crops/vines, the economic impact would be enormous. Recent events in other states have shown the potential for bans on importation of cattle/dairy products from affected states.

One of the primary concerns of the producers in the County is the illegal or uninspected importation of plants into this region. The majority of insect, pest, and disease issues in the County can be attributed to this problem.

**Table 40:** Primary Crop-related Insect Infestations for Riverside County

The table below shows the primary crop-related insect infestations in the County over the past twenty years:

| |
|---|
| AFRICANIZED HONEY BEE |
| BARK BEETLE |
| CITRUS LEAFMINER |
| GLASSY-WINGED SHARPSHOOTER |
| GYPSY MOTH |
| HONEY BEE TRACHEAL MITE |
| JAPANESE BEETLE |
| LESSER SNOW SCALE |
| MAGNOLIA WHITE SCALE |
| MEDITERRANEAN FRUIT FLY |
| ORIENTAL FRUIT FLY |
| PIERCE'S DISEASE |
| RED IMPORTED FIRE ANT |
| STING NEMATODE |
| TROPICAL PALM SCALE |
| VARROA MITE/HONEY BEE |
| ASIAN CITRUS PSYLLID |
| SILVERLEAF WHITEFLY |
| POLYPHAGOUS SHOT-HOLE BORER |

**Figure 41:** 2015 Pest Interceptions Chart

**PEST INTERCEPTIONS - 2015**

| Scientific Name | Common Name | Pest Rating | Interceptions |
|---|---|---|---|
| *Solenopsis invicta* | Red Imported Fire Ant | A | 30 |
| *Maconellicoccus hirsutus* | Pink Hibiscus Mealybug | A | 8 |
| *Lopholeacaspsis cockerelli* | Cockerell Scale | A | 3 |
| *Pseudaulacaspis cockerelli* | Magnolia White Scale | A | 1 |
| *Ceroplastes floridensis* | Florida Wax Scale | A | 1 |
| *Paropeas achatinaceum* | Land Snail | A | 1 |
| *Aspidiotus destructor* | Coconut Scale | A | 1 |
| *Homalodisca vitripennis* | Glassy-Winged Sharpshooter | B | 2 |
| *Aonideilla aurantii* | California Red Scale | B | 1 |
| *Pulvinaria urbicola* | Urban Soft Scale | B | 1 |
| *Bradybaena similaris* | Asian Tramp Snail | B | 1 |
| *Fatoua villosa* | Crabweed | B | 1 |
| *Nipaecoccus sp.* | Mealybug | Q | 2 |
| *Paracoccus sp.* | Mealybug | Q | 2 |
| *Aspindiella sacchari* | Armored Scale | Q | 1 |
| *Phenacoccus peruvianus* | Mealybug | Q | 1 |
| *Ferriasia sp.* | Mealybug | Q | 1 |
| *Milviscutulus sp.* | Scale | Q | 1 |
| *Ophelimus mastielli* | Gall Wasp | Q | 1 |
| *Bambusaspis miliaris* | Bamboo Pit Scale | Q | 1 |

### *Animal Diseases*

There have not been recent incidents of catastrophic outbreaks of disease in the cattle/dairy industry. This is due in part to excellent precluding efforts on behalf of the cattle/dairy industry. Studies and history show that if there is an outbreak of cattle/dairy- related disease, the economic impact would be enormous. Recent events in other states have shown the potential for bans on importation of cattle/dairy products from affected states. In a short period of time, the inability to export products from the County would have wide-ranging economic effects.

The poultry industry is particularly vulnerable to the spread of disease because many fowl are kept in residential back yards and are therefore hard to monitor. Diseases can be spread by mosquitoes and/or ranch service operations that often serve more than one farm, increasing the odds of infection being spread. Outbreaks of the Exotic Newcastle Disease in the poultry industry in 2003 have resulted in the necessary depopulation of 3.16 million chickens in the County. This disease required the quarantine of a large area of Southern California, including all of Riverside County. The economic loss to the ranchers and County as a whole was estimated to be 161 million.

Diseases of primary concern to the area are:

- Avian Influenza
- Exotic Newcastle Disease
- Fowl Pox
- Hoof-and-Mouth Disease
- Transmissible Spongiform Encephalopathies

*Loss of Electrical Power*

The loss of electrical power is becoming more of a concern to all areas of agriculture. Depending on the season, the loss of electrical supply to a poultry ranch can be devastating within 2-to-4 hours because of the inability to keep the chickens cool. The loss of electrical power for over a 12 hour period can be devastating to a dairy farmer who cannot milk dairy cows.

### 5.3.14 Transportation Failure

**Severity: 3**

**Probability: 2**

**Risk Score: 0.38**

**OA Jurisdictions Affected by Transportation Hazard Incidents**

- Riverside Community College District
- San Gorgonio Memorial Hospital
- Banning
- Beaumont
- Blythe
- Calimesa
- Canyon Lake
- Cathedral City
- Coachella
- Corona
- Desert Hot Springs
- Eastvale
- Hemet Indian Wells
- Indio
- Jurupa Valley
- La Quinta
- Lake Elsinore
- Menifee
- Moreno Valley
- Murrieta
- Norco
- Palm Desert
- Palm Springs
- Perris
- Rancho Mirage
- Riverside
- San Jacinto
- Temecula
- Wildomar

*Hazard Definition*

Transportation hazards are incidents involving air, rail, or highway transport of goods or passenger travel resulting in property damage, death, or serious injury. The incidents can be caused by transportation of hazardous materials, earthquake, hazardous weather, or other hazardous conditions affecting the uninterrupted flow of transportation and/or public safety.

Five major transportation systems operate within Riverside County.

1. Highways
2. Railroads
3. Air traffic
4. High-pressure petroleum and gas lines
5. Aqueducts.

Pipelines and aqueducts are treated separately in following sections of this LHMP.

*History*

Highways. The traffic density on the freeway and highway systems in the western part of the County is of particular concern. The population and economic growth in this area have caused increased demand on these networks.

Although the seasons do not have a large impact on Riverside County, there is the threat of poor visibility due to winter fog. Adding to this problem is the fact that one out of every ten trucks on the freeway carries some sort of hazardous materials. (In addition, California Highway Patrol statistics show that 20 – 25 percent of them are usually driven in an unsafe mechanical condition.)

Rail Lines. Major rail transport lines through Riverside County include Union Pacific and the Burlington Northern Santa Fe (BNSF) Railway Companies. Rails, cars, supporting bridges, overpasses, and electrically-operated switching mechanisms are susceptible to damage.

Union Pacific and the BNSF Railway Companies lines enter the Coachella Valley from Imperial County along the eastern shore of the Salton Sea.

Major population centers affected by railroad transportation are vulnerable to the impact of a wide variety of hazardous materials transported by these carriers. Additionally, there are lines running east and west that carry significant tonnage daily. Some of these lines are in remote areas, but that does not lessen the overall seriousness of their impact.

*Airlines / Airports.*

The western part of Riverside County has some of the busiest air traffic areas in the United States. Commercial, as well as military traffic, is very heavy. The number of near misses reported by pilots underscores the increasing possibility of a mid-air collision over the County.

There are two major airports in Riverside County: March Air Reserve Base and Palm Springs International. There are also numerous smaller municipal and commercial airports and private air strips:

- Banning Airport
- Bermuda Dunes Airport
- Blythe Airport
- Chiriaco Summit Airport
- Corona Municipal Airport
- Desert Center Airport
- Flabob Airport
- French Valley Airport
- Hemet- Ryan Airport
- Lake Elsinore/Skylark Airport
- Perris Valley Airport
- Rancho California Airport
- Riverside Municipal Airport
- Jacqueline Cochran Regional Airport

In addition, there are five major out-of-county airports operating in the vicinity of Riverside County with significant flight-paths over the County:

1. John Wayne Airport (Orange County)
2. Long Beach Airport (Los Angeles County)
3. Los Angeles International (LAX) Airport
4. Ontario Airport (San Bernardino County)
5. Chino Airport (Airport Influence Area extends into Riverside County)
6. San Diego International Airport (SAN) San Diego County

*Risk Assessment*

The possibility for a transportation hazard to occur is ongoing. There have been railway incidents in the recent past, although they have not been numerous and have not caused extensive damage. Semi-trucking incidents are not uncommon and could result in a hazardous spill at any time, although notable events have not occurred in recent history. There has not been a serious airline accident in the area in the recent past.

- **Effects on people and housing.** As the historical events in Riverside County show, people may be evacuated when a transportation emergency occurs. Relative to some of the other natural hazards assessed earlier in this LHMP, the numbers of people affected by transportation emergencies are usually less. However, a transportation accident on Interstate 10 during a period of high heat can result in hundreds (or more) of commuters being stranded on the highway with little resources for an extended period of time.

- **Effects on commercial and industrial structures**. There may be economic consequences due to transportation emergencies, but the damage is generally limited to clean-up of facilities and grounds or simply interruption of business due to evacuation.

- **Effects on infrastructure.** Transportation emergencies may result in downed power lines. Also, Hazmat materials released in a transportation emergency may impact waterways and drainage systems, and incidents can lead to the evacuation of schools, business districts, and residential areas.

- **Effects on agriculture**. Transportation is essential to the agricultural industry.

For all elements of agriculture other than those that are dairy-related, any incident that affects transportation for more than three days is "major." For the dairy segment of the agricultural industry, any incident that affects the ability to transport product by more than 12 hours is considered "major."

*Risk Assessment Conclusion.*

In general, transportation hazards are not cataclysmic in terms of widespread property damage and loss of life. Existing emergency operations should be equipped to handle almost of any transportation hazard that may occur.

However, because Riverside County has an agricultural production value of over $1 billion, any transportation emergency that affects the ability of agriculture to conduct its routine business (importing supplies and exporting production) can have severe economic consequences for the County.

*Relationship to Other Hazards – Cascading Effects*

Depending on the location of the incident, the cascading effects of transportation emergencies are generally limited to those of Hazmat incidents, Fires or Extreme Weather (if the incident occurs in the desert when the temperatures are very high, citizens in vehicles stopped for several hours can suffer from the heat and lack of conveniences). In all cases, health and life may be threatened.

### 5.3.15 Dam Failure

**Severity: 3**

**Probability: 1**

**Risk Score: 0.38**

**OA Jurisdictions Affected by Dam Failure**

- Norco
- Eastvale
- Corona
- Lake Elsinore
- Wildomar
- Murrieta
- Temecula
- Perris
- Menifee
- Riverside
- Jurupa Valley
- Hemet
- Moreno Valley
- San Jacinto
- Various Portions of unincorporated areas in the West County

*Hazard Definition*

The term "dam failure" encompasses a wide variety of circumstances. Potential causes of a dam failure are numerous and can be attributed to deficiencies in the original design of the dam, the quality of construction, the maintenance of the dam and operation of the appurtenances while the dam is in operation, and acts of nature including precipitation in excess of the design, flood, and damage from earthquakes. Water over topping the dam crest is a common cause of failure in earth dams.

Overtopping will cause erosion of the dam crest and eventual dam breach. Piping of earth dams is another common form of failure. Piping is a form of erosion that occurs underground caused by rodent burrowing and the presence of extensive root systems from vegetation growing on and around the dam.

Flooding of the area below the dam may occur as the result of structural failure of the dam, overtopping, or a seiche. The primary danger associated with a dam failure is the swift, unpredictable flooding of those areas immediately downstream of the dam.

There are three general types of dams: earth and rock fill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth/rock fill dam will fail gradually due to the erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch or hydraulic fill dam will fail almost instantaneously; with a very rapid build-up to a peak and then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with the corresponding build-up of flood wave.

*History*

Historically, Riverside County has not experienced any significant dam failure incidents, although there are several major dams in the County of both the earthen and steel reinforced concrete type

*Risk Assessment*

The County of Riverside is subject to potential flooding from several local dams, reservoirs, streams, rivers, and washes. These include but are not limited to, Lake Elsinore, the Colorado River, and the San Jacinto River. Seasonal flooding with the failure of run-off storage reservoirs, canals, and levees could seriously compound the situation, particularly in or near urban population centers. From the time of complete failure to inundation could be as little as 5-to-10 minutes.

Portions of Riverside County along the Colorado River corridor could suffer from a catastrophic failure of dams that are located far outside the borders of Riverside County. These dams include Palo Verde Diversion Dam, Headgate Rock Dam, Parker Dam, Davis Dam, and Hoover Dam. If there were a catastrophic dam failure, it is estimated that it would take a minimum of 23 hours before the flood waters reach the City of Blythe.

With major disruptions in power and communications systems, a warning may not be received from dam or reservoir sites in time to initiate an organized evacuation or broadcast warnings via emergency radio stations. If a credible prediction is initiated, then preparation for a damaging earthquake could begin and residents and business owners within dam inundation areas could be directed to assembly areas to wait for official word regarding safe re-entry. This method of direction and control could substantially reduce potential loss of life, if enough warning were available.

- **Effects on Agriculture** can be catastrophic, both for crops and for animals. Loss of property is a real risk, as well.

*Risk Assessment Conclusion.*

Although dam failure incidents have not historically been a problem in Riverside County, the County's location with respect to earthquake fault lines presents the very real danger of dam failure due to quakes. If this were to occur, the effects could be catastrophic. Also, as noted above, seasonal flooding with the failure of run-off storage reservoirs, canals, and levees could seriously compound the risks of dam failure and additional flooding.

*Relationship to Other Hazards - Cascading Effects*

Dam failure obviously causes downstream flooding. It may also lead to power failures and downed power lines. The secondary effects of dam failure can include the disruption of the local and state economies by damage to buildings and roads, the severance of communications, the disruption of supply and delivery mechanisms, additional welfare, and emergency aid to the recovering economy.

**Table 41:** Dams within the County of Riverside

Listed Alphabetically By County

| Dam No. | National ID No. | Name | Owner | County | Stream | Year Built | Capacity (Ac-ft) | Res. Area (Acres) | Drainage Area ($mi^2$) | Crest Elev. (ft) |
|---|---|---|---|---|---|---|---|---|---|---|
| 1003-003 | CA00798 | Alessandro | Riverside County Flood Control And Water Conservation | Riverside | Alessandro Cr | 1956 | 370 | 17 | 4.63 | 1146 |
| 1003-007 | CA00802 | Boxsprings | Riverside County Flood Control And Water Conservation | Riverside | Box Springs Cr | 1960 | 405 | 29 | 4 | 1139 |
| 35-021 | CA01441 | Cajalco Creek | Metropolitan Water Dist | Riverside | Cajalco Creek | 2001 | 889 | 74.4 | 22.7 | 1512 |
| 87-008 | CA01204 | Declez Retention | San Bernardino County Flood Control District | Riverside | San Sevaine Cr | 1984 | 331 | 21 | 10.7 | 849 |
| 35-018 | CA01410 | Diamond Valley Lake | Metropolitan Water District | Riverside | Domenigoni Valley Cr | 2000 | 800000 | 4860 | 13 | 1769 |
| 35-019 | CA01413 | Diamond Valley Lake Forebay | Metropolitan Water District | Riverside | Domenigoni Val Can | 1999 | 500 | 31 | 0.13 | 1497.5 |
| 1812-000 | CA01302 | Dunn Ranch | Agri-Empire,A Calif Corp | Riverside | Hamilton Cr | 1987 | 90 | 7 | 0.2 | 142.5 |
| 1003.02 | CA10503 | Eagle Canyon Debris Basin | Riverside County Flood Control And Water Conservation | Riverside | Eagle Canyon | 2015 | 222 | 7.1 | - | 405 |
| 822-000 | CA00767 | El Casco | Riverside Land Conservancy | Riverside | San Timoteo Creek | 1879 | 143 | 15 | 0.09 | 116 |
| 81-000 | CA00304 | Fairmount Park | City Of Riverside | Riverside | Santa Ana River | 1923 | 200 | 40 | 22 | 793 |
| 827-000 | CA00769 | Foster | Idyllwild Water District | Riverside | Lily Creek | 1945 | 56 | 6 | 0.85 | 5812 |
| 35-020 | CA01424 | Goodhart Canyon Detention Basin | Metropolitan Water Dist | Riverside | Goodhart Canyon | 1999 | 1026 | 98 | 3.8 | 1627.2 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1003 | CA00787 | Harrison Street | Riverside County Flood Control And Water Conservation | Riverside | Harrison Creek | 1954 | 208 | 14 | 2.03 | 1123.5 |
| 35-016 | CA01349 | Henry J Mills No 2 | Metropolitan Water Dist | Riverside | Offstream | 1996 | 92 | 5 | 0.1 | 1651.2 |
| 35-014 | CA01085 | Henry J Mills Reservoir | Metropolitan Water Dist | Riverside | Offstream | 1979 | 83 | 6 | 0 | 1651 |
| 35-017 | CA01374 | Hj Mills Reclamation | Metropolitan Water District | Riverside | Offstream | 1996 | 98 | 16 | 0.03 | 1593 |
| 1003-014 | CA01212 | Jurupa Basin | Riverside County Flood Control And Water Conservation | Riverside | Jurupa Wash | 1983 | 167 | 17 | 1.69 | 855 |
| 817-000 | CA00763 | Lake Hemet | Lake Hemet Municipal Water District | Riverside | San Jacinto Riv | 1895 | 14000 | 470 | 67 | 4341.5 |
| 1003-016 | CA01392 | Lakeview | Riverside County Flood Control And Water Conservation | Riverside | San Jacinto Riv | 1994 | 530 | 39 | 7.6 | 1621 |
| 818-002 | CA00766 | Lee Lake | Elsinore Valley Mun Wd | Riverside | Temescal Creek | 1919 | 1100 | 70 | 53 | 1153 |
| 1003-009 | CA01103 | Mabey Canyon | Riverside County Flood Control And Water Conservation | Riverside | Mabey Creek | 1974 | 68 | 5 | 1.5 | 1146 |
| 1003-011 | CA01211 | Mary Street | Riverside County Flood Control And Water Conservation | Riverside | Alessandro Wash | 1981 | 320 | 19 | 6.7 | 1009 |
| 35-000 | CA00212 | Mathews | Metropolitan Water District of Southern California | Riverside | Cajalco Creek | 1938 | 182000 | 2750 | 40 | 1404 |
| 1003-015 | CA01197 | Metz Road Debris Basin | Riverside County Flood Control And Water Conservation | Riverside | San Jacinto Riv | 1981 | 88 | 20 | 1 | 1470.5 |
| 81-003 | CA00305 | Mockingbird Canyon | City Of Riverside | Riverside | Mockingbird Can | 1914 | 1250 | 64 | 13.13 | 1015 |

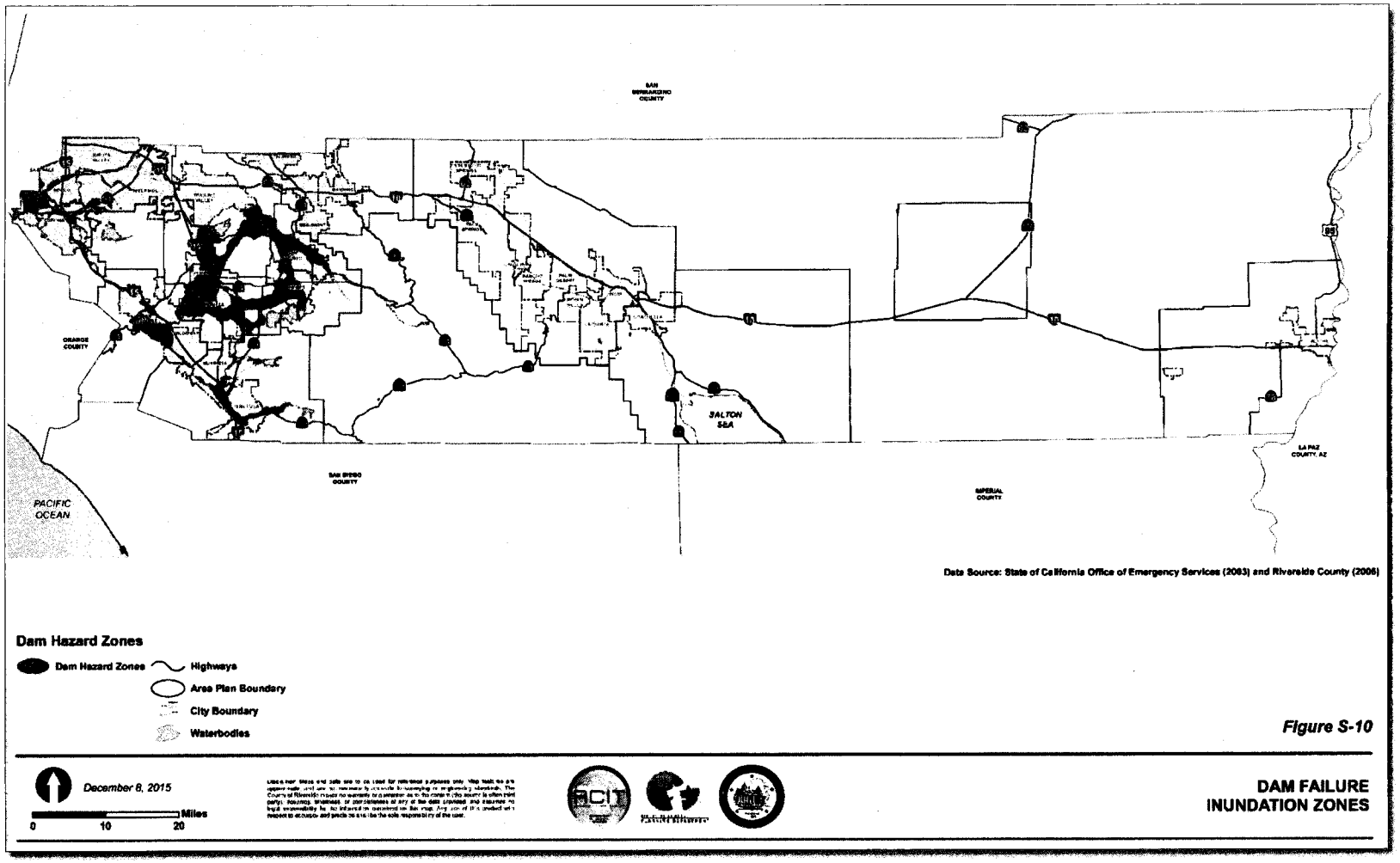
| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1003-010 | CA01179 | Oak Street | Riverside County Flood Control And Water Conservation | Riverside | Oak Street Cr | 1979 | 138 | 36 | 6.02 | 1034 |
| 1-068 | CA00054 | Perris | California Department Of Water Resources | Riverside | Bernasconi Pass | 1973 | 131452 | 2340 | 10 | 1600 |
| 1003-006 | CA00801 | Pigeon Pass | Riverside County Flood Control And Water Conservation | Riverside | Pigeon Pass | 1958 | 900 | 86 | 8.71 | 1702.5 |
| 1003-004 | CA00799 | Prenda | Riverside County Flood Control And Water Conservation | Riverside | Prenda Creek | 1954 | 192 | 15 | 1.93 | 1242 |
| 829-000 | CA00771 | Quail Valley | Forecast Homes | Riverside | San Jacinto Riv | 1959 | 103 | 10 | 1.6 | 1490 |
| 818-000 | CA00765 | Railroad Canyon | Elsinore Valley Mun Wd | Riverside | San Jacinto River | 1928 | 11586 | 525 | 664 | 1410 |
| 35-012 | CA00223 | Robert A Skinner | Metropolitan Water Dist | Riverside | Tucalota Creek | 1973 | 43800 | 860 | 51.5 | 1493 |
| 35-015 | CA01271 | Skinner Clearwell | Metropolitan Water District | Riverside | Offstream | 1991 | 356 | 14 | 0 | 1433 |
| 1811-000 | CA01237 | Sunnymead Ranch | Sunnymead Ranch Comm Assoc | Riverside | Reche Canyon | 1985 | 400 | 35 | 2 | 1770 |
| 1003-005 | CA00800 | Sycamore | Riverside County Flood Control And Water Conservation | Riverside | Sycamore Canyon | 1956 | 860 | 57 | 10.7 | 1013 |
| 1003-013 | CA01170 | Tahchevah | Riverside County Flood Control And Water Conservation | Riverside | Tachevah Creek | 1964 | 650 | 60 | 3.2 | 582 |
| 1003-012 | CA01242 | Tahquitz Creek Debris | Riverside County Flood Control And Water Conservation | Riverside | Tahquitz Creek | 1991 | 75 | 5 | 18 | 562 |
| 2028-000 | CA00770 | Vail | Rancho Calif Water District | Riverside | Temecula Creek | 1949 | 51000 | 1078 | 306 | 1482.6 |
| 1003-008 | CA00803 | Wide Canyon | Riverside County Flood Control And Water Conservation | Riverside | West Wide Canyon | 1968 | 1490 | 57 | 33.5 | 1560 |

| | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| 1003-000 | CA00796 | Woodcrest | Riverside County Flood Control And Water Conservation | Riverside | Woodcrest Creek | 1954 | 420 | 24 | 5.32 | 1122.5 |

The most recent damn built was Eagle Canyon Debris Basin in 2015

Descriptions of the dams, their inundation impact on the County, and a delineation of response efforts are outlined in the 2015 Draft version of the Flood and Dam Inundation Plan, maintained by Riverside County Transportation and Land Management Agency.

**Map 35:** Riverside County Dam Inundation Risks



### 5.3.16 Aqueduct

**Severity: 3**

**Probability: 2**

**Risk Score: 0.38**

**OA Jurisdictions Affected by Aqueduct Failure**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

*Hazard Definition*

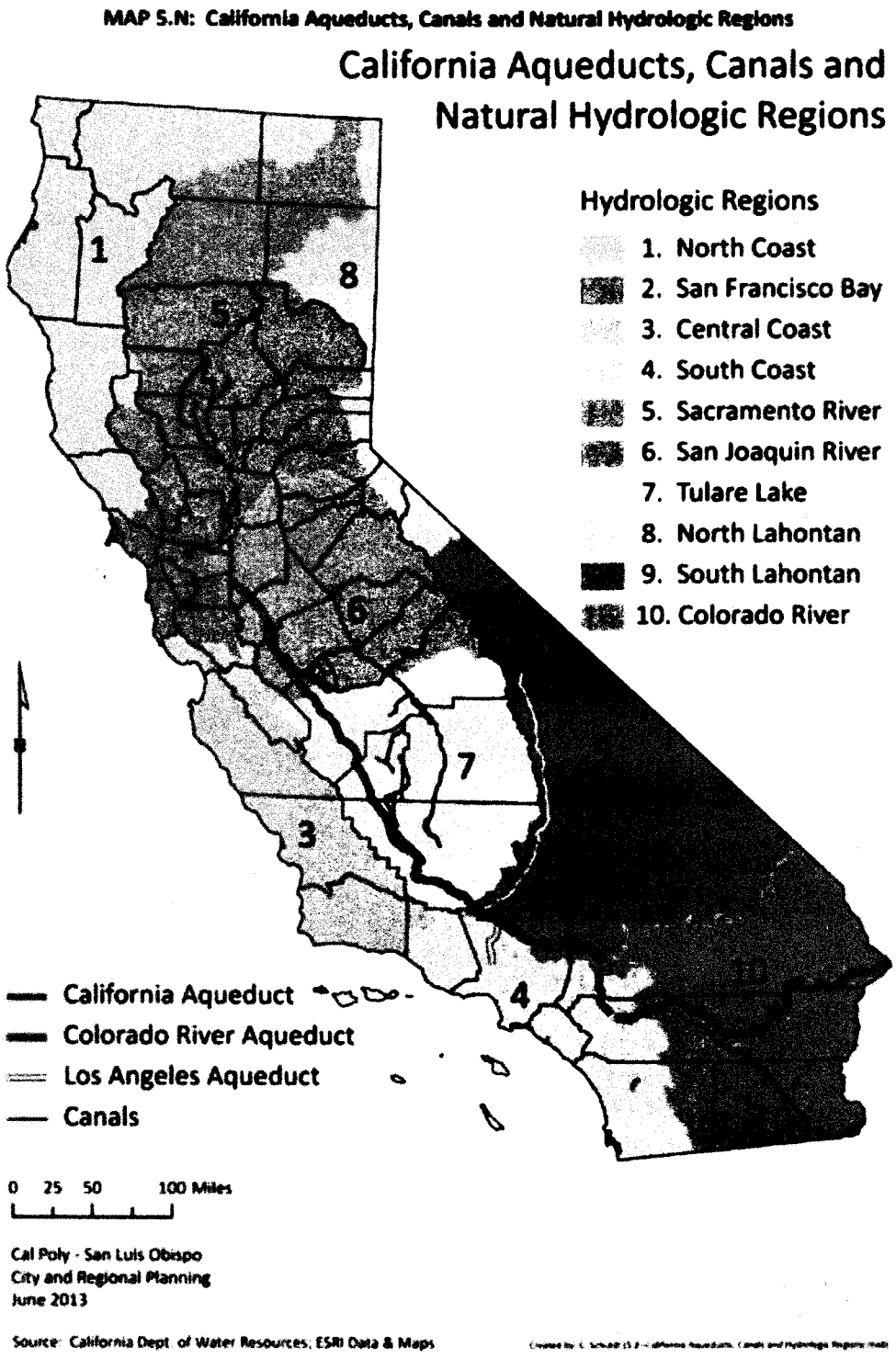
An Aqueducts is an artificial channel to transport water. There are two major Aqueducts that traverse Riverside County:

- California Aqueduct
- Colorado River Aqueduct.

The California Aqueduct is a 444-mile long, artificially river shaped facility that is a crucial component of the State Water Project. The California Department of Water Resources states that the Project includes 34 storage facilities, reservoirs and lakes; 20 pumping plants; 4 pumping-generating plants; 5 hydroelectric power plants; and about 701 miles of open canals and pipelines. It travels from Sacramento into San Bernardino County and finally ends in western Riverside County. The East Branch is the portion of the Aqueduct that transports water for storage into Lake Perris.

The Colorado River Aqueduct stretches 242 miles across Arizona and California. According to the American Society of Civil Engineers, it consists of more than 90 miles of tunnels, nearly 55 miles of cut-and-cover conduit, almost 30 miles of siphons, and five pumping stations. More than a billion gallons of water travel through it a day. It travels from Arizona into San Bernardino County, enters the eastern portion of Riverside County and travels the length of the County until it ends near the City of Riverside. It was built and is currently maintained by the Metropolitan Water District of Southern California.

Figure 42: California Aqueducts




Source: 2013 (SHMP)

*History of Events*

Riverside County has not experienced a large scale Aqueduct incident.

*Risk Assessment*

An earthquake or landslide could severely damage the two main aqueducts that travel through the county, possibly render them out of service. In this event the water supply to the County would be greatly affected.

Long periods of droughts have been known to damage aqueduct infrastructure. Wells have needed to work harder to pump low levels of water. This has resulted in many irrigation districts to raise the sides of canals to encourage gravitational water flow. However, this tactic can negatively affect bridges.

- **Effects on people and housing.** There is a low impact on housing unless the aqueduct was to flood a residential area. The impact to people can range from minor to disastrous. A failure could greatly impact the County's water supply leaving the County to source water elsewhere until the damages to the aqueduct can be remedied. It can also impact the economy in the event that crops are damaged and farmers lose valuable product.

- **Effects on commercial and industrial structures**. There is a low impact on commercial and industrial structures.

- **Effects on infrastructure.** There is a low impact on infrastructure.

- **Effects on agriculture.** In the event of an aqueduct failure crops could be devastatingly impacted.

*Risk Assessment Conclusion*

This hazard has a low probability but has the potential to have catastrophic impacts to the county.

*Relationship to Other Hazards – Cascading Effects*

An Aqueduct failure could lead to water supply contamination or disruption and flooding. It could also increase the effects of a drought.

## 5.3.17 Tornado

**Severity: 2**

**Probability: 1**

**Risk Score: 0.25**

**OA Jurisdictions Affected by Tornados**

- Hemet
- Perris
- Desert Center
- Coachella Valley
- Mecca
- Homeland

### *Hazard Definition*

#### *Tornados*

Tornadoes are spawned when there is warm, moist air near the ground, cool air aloft, and winds that speed up and change direction. An obstruction, such as a house, in the path of the wind, causes it to change direction. This change increases pressure on parts of the house, and the combination of increased pressures and fluctuating wind speeds creates stresses that frequently cause structural failures.

In order to measure the intensity and wind strength of a tornado, Dr. T. Theodore Fujita developed the Fujita Tornado Damage Scale. This scale compares the estimated wind velocity with the corresponding amount of suspected damage. The scale measures six classifications of tornadoes with increasing magnitude from an "F0" tornado to an "F6+" tornado.

Tornados, like those that occur every year in the Midwest and Southeast parts of the United States, are a rare phenomenon in most of California, with most tornado-like activity coming from micro-bursts.

The chart below depicts the Fujita Tornado Damage Scale:

**Table 42:** Fujita Tornado Damage Scale

| Scale | Wind Estimate (mph) | Typical Damage |
|---|---|---|
| F0 | < 73 | **Light damage.** Some damage to chimneys and TV antennas; breaks twigs off trees; pushes over shallow-rooted trees. |
| F1 | 73-112 | **Moderate damage.** Peels surface off roofs; windows broken; light trailer houses pushed or overturned; some trees uprooted or snapped; moving automobiles pushed off the road. 74 mph is the beginning of hurricane wind speed. |
| F2 | 113-157 | **Considerable damage.** Roofs torn off frame houses leaving strong upright walls; weak buildings in rural areas demolished; trailer houses destroyed; large trees snapped or uprooted; railroad boxcars pushed over; light object missiles generated; cars blown off highway. |
| F3 | 158-206 | **Severe damage.** Roofs and some walls torn off frame houses; some rural buildings completely demolished; trains overturned; steel-framed hangar-warehouse-type structures torn; cars lifted off the ground; most trees in a forest uprooted snapped, or leveled. |
| F4 | 207-260 | **Devastating damage.** Whole frame houses leveled, leaving piles of debris; steel structures badly damaged; trees debarked by small flying debris; cars and trains thrown some distances or rolled considerable distances; large missiles generated. |
| F5 | 261-318 | **Incredible damage.** Whole frame houses tossed off foundations; steel-reinforced concrete structures badly damaged; automobile-sized missiles generated; trees debarked; incredible phenomena can occur. |
| F6-F12 | 319 to sonic | **Inconceivable damage.** Should a tornado with the maximum wind speed in excess of F5 occur, the extent and types of damage may not be conceived. A number of missiles such as iceboxes, water heaters, storage tanks, automobiles, etc. will create serious secondary damage on structures. |
| Source: http://weather.latimes.com/tornadoFAQ.asp | | |

*Microbursts*

Unlike tornados, microbursts are strong, damaging winds that strike the ground and often give the impression a tornado has struck. They frequently occur during intense thunderstorms. The origin of a microburst is downward moving air from a thunderstorm's core. But unlike a tornado, they affect only a rather small area.

University of Chicago storm researcher Dr. Ted Fujita first coined the term "downburst" to describe strong, downdraft winds flowing out of a thunderstorm cell that he believed were responsible for the crash of Eastern Airlines Flight 66 in June of 1975.

A downburst is a straight-direction surface wind in excess of 39 mph caused by a small-scale, strong downdraft from the base of convective thundershowers and thunderstorms. In later investigations into the phenomena, he defined two sub-categories of downbursts: the larger macro bursts and small microbursts.

Macro bursts are downbursts with winds up to 117 mph that spread across a path greater than 2.5 miles wide at the surface and which last from 5 to 30 minutes. The microburst, on the other hand, is confined to an even smaller area, less than 2.5 miles in diameter from the initial point of downdraft impact. An intense microburst can result in damaging winds near 270 km/hr (170 mph) and often last for less than five minutes.

"Downbursts of all sizes descend from the upper regions of severe thunderstorms when the air accelerates downward through either exceptionally strong evaporative cooling or by very heavy rain which drags dry air down with it. When the rapidly descending air strikes the ground, it spreads outward in all directions, like a fast-running faucet stream hitting the sink bottom.

When the microburst wind hits an object on the ground such as a house, garage or tree, it can flatten the buildings and strip limbs and branches from the tree. After striking the ground, the powerful outward running gust can wreak further havoc along its path. Damage associated with a microburst is often mistaken for the work of a tornado, particularly directly under the microburst. However, damage patterns away from the impact area are characteristic of straight-line winds rather than the twisted pattern of tornado damage."

*History*

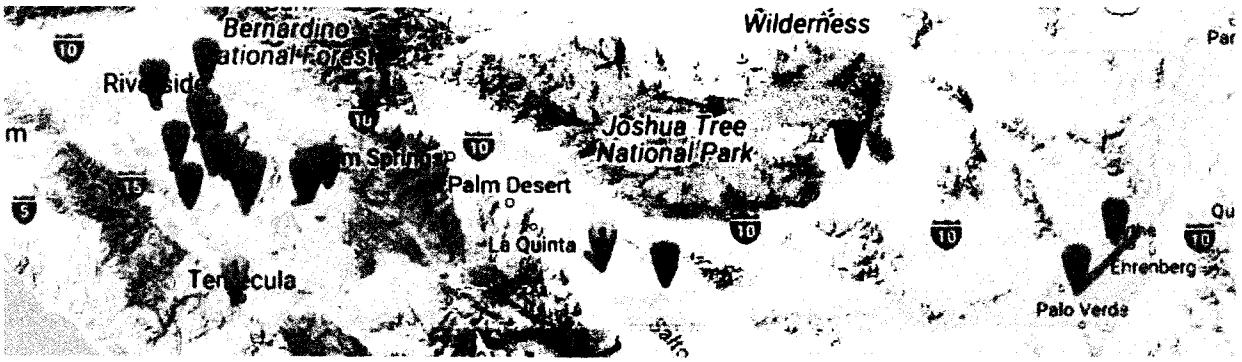
The history table demonstrates the high number of tornados and microbursts that have occurred in the County.

**Figure 43:** Historical Tornados Statistics for Riverside

| DATE ↑ | SCALE | DEATHS | INJURIES | DISTANCE |
|---|---|---|---|---|
| 10/17/2015 | 0 | 0 | 0 | 22 |
| 09/09/2012 | 0 | 0 | 0 | 14 |
| 08/12/2012 | 0 | 0 | 0 | 16 |
| 05/22/2008 | 0 | 0 | 0 | 11 |
| 05/22/2008 | 2 | 0 | 1 | 8 |
| 05/22/2008 | 0 | 0 | 0 | 8 |
| 05/22/2008 | 0 | 0 | 0 | 10 |
| 07/23/2006 | 0 | 0 | 0 | 20 |
| 07/23/2005 | 0 | 0 | 0 | 27 |
| 03/04/2005 | 0 | 0 | 0 | 11 |
| 02/26/2005 | 0 | 0 | 0 | 17 |
| 01/09/2005 | 0 | 0 | 0 | 29 |
| 12/21/2001 | 0 | 0 | 0 | 28 |
| 02/24/2001 | 0 | 0 | 0 | 27 |
| 02/16/2000 | 0 | 0 | 0 | 30 |
| 05/13/1998 | 0 | 0 | 0 | 21 |
| 02/07/1994 | 0 | 0 | 0 | 28 |
| 02/08/1993 | 0 | 0 | 0 | 28 |
| 01/17/1993 | 0 | 0 | 1 | 28 |
| 03/20/1991 | 0 | 0 | 0 | 1 |
| 03/20/1991 | 0 | 0 | 0 | 16 |
| 02/28/1991 | 0 | 0 | 0 | 27 |
| 01/18/1988 | 0 | 0 | 0 | 27 |

Source:http://www.homefacts.com/tornadoes/California/Riverside-County/Riverside.html

**Map 36:** Past Riverside Count Tornadoes




Source: http://www.tornadohistoryproject.com/tornado/California/Riverside/map

*Risk Assessment*

- **Effects on people and housing.** Tornadoes are very dangerous and can destroy homes and injure or kill Riverside County residents. The county has been fortunate in the past because we have not experienced loss of life and very few injuries caused by tornadoes or airborne debris.

- **Effects on commercial and industrial structures.** Industrial structures could house Hazardous Materials that have to potential to be released if the facility is damaged. Workers could be trapped under debris if the tornado hits during business hours.

- **Effects on infrastructure.** Infrastructures could be damaged by high winds at building failure points such as rook joist or wall stud- bottom plate intersections. Flying debris can also cause damages.

- **Effects on agriculture.** Tornadoes have the power to destroy crops or tools/structures needed by the farmer to tend his crops. It can also lead to the death of livestock.

*Risk Assessment Conclusion*

Riverside County's "Tornado Alley" spans from the 15 Corridor to desert center and is highly susceptible to microburst and tornados that result is high dollar recovery costs.

*Relationship to Other Hazards – Cascading Effects*

Tornados can destroy powerlines causing disruption in power to residents and commercial properties. They can damage critical facilities and devastate homes.

### 5.3.18 Insect Infestation

**Severity: 2**

**Probability: 3**

**Risk Score: 0.00**

**OA Jurisdictions Affected by Insect Infestation**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

**(Bark Beetle)**

- Idyllwild Fire Protection District

**(Red Imported Fire Ant Quarantine)**

- Alvord Unified School District
- Cathedral City
- City of Banning
- City of Blythe
- City of Calimesa
- City of Canyon Lake
- City of Coachella
- City of Corona
- City of Desert Hot Springs
- City of Hemet
- City of Indian Wells
- City of Indio -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of La Quinta
- City of Lake Elsinore
- City of Moreno Valley – only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Murrieta
- City of Norco
- City of Palm Desert -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Palm Springs -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Perris
- City of Rancho Mirage -- only portions of the city are within the boundaries of the Red Imported Fire Ant Quarantine area
- City of Riverside
- City of Temecula
- Home Gardens County Water District
- Idyllwild Water District
- Lake Elsinore Unified School District
- Menifee Unified School District
- Moreno Valley Unified School District
- Rancho California Water District
- Riverside Community Hospital
- Riverside County Office of Education, Children, and Family Services
- Riverside County Transportation

and Land Management Agency
- Riverside Unified School District
- San Gorgonio Pass Water Agency
- Valley Sanitation District
- Western Municipal Water District

*Hazard Definition*

Insect infestation occurs when an undesirable type of insect inhabits an area in a manner that causes serious harm to: cash crops, livestock, or poultry; wild land trees, plants, or animals; or humans. Countless insects live on, in, and around plants, animals, and humans in all environments. Many are harmless, while others can cause fatal damage. Under some conditions, insects that have been present and relatively harmless can become hazardous. For example, severe drought conditions can weaken trees and make them more susceptible to destruction from insect attacks.

The major forms of insects are:

- **Chewing insects** are defoliating insects. They generally strip plants of green matter such as leaves. Caterpillars and beetles make up the largest proportion of chewing insects. Under normal conditions, trees can usually bounce back from an attack of these defoliators, though repeat infestation will weaken a tree and can eventually kill it by starving it of energy.

- **Boring, or tunneling, insects** cause damage by boring into the stem, roots, or twigs of a tree. Some lay eggs that then hatch and the larvae burrow more deeply into the wood, blocking off the water-conducting tissues of the tree. Boring insects generally feed on the vascular tissues of the tree. If the infestation is serious, the upper leaves are starved of nutrients and moisture, and the tree can die. Signs of borer infestation include entry/exit holes in the bark, small mounds of sawdust at the base, and sections of the crown wilting and dying.

- **Sucking insects** do their damage by sucking out the liquid from leaves and twigs. Many sucking insects are relatively immobile, living on the outside of a plant and forming a hard protective outer coating while they feed on the plant's juices. Quite often they will excrete a sweet, sticky substance known as honeydew which contains unprocessed plant material. Honeydew can cause sooty mold to form on leaves and can become a nuisance. Signs of infestation include scaly formations on branches, dieback of leaves, and honeydew production.

**Table 43:** Example Insect Species

| NAME |
|---|
| AFRICANIZED HONEY BEE |
| BARK BEETLE |
| CITRUS LEAFMINER |
| GLASSY-WINGED SHARPSHOOTER |
| GYPSY MOTH |
| HONEY BEE TRACHEAL MITE |
| JAPANESE BEETLE |
| LESSER SNOW SCALE |
| MAGNOLIA WHITE SCALE |
| MEDITERRANEAN FRUIT FLY |
| ORIENTAL FRUIT FLY |
| RED IMPORTED FIRE ANT |
| STING NEMATODE |
| TROPICAL PALM SCALE |
| VARROA MITE/HONEY BEE |
| ASIAN CITRUS PSYLLID |
| SILVERLEAF WHITEFLY |
| POLYPHAGOUS SHOT-HOLE BORER |
| ASIAN CITRUS PSYLLID |
| GOLDSPOT OAK BORE BEETLE, (GSOB ) |
| PINE BARK BEETLE |
| SHOT HOLE BORER BEETLE |
| KUROSHIO SHOT HOLE BORERS |

In conjunction with the above outlined problems, insects can carry and spread or vector disease to plants, animals, and people.

*Definition of Vector Control*

Vector Control Programs are responsible for providing services that reduce the risk of illness caused by any organism transporting a pathogen. Some examples of these organisms and some of the pathogens they can carry are:

- Mosquito - West Nile Virus, St. Louis Encephalitis, Western Equine Encephalitis
- Rodent Fleas - Plague

- Western Black Legged Tick - Lyme Disease
- Rodents - Hantavirus

Riverside County actually has three vector control agencies. There are two Vector Control Districts and the County Vector Control Program operating through the Department of Environmental Health. The Coachella Valley Mosquito and Vector Control District manages these services for a portion of the desert community around the Coachella Valley. The Northwest Mosquito and Vector Control District provides services in the northwest portion of the county. The County Vector Control program covers the unincorporated areas of the County and other areas such as contracted cities that may fall outside of the two other vector district boundaries.

*History*

**Presently** - Parts of Riverside County (Moreno Valley, Indio, Rancho Mirage, Palm Desert, Bermuda Dunes, and Palm Springs) are under quarantine by state and federal officials to stop the spread of Red Imported Fire Ants. The quarantine limits the movement of plants and soil and requires commercial nursery growers to take steps to ensure their products are free of Red Imported Fire Ants. It is believed that the infestations in Southern California may stem from the shipment of infested nursery stock from the southeastern states.

**2012** - Polyphagous Shot-Hole Borer, an insect pest that attacks over 200 types of agricultural and landscape trees, became widespread in Southern California. By 2015, this insect pest was established in Western Riverside County. This insect pest is detrimental to the avocado industry and landscape ornamental trees in California.

**2009** - A portion of Riverside County (Coachella Valley) was placed under quarantine for Asian Citrus Psyllid (ACP). In 2011, the quarantine area was expanded to include Western Riverside County. The quarantine limits the movement of nursery stock and citrus from the quarantine area. Growers must take steps to ensure their products are free from ACP prior to movement.

**2003** -Governor Gray Davis proclaimed a State of Emergency in Riverside, San Bernardino, and San Diego Counties where hundreds of thousands of trees were dead and dying after being weakened by drought and attacked by an infestation of bark beetles. Trees on more than 150,000 acres died and an estimated 75,000 residents were threatened by catastrophic wildfire, injury, and property damage from falling trees.

**1999-2000**, an insect-spread disease (Pierce's Disease spread by Glassy-winged Sharpshooter) caused over $16 million damage to wine grapes in the west County area. Riverside County is under quarantine by state officials to stop the spread of

Glassy-winged Sharpshooter and Pierce's Disease. The quarantine limits the movement of nursery stock, bulk grapes, bulk citrus and requires inspection and certification of these commodities by the local Agricultural Commissioner prior to movement from the infested area.

**1991-1994** - Africanized Honey Bees entered California near Blythe. Since 1994, they have spread to all counties in Southern California (Imperial, San Diego, Orange, Los Angeles, Riverside, San Bernardino, Ventura and Kern). In 1993-94 and 1990, Med-fly infestations damaged fruit Countywide. In 1991, a whitefly infestation damaged melons, squash, and cucumbers Countywide.

*Risk Assessment*

Riverside County has a demonstrated vulnerability to insect infestation. The climate makes it possible for insects to reproduce with little natural hindrance to their proliferation.

Programs for monitoring Encephalitis in Riverside County have been in effect for more than two decades in a cooperative effort with the California Department of Public Health (CDPH), the University of California, the Mosquito and Vector Control Association of California, and the Riverside County Public Health Department. Since its introduction to Southern California in 2003, West Nile Virus surveillance has been a primary focus. This type of surveillance is driven by live mosquito trapping and processing for virus detection. The dead bird surveillance program is also headed up by CDPH where the public can report dead birds via their website (www.westnile.ca.gov) or a telephone hotline (1-877-WNV-BIRD). If CDPH staff determines that a dead bird is deemed acceptable for testing, Vector Control offices are notified for collection and testing. Another aspect of this program consists of sentinel chicken flocks being placed in areas where high populations of Culex tarsalis, the western encephalitis mosquito, are known to exist and where such areas infringe on local communities. Blood samples are sent to the CDPH Viral & Rickettsial Disease Laboratory where they are analyzed for the antibodies to the viruses. All of these disease indicators allow programs to focus their vector control efforts. Since 2006, at least seventy three cases of West Nile virus human infections have been reported within Riverside County with ten fatalities. Horses have also been infected and succumbed to this disease.

In Riverside County, Plague is associated with animal disease outbreaks in populations of California Ground Squirrels. The vector is the Squirrel Flea. In 1979 during a disease outbreak among California ground squirrels in Silent Valley, located south of the City of Banning, a boy contracted Plague. It was properly diagnosed and he recovered. This incident provided impetus to start the Plague Surveillance Program and eventually establish the County's Vector Control Program. Over the course of the past several

decades surveillance activities have isolated Plague endemic areas in the San Jacinto Mountain range.

- **Effects on people and housing.** In the case of the Bark Beetle, the fire hazard it creates can cause the loss of homes and life as demonstrated in the fall fires of 2003. In the case of certain mosquitoes, West Nile Virus has infected humans and horses.

- **Effects on agriculture, and commercial and industrial structures.** If a given insect is particularly hazardous to forests, crops, or property, it can cost the County millions of dollars in lost revenue and eradication and replacement.

*Risk Assessment Conclusion.*

Insect infestation is an ongoing threat to agriculture and public health in Riverside County. The effects on people and property can be disastrous and costly.

The County and independent vector control special districts have aggressive programs utilizing:

- Disease surveillance such as certified personnel, insect/rodent traps, lab testing capacities, and Sentinel chicken flocks.
- Vector control equipment and approved pesticides.
- Public outreach.

*Relationship to Other Hazards - Cascading Effects*

The Bark Beetle infestation is a classic example of cascading effects. The insect killed hundreds of thousands of trees, increasing the wildfire hazard, which resulted in the unfortunate devastation of the fall fires of 2003.

### 5.3.19 Jail/Prison Event

**Severity: 2**

**Probability: 1**

**Risk Score: -0.13**

**OA Jurisdictions Affected by Jail or Prison Events**

- Blythe
- Riverside
- Norco
- Banning
- Indio
- Murrieta

*Hazard Definition*

There are numerous State of California Correctional Institutions and County correctional facilities in Riverside County. Law enforcement is tasked with maintaining order in the facilities and preventing inmates from escaping into the community.

Chuckawalla Valley State Prison in Blythe provides long-term housing and services for male felons classified as medium and low-medium custody inmates.

Ironwood State Prison in Blythe provides services for minimum and medium custody inmates through academic education, vocational instruction, and support services. The prison also has the Institutional Hearing Program (IHP) which prepares inmates who are illegal immigrants for release to United States Immigration and Naturalization Service custody and the return to their native country.

The California Rehabilitation Center (CRC) in Norco is a medium Level II correctional facility and that only accommodates male inmates since April 2007. The CRC inmate population consists of felon commitments as well as Civil Addicts.

The California Institution for Woman (CIW) in Chino accommodates all custody levels of female inmates and functions as a reception/processing center for incoming female inmates. In addition to its large general population, CIW houses inmates with special

needs such as pregnancy, psychiatric care, methadone, and medical problems such as HIV infection.

The California Institution for Men in Chino consists of four separate facilities under the administration of one warden. Located three miles south of the city of Chino, the facilities provide housing for minimum through medium custody inmates. The reception centers receive and process newly committed male felons from several southern California counties. The California Youth Authority operates a facility in Chino. While all of these facilities are in the County of San Bernardino, their close proximity to Riverside County and the City of Corona necessitate their inclusion here as facilities of concern to Riverside County.

In addition, there are five correctional facilities within the County, namely:

1. Robert Pressley Detention Center
2. Blythe Jail
3. Indio Jail
4. Southwest County Jail (Murrieta)
5. Larry D. Smith Correctional Facility

*History*

Historically, the threat to society has been low. Law enforcement has demonstrated an overall capability to maintain the incarcerated population in a manner that does not pose an immediate threat to the general population.

*Risk Assessment*

It is important that law enforcement remains in a state of readiness for any incidents that could precipitate a threatening situation.

The passing of Assembly Bill 109 (2011) has shifted state prison populations back into the county jail populations as a way to stop state prison overcrowding. The effects of this change are just now being seen. Time will tell what the overall impact to Riverside County and its citizens will actually be.

Riots within the facilities generally do not pose a direct threat to the public on the outside. Occasionally an inmate has escaped correctional facilities. The danger involved in their escape is predicated on the escapee's criminal characteristics.

Riverside County Regional Medical Center provides medical care to both state and local inmates in an area designated as a prison ward, which could have a severe impact on health care delivery at the facility during and immediately after a prison ward incident. The degree of disruption would, of course, depend on the extent of the incident.

- **Effects on people and housing.** Relatively speaking, the risks are minimal. However, violent offenders escaping custody in a disaster could lead to residents in the surrounding areas being at risk of harm.
- **Effects on commercial and industrial structures**. The risks are minimal.
- **Effects on infrastructure.** The risks are minimal.
- **Effects on agriculture.** The risks are minimal.

*Risk Assessment Conclusion.*

Relatively speaking, the risks of jail and prison incidents will remain a minimal threat to the County. It is important that law enforcement remains in a state of readiness for any incidents that could precipitate a threatening situation.

*Relationship to Other Hazards – Cascading Effects*

In the event that Interstate 10 becomes damaged, it could affect evaluation routes and essential supplies from getting into the prison or jail.

Risks are minimal but have the potential to decrease responder availability during disasters if a facility is damaged. Another possible drain on resources would be in the event of inmate relocation due to damaged facilities or the potential damage to a facility.

### 5.3.20 Pipeline Disruption

**Severity: 3**

**Probability: 2**

**Risk Score: -0.38**

**OA Jurisdictions Affected by Pipeline Incidents**

- Desert Water Agency
- Western Municipal Water District
- City of Banning
- City of Beaumont
- City of Corona
- City of Palm Springs
- City of Temecula
- Riverside Community College District
- San Gorgonio Memorial Hospital

*Hazard Definition*

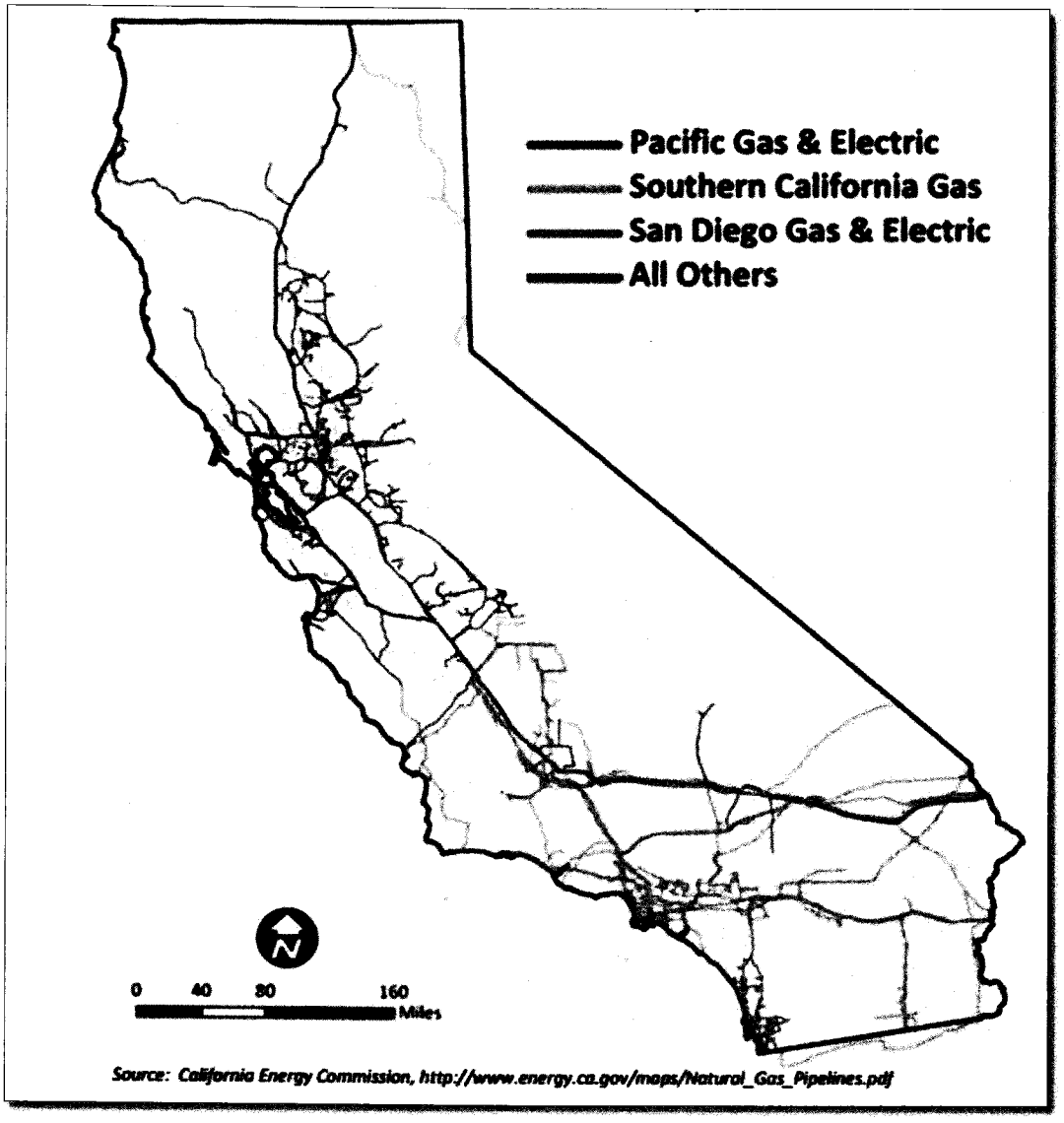
There are many pipeline distribution systems that transit Riverside County, including systems for water, natural gas, and petroleum products.

*Identifying Natural Gas Pipeline Hazards (SHMP)*

The United States is heavily dependent on transmission pipelines to distribute energy and fuel sources. Virtually all natural gas, which accounts for about 28 percent of the energy consumed annually, is transported by transmission pipelines. Energy demand in the United States continues to increase. Although California is a leader in exploring and implementing alternative energy sources such as the wind and solar, the expansion of traditional energy sources, such as natural gas, continues. Increased urbanization is resulting in more people living and working close to existing gas transmission pipelines that were placed prior to government agencies adopting and implementing land use and other pipeline safety regulations.

Compounding the potential risk is the age and gradual deteriorating of the gas transmission system due to natural causes. Significant failure, including pipe breaks and explosions, can result in loss of life, injury, property damage, and environmental impacts. Causes of and contributors to pipeline failures include construction errors, material defects, internal and external corrosion, operational errors, control system malfunctions, outside force damage, subsidence, and seismicity. Growth in population, urbanization, and land development near transmission pipelines, together with the addition of new facilities to meet new demands, may increase the likelihood of pipeline damage due to human activity and the exposure of people and property to pipeline failures.

**Figure 44:** California Gas Lines



Major water conveyance systems consist of the Colorado River Aqueduct operated by Metropolitan Water District (MWD) of Southern California, the California Aqueduct operated by the State Department of Water Resources (DWR), and water distribution lines operated by MWD.

A major pipeline carrying natural gas parallels Interstate 10 and Highway 60 throughout the County. This pipeline brings gas from the southwestern states into Southern California.

Petroleum products are stored and distributed at many major areas throughout the County. Of particular interest are the aviation fuel tanks and pipelines located at March Air Reserve Base. Although under the control of the U.S. Government, their potential for impact on the surrounding area is of interest to the County.

*History*

Fortunately, Riverside County has not experienced a large scale pipeline disruption. However, there are multiple small incidents on a yearly basis that are handled by the respective resource provider.

*Risk Assessment*

A rupture of the main line with a major release could have serious effects in terms of flooding and property damage. A gas line rupture could explode causing serious property damage and loss of life.

- **Effects on people and housing.** The consequences to people and housing from pipeline disruption can range from flooding to explosion, both could be quite severe.

- **Effects on commercial and industrial structures.** Similarly, the effects on commercial and industrial structures from flooding or explosion could be severe.

- **Effects on agriculture.** In the same way, the effects on agriculture from flooding or explosion could be severe.

*Risk Assessment Conclusion.*

Pipelines are vulnerable to especially with the possibility of an earthquake, causing significant breakage. The degree of damage county-wide for a given rupture would be minimal, even though there might be significant injuries, loss of life and property in the

immediate area of the incident, depending on what kind of pipe ruptures and where the rupture occurs.

*Relationship to Other Hazards – Cascading Effects*

Pipeline incidents may lead to flooding, fires and air, water and land contamination. Incidents with natural gas or petroleum product pipelines may lead to explosion and fire.

### 5.3.21 Landslide

**Severity: 3**

**Probability: 3**

**Risk Score: -0.58**

**OA Jurisdictions Affected by Landslide Incidents**

- Most mountain areas within the County

*Hazard Definition*

Like its earthquake-generating faults, California's mountainous terrain is also a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. More than one-third of California is mountainous terrain that generally trends parallel to the coast, forming a barrier that captures moisture from offshore storms originating in the Gulf of Alaska and Mexico. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone.

A landslide is the breaking away and gravity-driven downward movement of hill slope materials, which can travel at speeds ranging from fractions of an inch per year to tens of miles per hour depending on the slope steepness and water content of the rock/soil mass.

Landslides range from the size of an automobile to a mile or more in length and width and, due to their sheer weight and speed, can cause serious damage and loss of life. Their secondary effects can be far reaching; for example, catastrophic flooding can result from the sudden release of river water impounded by landslide debris or slope failure of an earthen dam.

Although the area affected by a single landslide is less than that of earthquakes, landslides are pervasive in California's mountainous terrain and occur far more often, resulting in cumulative losses approaching $200 million in a given year. Average annual landslide losses in California are estimated at about $100 million. Because landslides occur as isolated events in both time and location, and there is presently no systematic means in place for documenting their losses, landslide hazard is often underestimated or goes unrecognized in the policy arena, even though landslides continue to cause millions of dollars in cumulative damage to California's homes, businesses, and infrastructure.

A landslide is a geologic hazard where the force of gravity combines with other factors to cause earth material to move or slide down an incline. Some landslides move slowly and cause damage gradually, whereas others move so rapidly that they can destroy property and take lives suddenly and unexpectedly. Slopes with the greatest potential for sliding

are between 34 degrees and 37 degrees. Although steep slopes are commonly present where landslides occur, it is not necessary for the slopes to be long.

Landslides, rock falls, and debris flows occur continuously on all slopes; some processes act very slowly, while others occur very suddenly, often with disastrous results. As human populations expand over more of the land surface, these processes become an increasing concern.

The most common types of landslides are (U.S. Department of the Interior, U.S. Geological Survey, Fact Sheet 2004-3072, July 2004):

**Slides** - Although many types of mass movements are included in the general term "landslide," the more restrictive use of the term refers only to mass movements, where there is a distinct zone of weakness that separates the slide material from the more stable underlying material.

**Falls** - Abrupt movements of masses of geologic materials, such as rocks and boulders that become detached from steep slopes or cliffs.

**Topples** - Toppling failures are distinguished by the forward rotation of a unit or units about some pivotal point, below or low in the unit, under the actions of gravity and forces exerted by adjacent units or by fluids in cracks.

**Flows** – There are five basic categories of flows that differ from one another in fundamental ways.

a. Debris flows: A debris flow is a form of rapid mass movement in which a combination of loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope.
b. Debris avalanche: This is a variety of very rapid to extremely rapid debris flow.
c. Earthflow: The slope material liquefies and runs out, forming a bowl or depression at the head. The flow itself is elongate and usually occurs in fine-grained materials or clay-bearing rocks on moderate slopes and under saturated conditions. However, dry flows of granular material are also possible.
d. Mudflow: A mudflow is an earthflow consisting of material that is wet enough to flow rapidly and that contains at least 50 percent sand-, silt-, and clay-sized particles. In some instances, for example in many newspaper reports, mudflows and debris flows are commonly referred to as "mudslides."
e. Creep: Creep is the imperceptibly slow, steady, downward movement of slope-forming soil or rock.

**Lateral Spreads** - Lateral spreads are distinctive because they usually occur on very gentle slopes or flat terrain. The dominant mode of movement is lateral extension accompanied by shear or tensile fractures. The failure is caused by liquefaction, the process whereby saturated, loose, cohesionless sediments (usually sands and silts) are transformed from a solid into a liquefied state.

The geologic setting of southern California locally is conducive to slope failures and slope-failure deposits (landslides) that can be a hazard to human life and property. These hazards are created when geologic materials are displaced down a topographic slope under the influence of gravity. Factors that determine slope-failure occurrence include:

1. Slope angle
2. Geologic materials (substrate)
3. Climatic conditions
4. Earthquake shaking
5. Debris Flows

Sudden "mudslides" gushing down rain-sodden slopes and gullies are widely recognized by geologists as a hazard to human life and property. Most "mudslides" are localized in small gullies, threatening only those buildings and roadways in their direct path. They can burst out of the soil on almost any rain-saturated hill when rainfall is heavy enough. Often they occur without warning in localities where they have never been seen before.

There are predictable relationships between local geology and landslides, rockfalls and debris flows. Knowledge of these relationships can improve planning and reduce vulnerability. Slope stability is dependent on many factors and their interrelationships, including rock type, pore water pressure, slope steepness, and natural or man-made undercutting.

Riverside County has a history of landslides during seasons of high precipitation.

*History*

**January, 2016** – Landslides near Banning resulted from a low 4.3 magnitude earthquake.

**December, 2014** – Mud Flow in Gilman Springs, San Jacinto.

**2002** – Landslide on Highway 60 in San Timoteo Badlands

*Risk Assessment*

There is a continuing risk of landslides during seasons of high precipitation. In addition, earthquakes could also cause significant landslides. The County has a great deal of hilly and mountainous terrain increasing the likelihood of a landslide incident.

- **Effects on people and structures**. Landslides constitute a threat to property, road safety, and life. Small landslides would not pose a serious risk. However, there is a possibility that a severe landslide in a populated area could cause significant damage and risk to life.

- **Effects on infrastructure**. Landslides can cause disruptions in power supply pipelines, power and telephone poles, and County roads and highways.

- **Effect on Critical Facilities**. An initial review of known landslide locations and the location of critical facilities indicates that there does not appear to be any of these facilities in close proximity to a Landslide Management Zone.

- **Effects on agriculture**. Similar to the threats to people and structures, small landslides would not pose a serious risk. However, there is the possibility that a severe landslide could cause significant damage and risk of life to elements of the agricultural industry.

*Risk Assessment Conclusion*

Landslides are a continuing risk in Riverside County, especially during seasons of high precipitation. History has shown also that many landslides occur in areas where landslides have not been predicted.

*Relationship to Other Hazards – Cascading Effects*

As noted, landslides can be the result of an earthquake or severe weather. The starting mechanism for a landslide will determine some of the cascading events. The end result is if a landslide occurs in a populated area, or area used by people, earth materials can cover or impede the area as described above. If a landslide were to impact power lines or other utility systems a cascading effect could be power, utility or sewer loss.

**Map 37:** Riverside County Surface Materials

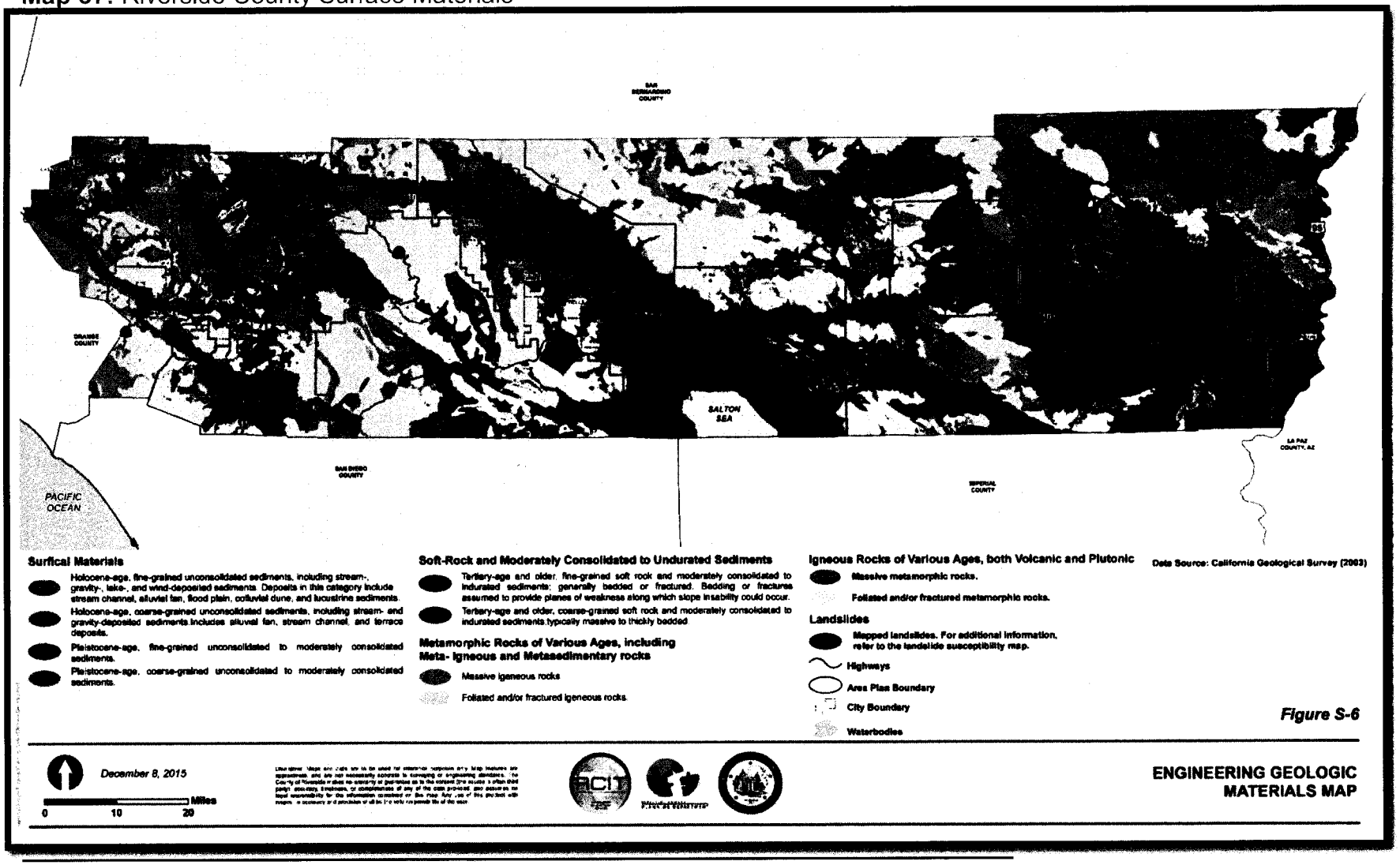



*Figure S-6*

**Map 38:** Riverside County Slope Instability Map

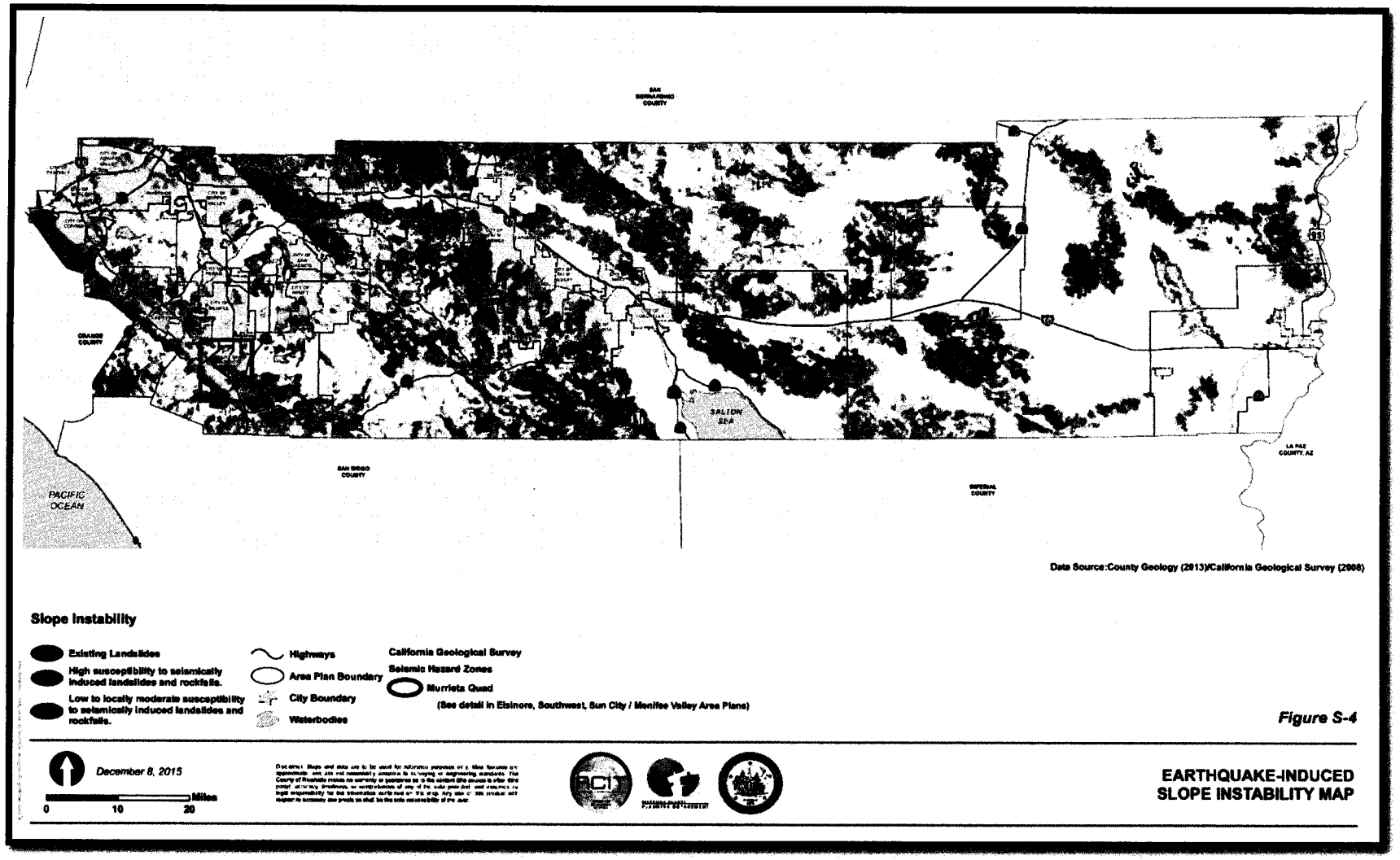



*Figure S-4*

### 5.3.22 Hazardous Materials Incident

**Severity: 3**

**Probability: 4**

**Risk Score: -0.75**

**OA Jurisdictions Affected by Hazardous Materials Incidents**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

*Hazard Definition*

Hazardous materials (Hazmat), consist of substances that by their nature, lack of containment, and reactivity, have the capability for inflicting harm. Hazmat poses a threat to health and the environment when improperly managed. Hazmat can be toxic, corrosive, flammable, explosive, reactive, an irritant, or a strong sensitizer. Hazmat substances also include certain infectious agents, radiological materials, oxidizers, oil, used oil, petroleum products, and industrial solid waste substances.

Hazardous materials can pose a threat where they are manufactured, stored, transported or used. They are used in almost every manufacturing operation and by retailers, service industries, and homeowners.

Hazardous material incidents are one of the most common threats to public health and the environment. Incidents may occur as the result of natural disasters, human error, terrorism, and/or accident.

Hazmat incidents typically take five forms:

1. Fixed facility incidents
    - Laws require those facilities to notify state and local authorities about what is being used or produced there and incidents with the materials can be planned for.
2. Transportation incidents
    - Transportation incidents are more difficult to prepare for because it is impossible to know what material(s) could be involved until an accident actually happens.

3. Pipeline incidents

    - Pipelines carry natural gas and petroleum. Breakages in pipelines carry differing amounts of danger, depending on where and how the break occurs, and what is in the pipe.

4. Terrorism incidents (or suspected Terrorism)

    - Intentional acts involving violence and/ or the threat of violence. Similar to transportation incidents, these occurrences are more difficult to prepare for due to unknown locations and substances.

5. Illegal Disposal / Abandonment
    - Similar to transportation incidents, these occurrences are more difficult to prepare for due to unknown locations and substances.

*History*

Many forms of hazardous materials are present in both the rural and urban areas of Riverside County. They are present in permanent storage locations, roadway and railway transport mediums, long-distance pipelines, and at various industrial and agricultural application sites. The County's location, with its rail and highway transportation routes, and various industries, has a growing potential for serious hazardous materials incidents. Interstates 10, 15 and 215, and State Highways 60 and 91 are all heavily traveled by trucks. Those trucks carry a wide variety of hazardous materials including gasoline, corrosives, oxidizers, pesticides, and radioactive materials.

The railroad lines traveling throughout the County also carry some extremely hazardous cargoes. Fortunately, the railroads have a good safety record with regard to the transportation of hazardous materials.

Traffic on railroads is not as prevalent as on truck routes in Riverside County, but poses a much greater problem when an accident is involved due to the volumes of hazardous materials on board.

There is a great deal of air traffic along the airways above Riverside County with the March Air Reserve Base Palm Springs International Airport, French Valley Airport, Hemet-Ryan Airport, Riverside Municipal Airport, Jacqueline Cochran Regional Airport and Bermuda Dunes Airport all operating within the County. The potential for a hazardous materials incident exists, especially with respect to military operations.

There are many pipeline distribution systems that traverse the County. These are discussed in Section 5.3.20.

**Table 44:** History of Hazmat Incidents in 2016

| Riverside County Department of Environmental Health Hazmat Incidents July 1, 2015 to June 30, 2016 | |
|---|---|
| **HAZARDOUS MATERIALS INCIDENT TYPE** | **TOTAL NUMBER** |
| General Emergency Response (do not fit other categories) | 28 |
| Drug Labs | 23 |
| Drug Dumps | 3 |
| Facility Incidents | 122 |
| Roadway Incidents | 119 |
| Aircraft Incidents | 3 |
| Railroad Incidents | 7 |
| Mercury Incidents | 5 |
| Dielectric Fluid Incidents | 40 |
| Radiological Incidents | 0 |
| Pesticide Incidents | 2 |
| Medical Waste Incidents | 9 |
| Noxious Odor Incidents | 39 |
| Illegal Disposal of Substances | 207 |
| Transportation/Manifesting Violations | 0 |
| Suspected Terrorism | 4 |
| **TOTAL Hazardous Materials Incidents:** | **611** |

The Riverside County Department of Environmental Health Hazardous Materials Emergency Response Program handled over 611 incidents in fiscal year (FY15/16) often in conjunction with Cal Fire countywide except for a few cities that handled Haz Mat incidents within their jurisdiction. The incidents cover all areas described in the definition section.

In 2016 The Riverside County Fire department responded to 613 Hazardous Materials Incidents.

The administering agencies within Riverside County are responsible for the control of fixed hazardous materials facilities, including the Participating Agencies of Riverside Fire Department and Corona Fire Department.

*Risk Assessment*

The amount of hazardous materials transported over rail and roadways on a daily basis is unknown, but estimated to be steadily increasing as our economy grows. There is the potential for a hazardous materials incident almost anywhere on the numerous highways and roads that crisscross Riverside County. The greatest concern focuses on the 10, 15, 60, 91, and 215 freeways. The most vulnerable areas along these routes are considered to be the on/off ramps and interchanges.

A major concern with the trucking industry is the safe operation of their trucks. With the deregulation of the trucking industry, spot checks of trucks in many states, including California, have shown that a large percentage of trucks currently in service are not in safe enough condition to be operated on public highways.

Many industries are moving into the County. Many facilities exist today, with more construction forecast. To support these industries, the County is likely to realize a large increase in the transportation of toxic, flammable, and corrosive materials into and out of the County. With the increased use of hazardous materials, there is an increased need for safe hazardous waste management and disposal. There will be the increased transportation of hazardous materials waste to proper disposal sites located outside of Riverside County.

Illegal dumping and clandestine drug labs are also a hazardous materials problem. Although not exclusive to Riverside County, the County is a target for these activities due to its accessibility in the outlying areas and the open living conditions in the mountain and desert areas.

No Class I landfills are operated in Riverside County. Seven Class III landfills are active in Riverside County. All accept only non-hazardous solid wastes and are located in unincorporated areas. Six of these landfills are operated by the Riverside County Waste Resources Department, while one (El Sobrante) is privately owned and operated. The El Sobrante, Badlands, Lamb Canyon, and Blythe landfills currently accept waste from outside of Riverside County. Blythe however, only takes small loads or may refuse to accept waste because it is a relatively small facility.

Hazardous waste generators include food and beverage processors as well as battery, semi- conductor, and metal container manufacturers, as well as automobile repair facilities, munition manufacturers, utility districts, and other industries. Although hazardous waste generators are scattered throughout Riverside County, most of the large generators of hazardous waste are located in the western portion of the County, including in the cities of Corona, Jurupa Valley, Riverside, and Temecula.

Nearly all of Riverside County residents have some type of hazardous materials in their homes. Examples include motor oil, paints, cleaners, aerosols, and pesticides. Household hazardous materials pose serious health issues for people who improperly use or dispose of these materials. Adverse environmental impacts can occur when household hazardous materials are disposed of in unlined sanitary landfills, where these materials may leach through the soil and contaminate groundwater.

Medical facilities, including clinics, hospitals, professional offices, blood and plasma centers, and medical research facilities generate a wide variety of hazardous substances. These substances may include contaminated medical equipment or supplies, infectious biological matter, prescription medicines, and radioactive materials used in medical procedures. The disposal of medical waste is achieved by on-site autoclaving of red-bagged waste (any medical waste that could possibly transmit a pathogen) and subsequently transported to a Class III landfill, or to a permitted incinerator. The Riverside County Department of Environmental Health has regulatory control over the disposal of medical and biological waste.

- **Effects on people and housing.** Historical events in Riverside County have necessitated evacuations when a Hazmat incident occurs. Relative to some of the other natural hazards assessed earlier in this LHMP, the numbers of people affected by Hazmat incidents are usually less.

- **Effects on commercial and industrial structures.** There may be economic consequences due to Hazmat incidents, but the damage is generally limited to clean-up of facilities and grounds, or simply an interruption of business due to evacuation.

- **Effects on infrastructure.** Hazmat incidents involving transportation may result in downed power lines. Also, Hazmat materials may impact waterways and drainage systems, and incidents can lead to the evacuation of schools, business districts, and residential areas.

- **Effects on agriculture.** As noted previously, there is a long history of agricultural production in Riverside County. Agricultural activities typically include the storage and periodic application of pesticides, herbicides, and fertilizers, as well as the storage and use of toxic fuels and solvents. The infiltration of these substances may leach into local groundwater supplies, presenting an elevated risk of groundwater contamination.

*Risk Assessment Conclusion*

Although Hazmat incidents can have serious property damage and even loss of life, Hazmat accidents do not generally affect extremely large areas. Hazmat incidents present a real danger and are highly unpredictable in terms of determining when or where they will occur, but generally do not pose a serious threat to the ability of Riverside County to respond. Reasonable preparation by law enforcement, fire department, and medical community enables the County to deal with the majority of likely events. Many emergency workers prepare for Hazmat events as part of their ongoing training. Agencies and facilities are also routinely equipped to deal with most events that might occur.

*Relationship to Other Hazards – Cascading Effects*

Besides the immediate effect of a hazardous materials incident at the scene of the emergency, there are ancillary effects as well. For instance, there may be impacts on waterways and drainage systems, and the evacuation of schools, business districts, and residential areas.

### 5.3.23 Water Supply Disruption/Contamination

**Severity: 2**

**Probability: 3**

**Risk Score: -1.50**

**OA Jurisdictions Affected by Hazardous Materials Incidents**

- All incorporated cities of Riverside County
- Unincorporated areas of Riverside County

*Hazard Definition*

People exposed to water supply disruption or toxic pollutants caused by contaminations may be threatened by a number of health risks:

- Dehydration, hepatitis, and cancer
- Eating contaminated food products, such as fish from contaminated waters; meat, milk, or eggs from animals that fed on contaminated plants; and fruits and vegetables grown in contaminated soil
- Drinking water contaminated by toxic pollutants
- Ingesting contaminated soil. Young children are especially vulnerable because they often ingest soil from their hands or from objects they place in their mouths
- Touching (making skin contact with) contaminated soil, dust, or water (for example, during recreational use of contaminated water bodies)

*Risk Assessment*

According to the Environmental Protection Agency, there are four major types of drinking water contamination; physical, chemical, biological, and radiological.

**Physical** contaminants primarily impact the physical appearance or other physical properties of water. Examples of physical contaminants are sediment or organic material suspended in the water of lakes, rivers and streams from soil erosion.

**Chemical** contaminants are elements or compounds. These contaminants may be naturally occurring or man-made. Examples of chemical contaminants include nitrogen,

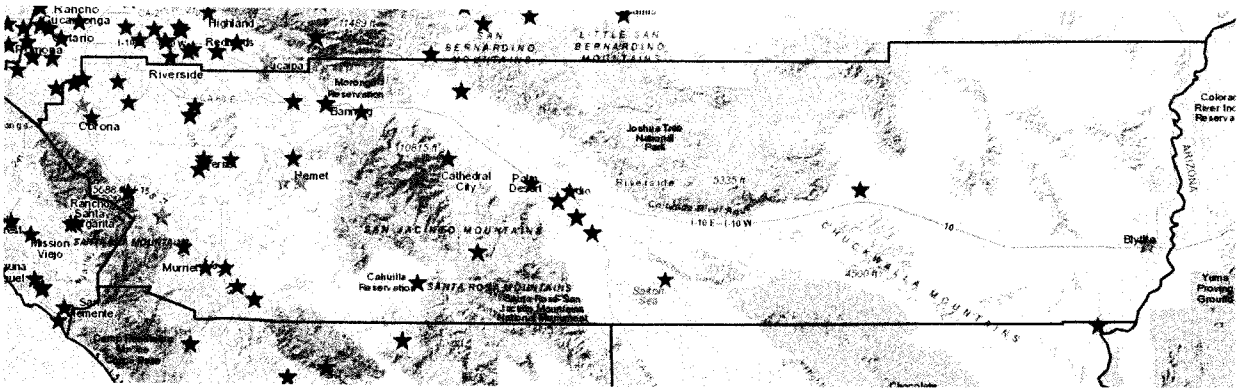
bleach, salts, pesticides, metals, toxins produced by bacteria, and human or animal drugs.

**Biological** contaminants are organisms in water. They are also referred to as microbes or microbiological contaminants. Examples of biological or microbial contaminants include bacteria, viruses, protozoan, and parasites.

**Radiological** contaminants are chemical elements with an unbalanced number of protons and neutrons resulting in unstable atoms that can emit ionizing radiation. Examples of radiological contaminants include cesium, plutonium and uranium.

Source: https://www.epa.gov/ccl/types-drinking-water-contaminants

Ground water contamination is also a major threat because of its use for drinking water and irrigation. Potential groundwater contaminants include; storage tanks, septic systems, hazardous waste, landfills, chemicals and road salts, and littering.




Source: waterboards.maps.arcgis.com

Map illustrated water systems in Riverside County. Blue stars represent in compliance water systems, red stars are systems out of compliance as of July 2017.

- **Effects on people and housing.** The effect on housing is relatively low, but the effect on people may be devastating. Though the County encourages residents to store at least 72 hours of water for their household, the reality is only a small percentage actual partake in that practice. This means that in the event of disruption or contamination that renders usable water sources limited, people may become dehydrated and suffer from other serious health issues such as cancer. In the event that contamination happens during the summer months when temperatures reach 90-105, the population is at an even higher risk.

- **Effects on commercial and industrial structures.** The effect to structures is relatively low.

- **Effects on infrastructure.** The effect to structures is relatively low.

- **Effects on agriculture.** Water contamination could devastate agriculture in Riverside County. The contaminant could be poisonous to crops and livestock. Depending on the level of exposure, entire field could be damaged to the point of total loss.

*History*

**March 2, 2017** – 198 residents were exposed to water contaminated with uranium in the unincorporated area of Pinyon Pines.

*Risk Assessment Conclusion*

Due to high levels of monitoring and preparedness within water agencies, the threat of water contamination is fairly low. However, it could greatly impact the county if it is caused by a cascading event such as an earthquake.

*Relationship to Other Hazards – Cascading Effects*

The loss of water could drastically affect other man-made and natural hazards. In the event of an earthquake and pipelines are damaged, it could greatly reduce the amount of water available to fight fires. The amount of water available to residents would also be drastically reduced.

# Section 6.0 – Community Rating System

The County of Riverside and all cities within the County participate in the National Flood Insurance Program (NFIP). Riverside County Ordinance NO. 458 Regulating Special Flood Hazard Areas and Implementing the National Flood Insurance Program was last updated on August 14, 2014.

Riverside County also participates in the Community Rating System (CRS). The rating system is a voluntary NFIP program that aims to reduce flood damages to insurable property, strengthen and support the insurance aspects of the NFIP, and encourage a comprehensive approach to floodplain management. In addition to the county, four cities participate in CRS: Lake Elsinore, Moreno Valley, Murrieta, and Palm Springs.

The most active in the Community Rating System within the County is Palm Springs. Their high scores in the system allow the city to offer the highest discount off of flood insurance (20% for SFHA and 10% for Non-SFHA).

| Community Number | Community Name | CRS Entry Date | Current Effective Date | Current Class | % Discount for SFHA | % Discount for Non-SFHA | Status |
|---|---|---|---|---|---|---|---|
| 060245 | Riverside County* | 10/01/10 | 05/01/16 | 7 | 15 | 5 | C |
| 060636 | Lake Elsinore | 10/01/09 | 05/01/14 | 8 | 10 | 5 | C |
| 065074 | Moreno Valley | 10/01/91 | 10/01/96 | 8 | 10 | 5 | C |
| 060751 | Murrieta | 10/01/97 | 10/01/97 | 9 | 5 | 5 | C |
| 060257 | Palm Springs | 10/01/92 | 05/01/11 | 6 | 20 | 10 | C |

Note: SFHA, Special Flood Hazard Areas

## 6.1 Repetitive Loss Properties

Areas which have flooded in the past are highly likely to experience recurring flooding. The repetitive nature of flood damage is cause for concern. FEMA, in coordination with the state, identifies California's top Repetitive Loss (RL) Communities. Riverside County is not a top Repetitive Loss community. Riverside County unincorporated areas only have eleven identified repetitive loss properties. That is an increase of four properties since the 2012 plan. Two of the eleven repetitive loss properties have been mitigated and the Riverside County Flood Control District is investigating ways to mitigate the remaining five properties so as to avoid future flooding incidents. Options being considered are both structural and non-structural mitigation measures.

**Table 45:** Riverside County Repetitive Loss Properties

| City | Mitigated? | Insured? | Date of Loss | Date of Loss | Total Paid |
|---|---|---|---|---|---|
| LAKE ELSINORE | YES | NO | 02/14/1980 | 01/05/1979 | $91,618.83 |
| LAKE ELSINORE | NO | NO | 12/04/1982 | 03/15/1980 | $21,052.64 |
| LAKE ELSINORE | NO | NO | 04/15/1983 | 08/11/1980 | $ 6,436.09 |
| HEMET | YES | NO | 03/02/1983 | 09/06/1981 | $ 2,684.06 |
| RIPLEY | NO | NO | 09/23/1983 | 07/23/1983 | $ 6,602.15 |
| CORONA | NO | NO | 01/04/1995 | 12/04/1987 | $ 70,282.69 |
| THOUSAND PALMS | NO | NO | 12/22/2010 | 10/17/2005 | $ 26,331.18 |
| THOUSAND PALMS | NO | YES | 09/08/2014 | 02/25/2005 | $ 44,272.25 |
| THOUSAND PALMS | NO | YES | 09/08/2014 | 12/22/2010 | $ 29,896.05 |

| | | | | | |
|---|---|---|---|---|---|
| THOUSAND PALMS | NO | YES | 09/08/2014 | 12/22/2010 | $ 33,345.35 |
| THOUSAND PALMS | NO | YES | 09/08/2014 | 01/22/2010 | $ 119,638.09 |

## 6.2 National Flood Insurance Program

Public Law 90-448 of 1968, known as the National Flood Insurance Act, established the National Flood Insurance Program (NFIP) which provides for federal government underwriting of flood insurance policies sold by private companies. Supported by a national mapping system showing boundaries for 100- and 500-year floodplains, the NFIP encourages local governments to direct development away from floodplain areas or mitigate flood risks through local floodplain management regulations. Through the Community Rating Service (CRS), the NFIP provides for financial incentives in the form of lower insurance rates for local communities encouraging mitigation of flood hazards in a manner parallel to rate incentives related to private fire insurance and enforced by the mortgage industry. The National Flood Insurance Act was modified in 1994 to provide for flood hazard mitigation planning and project grants.

The unincorporated community of Riverside County joined the NFIP on April 15, 1980. Currently, unincorporated Riverside County is one of 30 local communities that participate in the NFIP. Please refer to the table on the following page for participating jurisdictions.