Appendix A

Regional Setting and Context

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Contents

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1. Overview to Appendix A

This appendix provides more detailed information on regional setting and context than that contained in Chapter 2 of the RFMP. This chapter should be helpful for those readers unfamiliar with the Lower San Joaquin River and Delta South regions (collectively referred to as Regions).

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2. Regional Setting

2.1. Area and Boundaries

The Regions are in the central portion of the Central Valley of California, a broad, gently sloping valley that drains into the Sacramento-San Joaquin Delta. Located near the mouth of the San Joaquin River, the Regions are subject to runoff from nearly the entire 14,700 square mile San Joaquin River Basin. In general, the Regions consist of a mixture of urban and agricultural land uses.

The Regions are traversed by the lower San Joaquin River, the Delta South, and the numerous tributaries which flow through urban areas from the foothills. Some of the primary tributaries to the lower San Joaquin River include: Bear Creek, Calaveras River, Mormon Slough, Mosher Slough, Stockton Diverting Canal, and the French Camp Slough.

The primary channel in the Delta South Region is the San Joaquin River. There are numerous sloughs and canals traversing this region. Some of the prominent waterways include: Paradise Cut, Old River, Middle River, Burns Cutoff, Turner Cut, Whiskey Slough, Trapper Slough, Victoria Canal, and Grant Line Canal. Urban development in the Delta South is focused near Tracy and Lathrop. The Delta South Region is characterized predominantly by agricultural land use.

2.2. Land Use and Population

2.2.1. *Land Uses*

Land uses in the Regions generally relate to the Central Valley's agricultural heritage and proximity to effective distribution facilities, namely the Stockton Ship Channel, interstate freeways, and transcontinental railroads.

The Regions consist of actively farmed agricultural land (75%), urban and built-up land (23%) and native vegetation and grazing land (2%). Urban development is generally centered near the cities of Stockton, Lathrop, Manteca, and Tracy. Lands outside the spheres of influence of these cities are generally agricultural.

Most of the farmland in the Regions is classified as Prime Farmland, or Farmland of Statewide Importance, the California Farmland Mapping and Monitoring Program's highest designated tiers. This indicates that every reclamation district in the Regions with any agricultural production protects a portion of the most valuable farmland in the State of California, regardless of the crops planted at any given time. The continued use of the land for agricultural production is critical to agricultural economic output of the state. Figure 1 provides a graphical overview of the land use in the Regions.

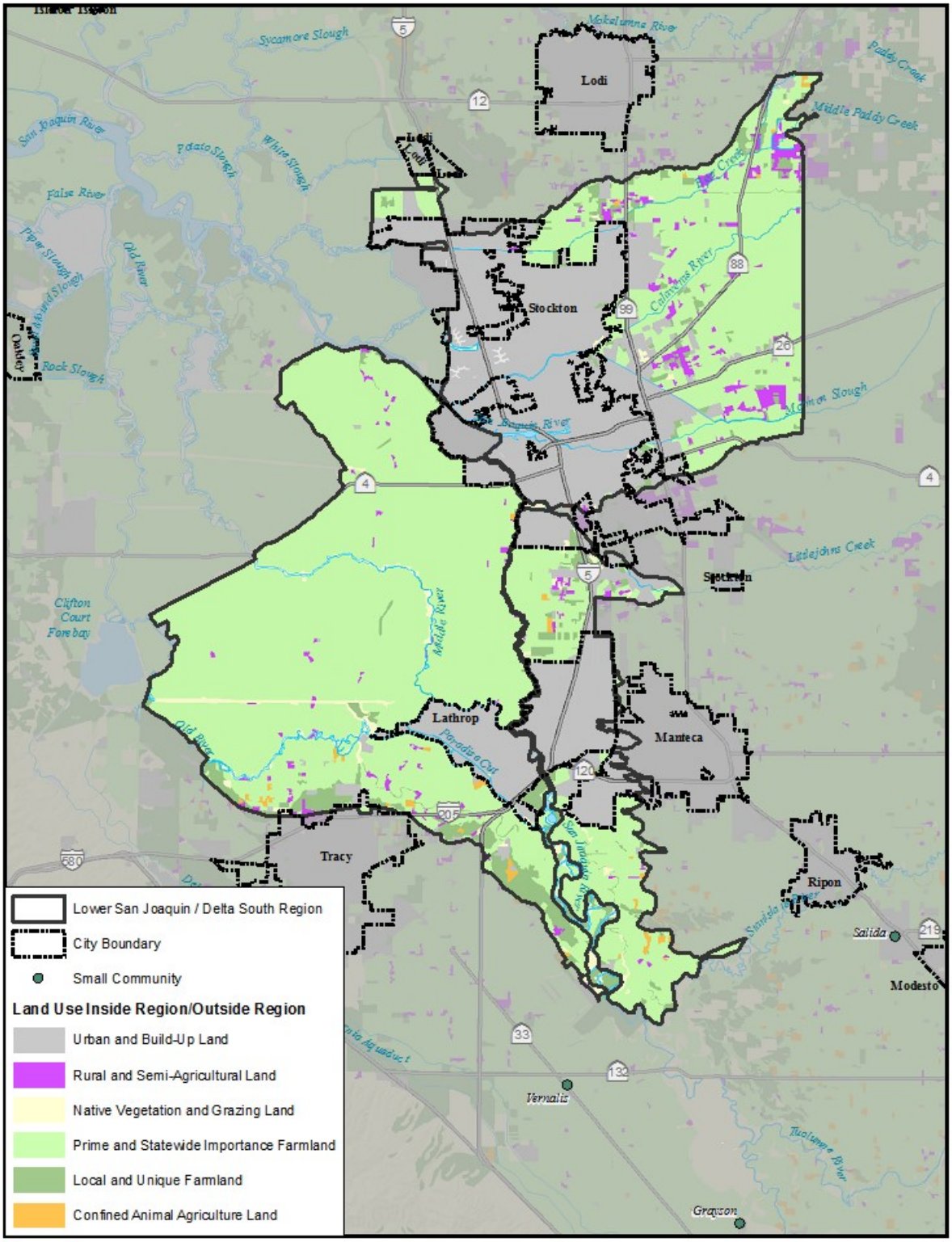

Figure 1 – General Land Uses in the Regions

2.2.2. *Conservation Areas*

San Joaquin County participates in the California Land Conservation Act (commonly known as the Williamson Act) program. The Williamson Act aims to preserve agricultural land and related open space uses by discouraging premature and unnecessary conversion to urban uses. In exchange for agreeing to maintain Williamson Act compatible land uses, landowners receive the benefit of reduced property tax rates from the County. Williamson Act contracts are voluntarily established 10-year agreements between a landowner and the County and the term of the contract is automatically renewed every year, unless a notice of non-renewal is filed by the landowner.

A Williamson Act contract restricts a landowner's ability to use or subdivide any parcel of land that is under an existing contract. Compatible uses under the Williamson Act generally consist of agricultural (i.e. farming, ranching, grazing, timber) and related uses such as agriculturally-related processing facilities.

Similar to Williamson Act lands, conservation easements also aim to set aside lands for non-urban uses. Conservation easements differ from the Williamson Act parcels in that agricultural or conservation easements are legal agreements between a landowner and a government or nonprofit entity such as a land trust, that conserves agricultural, biological habitat, or open space resources by temporarily or permanently limiting future development. Agricultural or conservation easements can be tailor made to meet the needs of an individual landowner and can cover an entire parcel or portions of a property. Tax benefits and/or financial compensation are often available for grantors of these types of easements.

Conservation easements typically restrict development and subdivision to the degree that is necessary to protect significant habitat, open space, or other conservation values of that particular property. Some conservation easements include "home sites," or areas known as "exclusions" to the easement terms where limited development is allowed. Generally, home sites or exclusions are small in size (1-2 acres) and located on areas low in conservation value. Landowners and land trusts work together to draft conservation easements that reflect both the landowner's desires and the need to protect conservation values.

There are approximately 113,000 acres of Williamson Act and Conservation Easement parcels in the Regions. Figure 2 shows Williamson Act parcels and Conservation Easements in the Regions.

In addition, the San Joaquin Multi-Species Habitat Conservation and Open Space Plan (SJMSCP) is a master plan with the key purpose of balancing the need to conserve open space for wildlife and converting open space to accommodate a growing population while minimizing costs to project proponents and society at large. The program imposes a fee of about $13,000 per acre on top of conservation requirements of other jurisdictions. San Joaquin County along with several of the cities in the Regions impose a 1:1 mitigation requirement for the conservation of any agricultural land to urban uses.

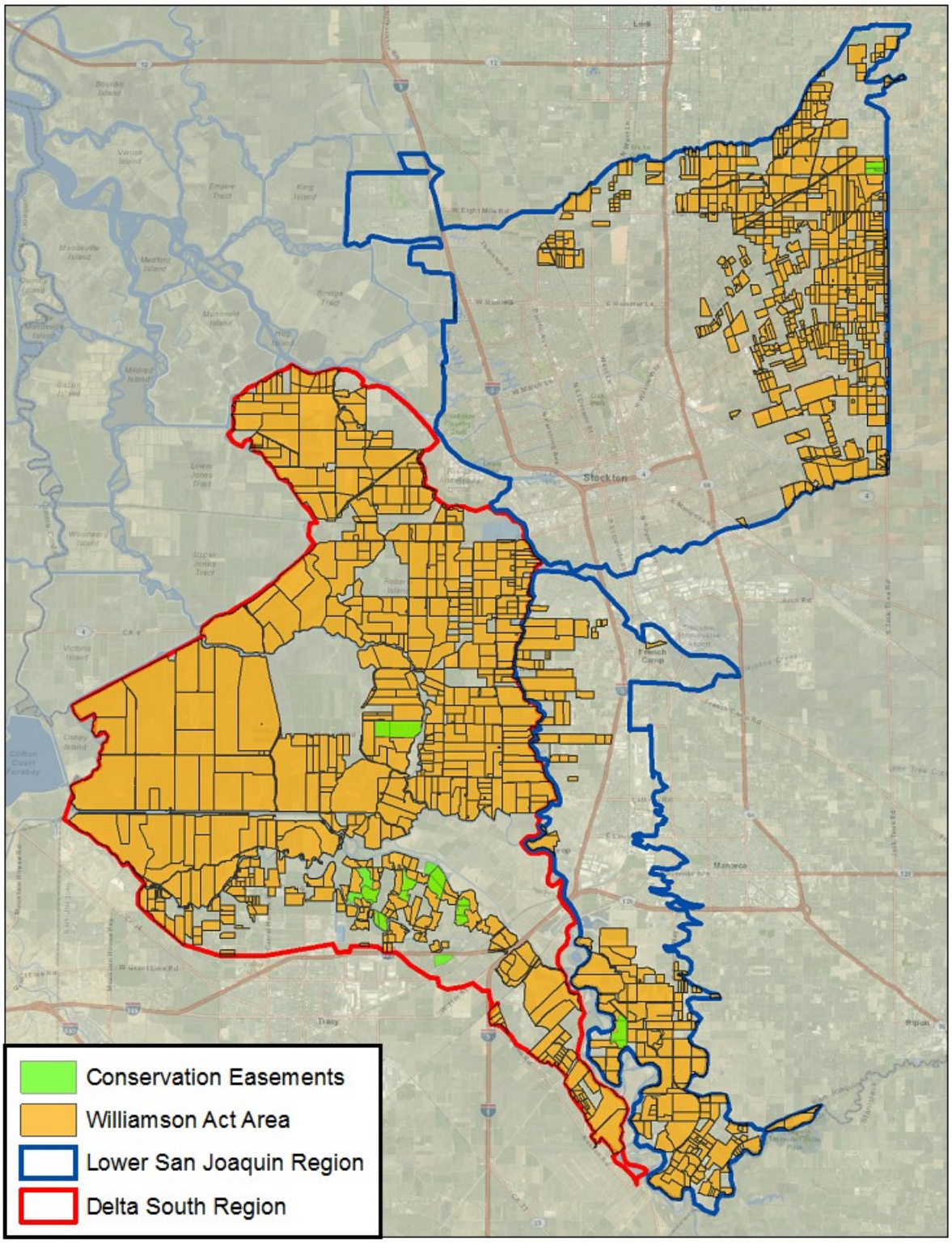

Figure 2 – Williamson Act Lands & Conservation Easements in the Regions

2.2.3. *Population & Demographics*

Based on the 2013 California Department of Finance data, San Joaquin County has a population of 698,414 with most residents concentrated in the urban areas of the cities of Stockton, Tracy, Lathrop, Manteca, Lodi, and Ripon. Table 1 shows the populations of the communities in and near the Regions. It should be noted that this data is identified by jurisdiction, some of which extend beyond the regional boundaries.

Table 1 – Population by Jurisdiction in the Regions

Jurisdiction	Total Population January 1st, 2013
San Joaquin County	698,414
Lathrop	19,209
Lodi	62,930
Manteca	71,164
Ripon	14,606
Stockton	296,344
Tracy	84,060
Other Areas	150,101

Source: 2013 Population Estimates, CA Dept. of Finance, Demographics

The Regions are populated by approximately 385,000 residents, which is just less than half of San Joaquin County's total population. Of the cities that are at least partially located within the Regions, Stockton is the largest with a total population of 295,000, followed by Tracy (84,000), Manteca (70,000), and Lathrop (19,000).

In addition to these cities, the RDs within the Regions and 3 additional RDs of local interest were engaged during the RFMP process. Acreage for these RDs is shown in Table 2.

Table 2 – Acreage by RD in the Regions

Delta South Region	
Reclamation District	**Acreage**
RD 1	11354
RD 2	12580
RD 524	11950
RD 544	7574
RD 684	10437
RD 773	6900
RD 1007	5933
RD 2058	7386
RD 2062	3962
RD 2085	1460
RD 2089	714
RD 2095	3750
RD 2107	1031
RD 2116	131
Drexler Tract/Pocket	3137
Total	**88299**

Lower San Joaquin River Region	
Reclamation District	**Acreage**
RD 17	11221
RD 404	2130
RD 828	1131
RD 1608	566
RD 1614	1598
RD 2042	3100
RD 2064	5888
RD 2074	1186
RD 2075	3481
RD 2094	1970
RD 2096	67
RD 2126	360
Total	**32698**

Other Closely Aligned RDs	
Reclamation District	**Acreage**
RD 403	1451
RD 2115	1806
RD 2119	2097
Total	**5354**

Table 3 below presents US Census Bureau demographic information for San Joaquin County. County information was used since the Regions span multiple cities and unincorporated areas. It is noted that the data in Table 3 cites 2011 and 2012 data, which is not as current as the data in Table 1.

Table 3 – Demographics

	San Joaquin County	State of California
General Data		
Percentage of population under 5 years old	7.7%	6.7%
Percentage of population between the ages of 5 and 18	20.9%	17.6%
Percentage of population between the ages of 18 and 65	60.4%	63.6%
Percentage of population over 65 years old	11.0%	12.1%
Ethnicity		
White	68.4%	73.7%
Black or African American	8.2%	6.6%
American Indian and Alaska Native	2.0%	1.7%
Asian	15.7%	13.9%
Native Hawaiian and Other Pacific Islander	0.7%	0.5%
Two or More Races	5.0%	3.6%
Hispanic or Latino*	39.7%*	38.2%*
** According to the US Census Bureau, people who identify their origin as Spanish, Hispanic, or Latino may be of any race. Thus, the percent Hispanic should not be added to percentages for racial categories.*		

2.3. Economy and Industry

The Regions have a long and rich history of farming. Accordingly, agriculture and related industries account for 30%-35% of the total economy of San Joaquin County. In 2011, the farming and agriculture industry accounted for more than $2.2 billion of the economy in San Joaquin County. Proximity to transcontinental railroads and the Port of Stockton continue to make San Joaquin County one of the most important areas west of the Rocky Mountains for commerce.

Table 4 presents data from the US Census Bureau on the different types of industries in San Joaquin County. It is noted this data is not current; however it represents the latest available information on the US Census Bureau.

Table 4 – San Joaquin County Business Data

Private nonfarm establishments, 2011	10,697
Private nonfarm employment, 2011	159,882
Private nonfarm employment, percent change, 2010-2011	-0.5%
Non-employer establishments, 2011	34,053
Manufacturers' shipments, 2007 ($1000)	$8,272,476
Merchant wholesaler sales, 2007 ($1000)	$9,001,313
Retail sales, 2007 ($1000)	$7,109,680
Accommodation and food services sales, 2007 ($1000)	$745,809
Building permits issued in 2012	1,006

According to the US Census Bureau, the median household income in San Joaquin County from 2007 – 2011 was approximately $53,764, and approximate 17% of the County's population was below the poverty level. Additionally, the Regions have areas that meet the definition of a Disadvantaged Community (DAC). According to DWR's guidelines, a DAC is defined as an area with a median household income less than $48,706. This is significant to the Regions because these areas are less able to locally fund large-scale projects, and are therefore eligible for increased State funding to implement these projects. Figure 3 shows the disadvantaged communities in the Regions.

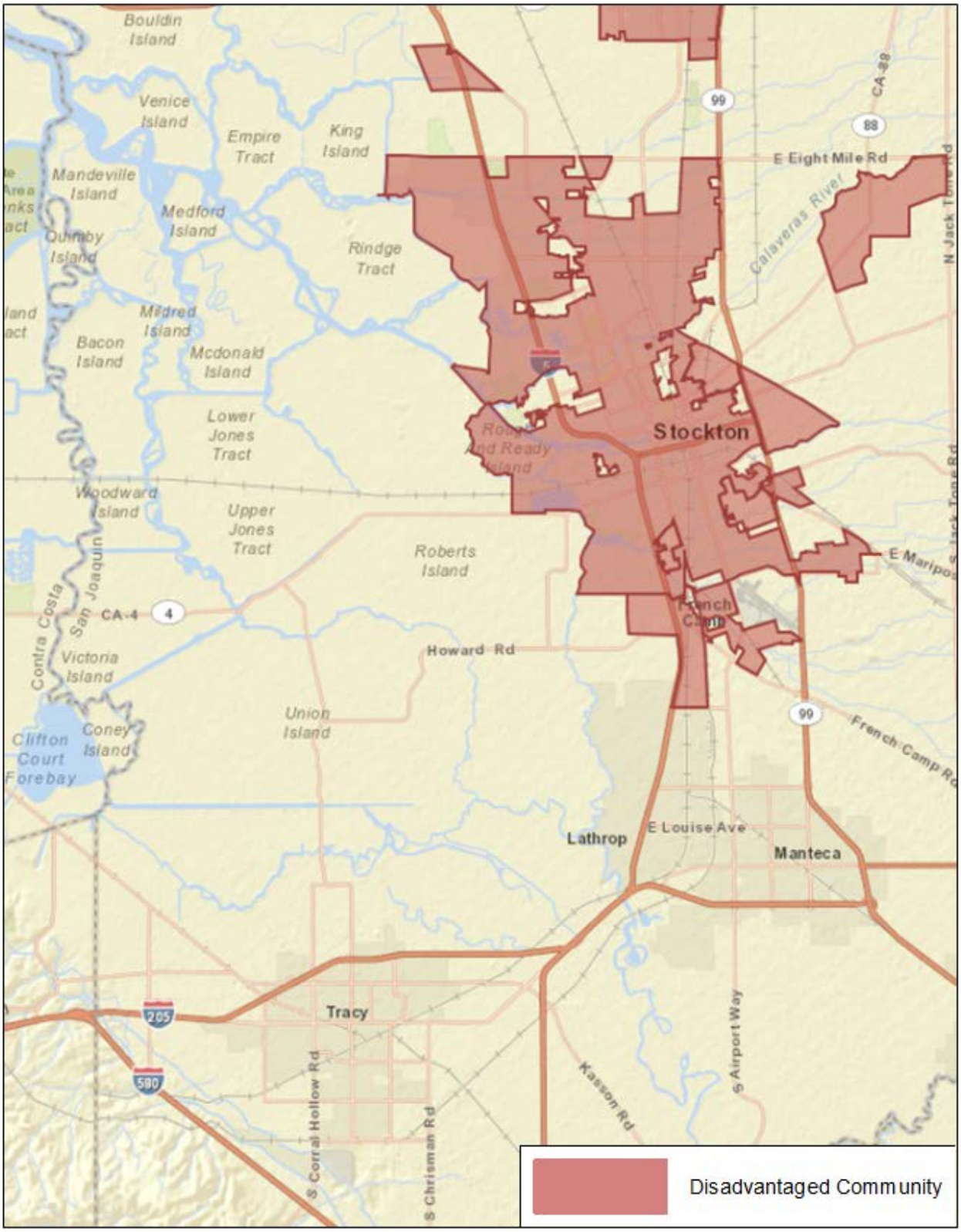

Figure 3 – Disadvantaged Communities in the Regions

2.4. Natural Resource Assets

The rich, productive soils in San Joaquin County represent one of the most important natural resource assets in the Regions. The numerous rivers, streams, creeks, sloughs, and channels are also a vital resource. The Stockton Ship Channel is used as a navigational channel by large commercial ships traveling to and from the Port of Stockton. These waterways support the vast agriculture industry in the Regions, provide drinking water, and recreation opportunities for residents.

Statewide, the Sacramento–San Joaquin Delta provides water for approximately 7 million acres of farmland and drinking water for approximately 25 million people, making it the single largest drinking water source in California. Therefore, the protection and preservation of water quality within the Delta and for the State and federal water projects is a critical. The RD levees in the Regions help protect drinking water in the Delta by maintaining an appropriate balance between freshwater and saltwater. Flooding of Delta islands has the potential to negatively affect water quality due to increases in salinity, both locally and statewide.

If the levees along any of the Reclamation Districts in the Regions were breached, particularly during a storm or high water event, adjacent islands would be threatened by seepage under the levee and higher wind fetch, which could cause levee failures.

In addition to agriculture and water supply, the Regions provide habitat and riparian areas for wildlife. Riparian vegetation is a habitat type characterized by trees, other vegetation and physical features normally found on the stream banks and floodplains associated with streams, lakes, or other bodies of water. Riparian systems provide several important functions to both the aquatic and terrestrial ecosystems associated with them. These include, but are not limited to, stream bank stabilization, flow moderation and flood control, sediment control, organic matter necessary to support aquatic communities, water quality improvement by filtration, temperature moderation by shading, and stream structural diversity. Riparian habitats support a great diversity of wildlife, including sensitive invertebrates, amphibians, reptiles, birds, and mammals. Riparian vegetation occurs intermittently and concentrated around waterways in the Regions including: Littlejohns Creek, the right bank of the Stanislaus River, and San Joaquin River.

Finally, the Regions have “Designated critical habitat” areas. Designated critical habitat is a term defined in the Endangered Species Act and used by US Fish and Wildlife Service and the National Marine Fisheries Service as an area that is essential for the conservation and recovery of a federally threatened or endangered species that requires special management and protection. It may include an area that is not currently occupied by the species but that will be needed for its recovery. Critical habitats are designated to ensure that actions authorized by federal agencies will not destroy or adversely modify critical habitat, thereby protecting areas necessary for the conservation of the species. Not all federally listed species have designated critical habitat.

Species with land designated as critical habitat in the Lower San Joaquin River Region and Delta South Region include: the delta smelt (Hypomesus transpacificus), Central Valley steelhead

(Anadromous O. mykiss), Green sturgeon (Oncorhynchus tshawytscha) and the Valley Elderberry Longhorn Beetle (Desmocerus californicus dimorphus). It is noted that Endangered and Threatened species data shown are representative of occurrence areas defined by the California Natural Diversity Database. Figure 4 provides an overview of habitat types in the Regions.

2.5. Critical Infrastructure

The hundreds of thousands of people who live, work, and play in the Regions depend on a significant amount of infrastructure. Specifically, potable water distribution facilities, treatment facilities, interstate freeways, highways, airports, railroads, and the Port of Stockton are all vital to interstate commerce and the economy in the Regions. Figure 5 and Regional Atlas Map 8 provide a graphical overview of the key infrastructure facilities described below.

Major north-south highways include: Interstate 5 and State Highway 99. Major east-west highways include: Interstates 205 and 580 (just west of the Regions); State Highways 4, 26, 88, and 120.

Other critical infrastructure in the Regions includes:

- Port of Stockton
- 2 airports including the Stockton Municipal Airport and Wallom Field Airport
- Union Pacific Railroad
- Burlington Northern Sante Fe Railroad
- Central California Traction Railroad
- Lathrop and Stockton City Halls
- 2 San Joaquin County Admin Buildings
- 15 boat launching facilities
- 6 hospitals
- 14 fire stations
- 4 police stations
- Stockton Waste Water Treatment Plant and wastewater ponds
- Lathrop/Manteca Sewer Treatment Plant
- Mokelumne (EBMUD) Aqueduct
- City of Manteca Water Quality Plant
- City of Lathrop Water Recycling Plant
- Westside Sewer pump station at the northeast corner of RD 2119
- Tracy wastewater ponds

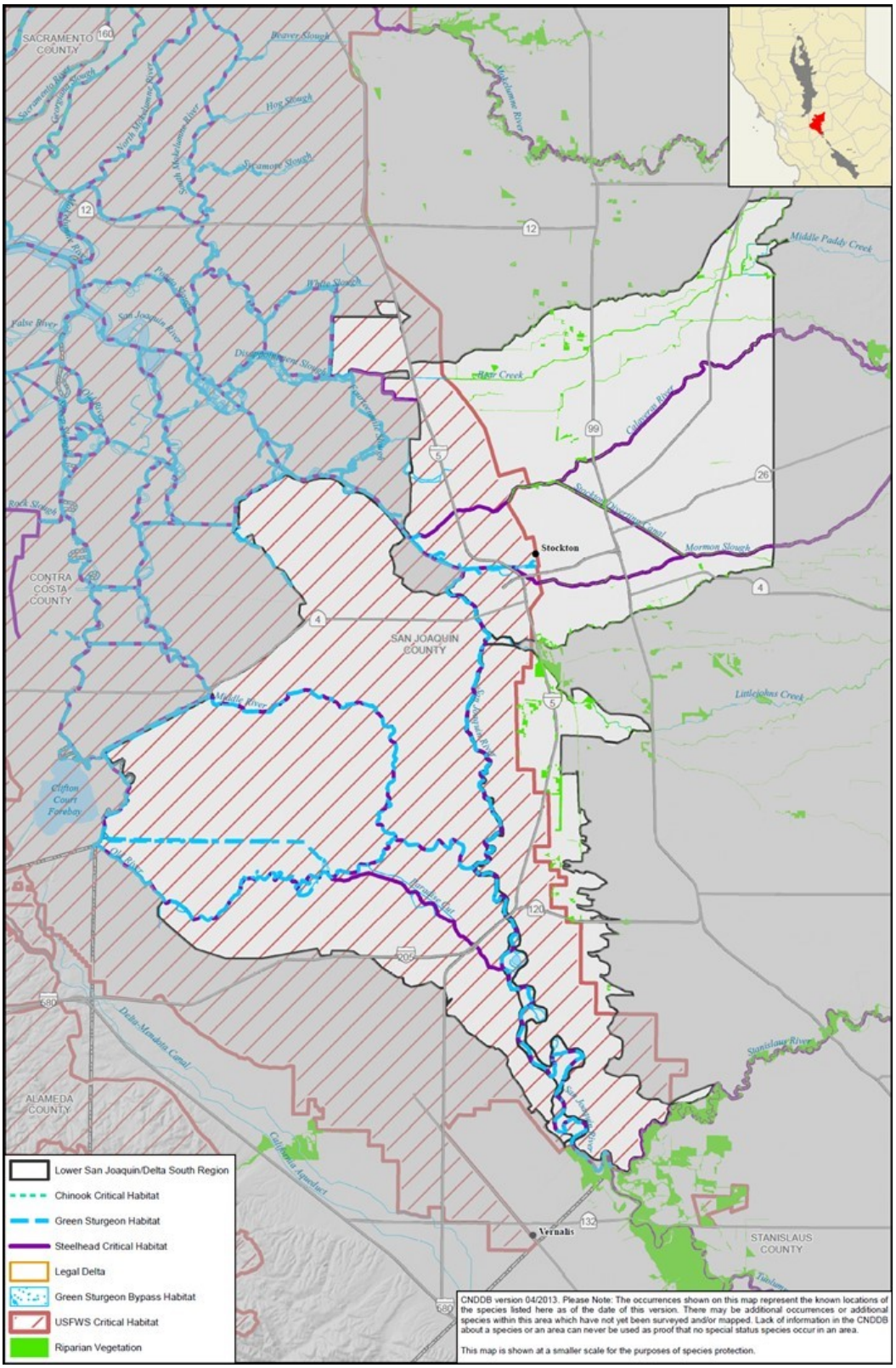

Figure 4 – Critical Habitat

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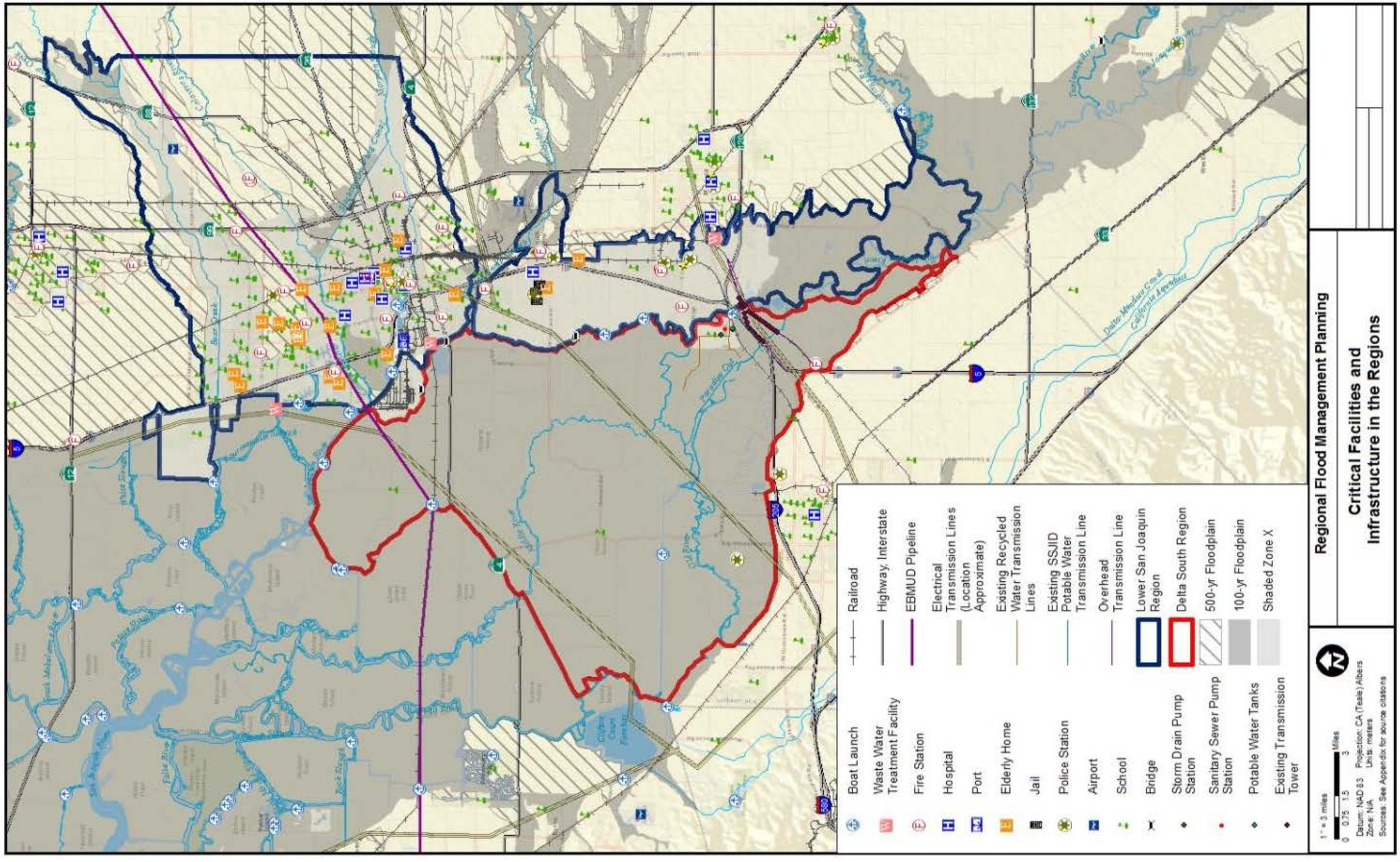

Figure 5 – Critical Facilities and Infrastructure in the Regions

Appendix A

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2.6. Climate

The Regions are characterized by a well-defined cool, wet season lasting generally from November through April, followed by a hot, dry summer. With the Sierra Nevada Mountains to the east, and the exposure to the influence of storms sweeping in from the Pacific Ocean, the Regions can be subjected to rapid, extreme, and persistent rainfall and subsequent flooding.

Runoff from storm events traverses the Regions via numerous creeks and rivers, ultimately draining to the San Joaquin River. This type of rainfall event was formerly referred to as a Pineapple Express since the warm, moist air mass originates near Hawaii in the Pacific Ocean. This phenomena is now referred to as an "atmospheric river".

2.7. Historical Context of Flood Management

This section provides some historical context on past flooding and flood management in the Regions. It is intended to provide readers who have limited familiarity with the Regions with some perspective on past flooding and its management, not to provide a complete history.

2.7.1. *Historic Flood Events*

The most recent major flood events occurred in the Regions along the Lower San Joaquin River in 1955, 1958, 1983, 1986, 1995, 1997, and 2006. The distribution of flood damages in the Regions has varied considerably with each storm event. However, the highest magnitude of damages occurred to agricultural crops and developments. The 1997 flood event did, however, damage 1,842 residences, mobile homes, and businesses in San Joaquin and Stanislaus counties. Estimated average annual equivalent damages from floods in the Lower San Joaquin River basin amount to about $25 million based on preliminary HEC-FDA model for the CVFPP. Crop damages ($15.2 million) account for 60% of the estimated damages. While it is noted that the data included herein represents an area larger than the RFMP Regions, it highlights the history and magnitude of severe flood events basin-wide, and in the Regions in particular. Table 5 shows a summary of past flooding events.

Following Table 5, a series of photographs and maps show some historical flooding. The earliest photograph below is downtown Stockton during a flood in the 1890s. The primary flood protection measures in place at that time were locally constructed levees. It should be noted that flood management facilities have significantly evolved since this original photograph. With construction of the Stockton Diverting Canal in the early 1900s, some flood protection was provided to the area west of the Diverting Canal. Both project and non-project levee construction and improvements subsequently provided additional protection. By the time of the 1955 and 1958 floods, their still wasn't a project levee along the east side of the Diverting Canal, which was constructed in the late 1960s. New Hogan dam has provided additional control of floodwaters for the Stockton area since the mid-1960s. Many other incremental system improvements provided even greater flood protection to the Regions by the time that the 1997 flood occurred. An important message is that none of the flood events in Table 5 are directly comparable due to the evolution in facilities and management practices that continue to this day.

Table 5 – Historic Flood Events in and near the Regions

Date	Location	Flood Type	Description
December 1861-January 1862	Statewide	Slow Rise, Structure Failure	The "Great Flood" was remarkable for the exceptionally high stages reached on most streams, repeated large floods, and prolonged and widespread inundation in the San Joaquin Valley. There were four periods of flooding; the first on December 9, 1861: the second on December 23-28: the third on January 9-12: and the fourth on January 15-17.
1907, 1909 & 1911	Statewide	Slow Rise	Major floods occurred in March 1907, January 1909, and January-February 1911. Flooding from the 1911 event extended in a sheet from the Southern Pacific RR across Mormon Slough to the Diverting Canal, a distance of about seven miles. During the 1911 flood, floodwaters overtopped the left levee of the Diverting Canal. The City of Stockton's experience with flooding since 1907 led to construction of Hogan Dam on the Calaveras River, primarily for flood control.
1938	Regional	Slow Rise	Hogan Dam helped temper flooding in the Stockton area during the February 1938 flood – the flood would have been substantially greater without the dam. Runoff was estimated to be the greatest since 1911. The flood caused severe flooding on Bear Creek in the vicinity of the Highway 99 crossing. Levees in the Delta breached on Pescadero and Stewart Tracts and several other islands and tracts outside the Regions.
1950	San Joaquin Valley, Stockton Delta	Slow Rise, Stormwater	A series of severe storms from November 13 to December 8, 1950 resulted in extensive flooding. Upstream reservoirs were full and spilling by early December 1950. A record flood of 79,000 cfs at Vernalis occurred on December 9. High San Joaquin River flows combined with the highest tides in 10 years to breach the right levee of the San Joaquin River to flood a large part of RD 17. The west levee of Paradise Cut breached, causing flooding on the Pescadero Tract and the Stewart Tract, and washed out the Southern Pacific Railway tracks. Levees breached and flooded 3,220 acres on Venice Island and 5,490 acres on Webb Tract.
December 1955 - January 1956 "1955 Christmas Flood"	Regional	Sudden Rise	Intense rainfall and snowmelt event during the week before Christmas created flood peaks on December 23rd and 24th. Numerous breaches resulted on Mormon Slough and Diverting Canal. During the flood, 3000 – 3500 Stockton residents were evacuated. About 125 blocks of the City were flooded. The flood occurred prior to flood management improvements made to the Calaveras River, Mormon Slough, Duck Creek, Littlejohns Creek,

			Farmington Dam, and the construction of New Hogan Dam to replace the original Hogan Dam.
April 1958 Flood	Regional	Slow rise	Unusually wet winter caused highest runoff on the Calaveras River since 1911 and largest flows recorded at that time on the Bear Creek system. Extensive flooding and damage east and north of Stockton. Flood fight operations protected urbanized areas as well as all Delta islands. Waters flooded areas along the east side of the Diverting Canal. Multiple bridge crossings were inundated, including: California Central Traction Railroad, Cherokee Lane, Waterloo Road/Highway 88, Highway 99, Stockton Terminal & Eastern Railroad, and Freemont Street/Highway 26.
December 1964 – January 1965	Regional	Rain on snow	Storms over the area resulted in minimal flood damage because of new levee and channel improvements that were nearly finished. New Hogan Dam, which became operational just prior to the flood, controlled flows downstream to nom-damaging levels.
1980	Regional	Slow Rise	Heavy releases into the Delta and high winds created a threatening situation in mid-January requiring extensive flood fight.
November 1982-March 1983	Delta and Lower San Joaquin River; McDonald Island, Venice, Mildred, Shima, and RD2064	El Nino Event with prolonged high water in the Delta,	Extended rainfall events beginning in November caused continuing high reservoir releases into the Delta resulting in prolonged high waters over period of weeks with very high Spring Tide peaks. Shima Tract flooded in January 1983. Mildred Island was never reclaimed. High Lower SJR flows in March from continuing rainfall and snowmelt led to flooding of RD2064 at the confluence of the Stanislaus and San Joaquin Rivers. Even with all the runoff, Sierra snow water content exceeded 230 percent of normal in early May 1983.
February 1986	Regional	Short duration	Local runoff and releases from New Hogan Dam produced a short duration peak of 16,700 cfs in Mormon Slough at Bellota. Although this exceeded the 12,500 cfs channel design capacity, flows remained in the channel. Without New Hogan Dam, flows at Bellota could have peaked at 40,000 cfs.

January 1997	Regionwide, San Joaquin Valley, Delta	Extreme rainfall event caused rapid rise on all river systems in Regions except Calaveras River	December 1996 was one of the wettest Decembers on record, resulting in nearly all upstream dams having reservoir water elevations near or slightly encroaching into their flood storage capacity by the end of the month. The extreme rainfall event during December 30th-January 1st subsequently resulted in nearly simultaneous high releases by all reservoirs on the system and uncontrolled emergency releases at Don Pedro and Friant Dams. Reservoir operators made initial release decisions on an individual basis which prevented any coordinated management of resulting flood elevations in valley waterways and on their levees in the initial days of the flood. Major flood fight efforts occurred on the lower San Joaquin River. RD 2095, 2058, 2107 & 2062 on the west bank of the San Joaquin River all flooded in 1997. Major flood fight efforts on Mokelumne and Lower San Joaquin Rivers with lesser event in the tidal Delta. An emergency dike at the McKinley Avenue overpass was created to hold back floodwaters as the levee wall by Perrin Road broke and an adjacent containment levee washed away on January 6th. By that time, more than 250 mobile homes had been destroyed, 585 houses damaged, and 4,000 people forced to evacuate from their homes. Homes at the Islander Mobile Park by Woodward Road were almost completely submerged with only the rooftops showing. Flood waters began to recede in the San Joaquin area on January 9th by which time at least fourteen dairies had been affected, multiple livestock animals had drowned, and more than 25,000 acres of farms destroyed.
June 2004	Delta: Lower and Upper Jones Tracts	Sudden failure with summer water elevations	Sudden failure of Upper Jones Tract levee during summer water elevations in early June. Flows subsequently flooded that 5,894-acre tract and Lower Jones Tract of similar size. Flood waters threatened to overtop southerly Trapper Slough Levee and flood Highway 4, Drexler and Honker Tracts, and portions of Middle and Lower Roberts Island. Major flood fight prevented failure of Trapper Slough levee. The Jones Tract flood displaced about 250 people, and caused $25 million in structure damage and $10 million in crop damage. A total of 12,000 acres of land were flooded an average depth of twelve feet. The cause of the breach is still unknown. It took three weeks to repair the breach, followed by five months of dewatering the area.

			While being located just outside of the Delta South region, the levee failure provides an indication of how Delta levees can fail without major flood flows in the San Joaquin River or tributaries.
December 2005-January 2006	Delta and Lower San Joaquin River	High Tide and Spring flood on Lower SJR	Heavy rains and high reservoir releases into Delta caused extreme Spring Tide water elevations on January 1st requiring a major Delta flood fight. Subsequent severe rainfall event in early April caused rise of Lower San Joaquin River to Danger Stage at Vernalis. Major flood fight required to prevent levee failures on Lower SJR. This flood fight effort was successful in avoiding levee failures in the Regions. While this event caused relatively minor flooding, it did erode levees which led to the emergency repairs by DWR, USACE and local LMAs.

The Delta Risk Management Strategy (DWR, 2008) technical memorandum on levee vulnerability shows a table of Delta reclamation districts that have flooded since 1900. According to this study, a total of 15 reclamation districts within the Regions have flooded. Some districts have been flooded once, some have been flooded twice, and some have been flooded three times. At least one RD flooded in years, 1901, 1904, 1906, 1907 1911, 1920, 1938, 1950, 1958, 1983, and 1997.

Image 1: St. John's Episcopal Church located in downtown Stockton, at East Miner Avenue and El Dorado Street, during a flood in 1890s (likely 1896).

Image 2: Flooding of Stockton looking west along Mormon Channel (Slough), December 24, 1955.

Image 3: Inundated area adjacent to Stockton Diverting Canal during the 1958 flood; looking southeast.

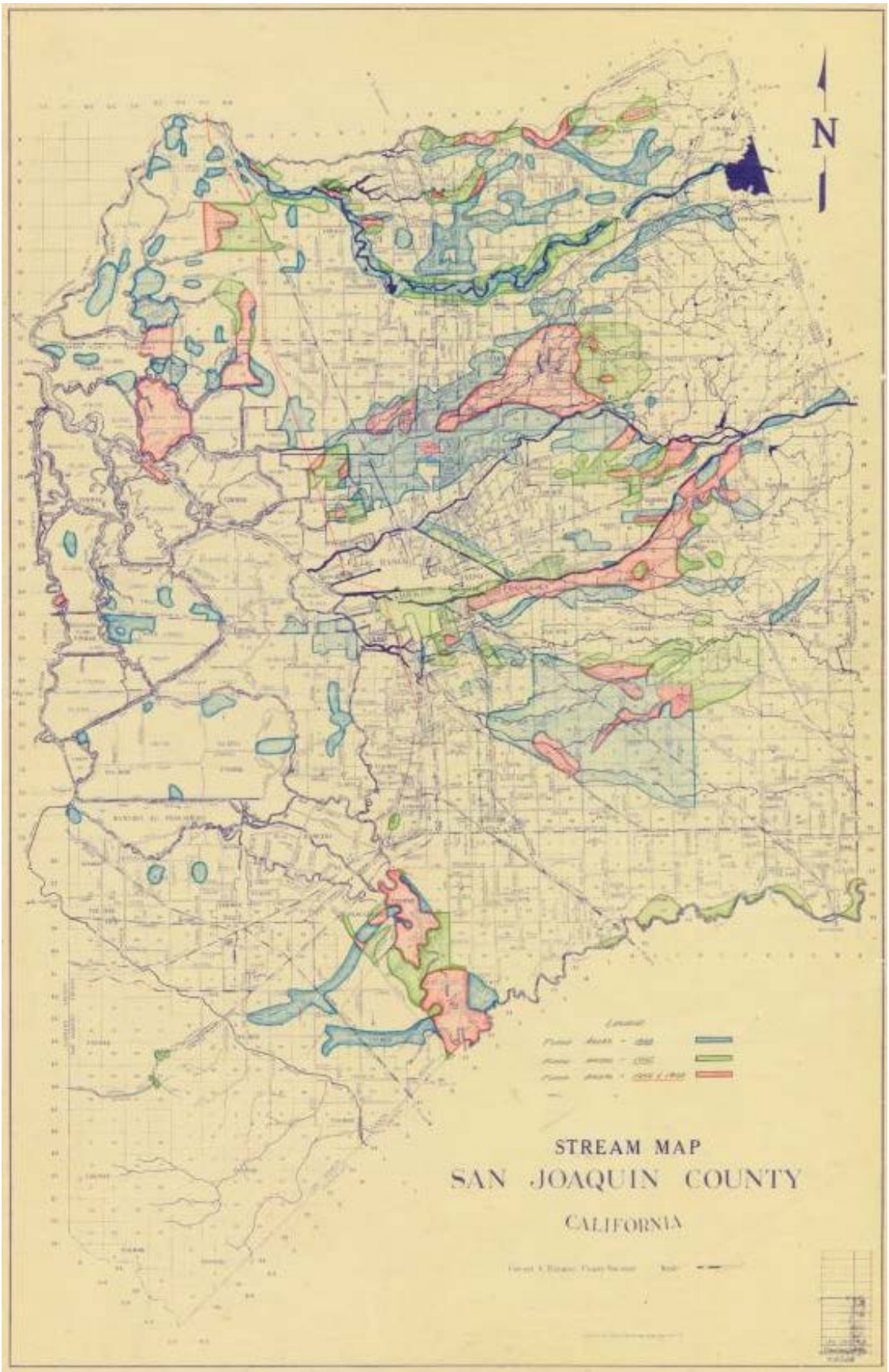
N
STREAM MAP
SAN JOAQUIN COUNTY
CALIFORNIA

Image 4 (prior page): Map of San Joaquin County showing inundated areas during the 1955 and 1958 floods. Blue represents the 1958 flooding, green shows the 1955 flooded areas, and red is the overlap of the two years. See San Joaquin County web page to zoom in on map http://www.sjgov.org/pubworks/Docs/FLOOD%20INFO/Historical%20Flood%20Area%20Map.pdf

Image 5: Flooding of Paradise trailer park 1997. Note a ready response rescue team on raft in the foreground of this image. Photo taken January 7, 1997.

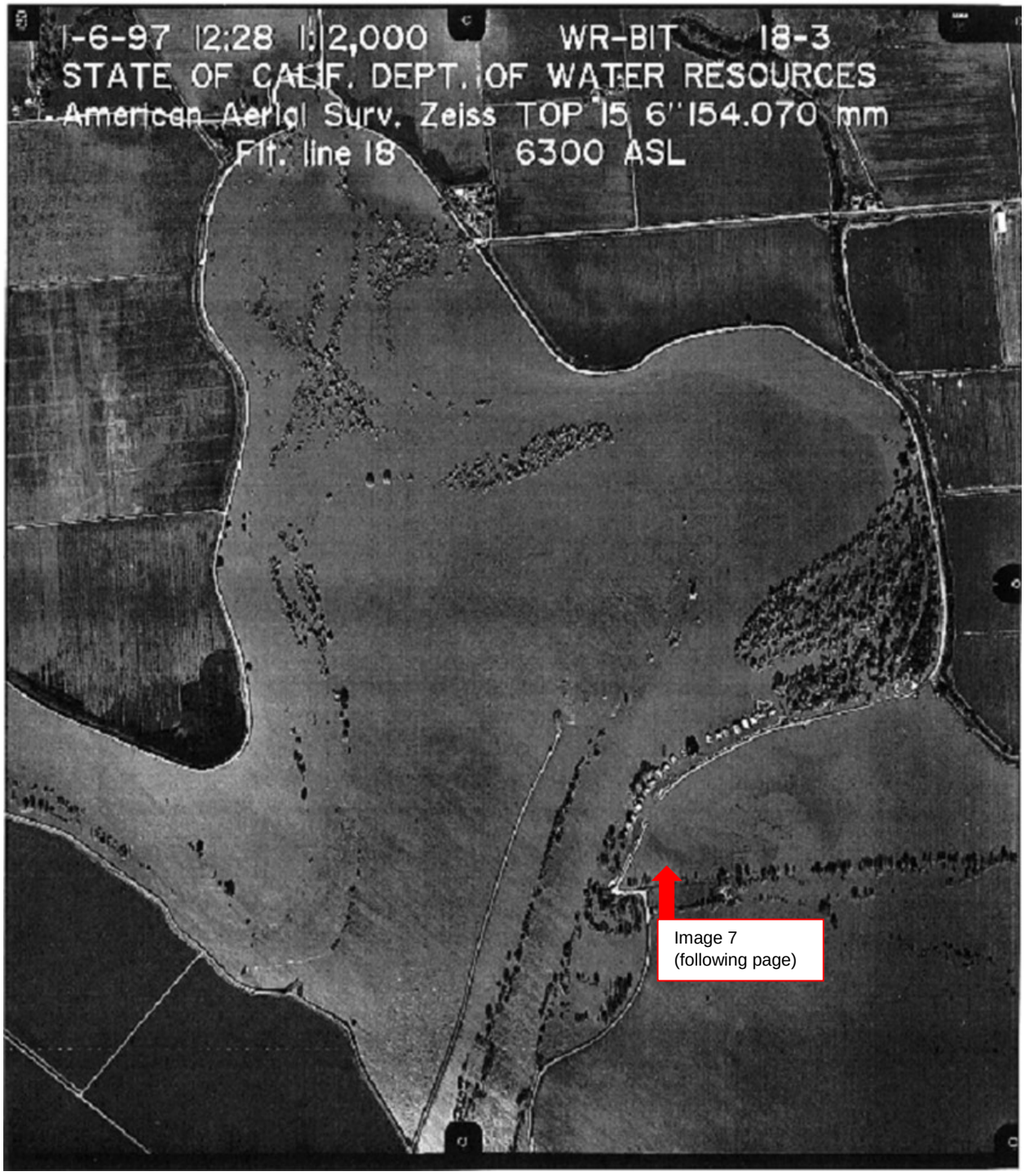

Image 6: Aerial photograph showing the January 1997 flooding within McMullin Ranch area (RD 2075). The South-Eastern levee breached by a tract of houses. (See Image 8)

Image 7: Houses near a breach in RD 2075 levee in January 1997.

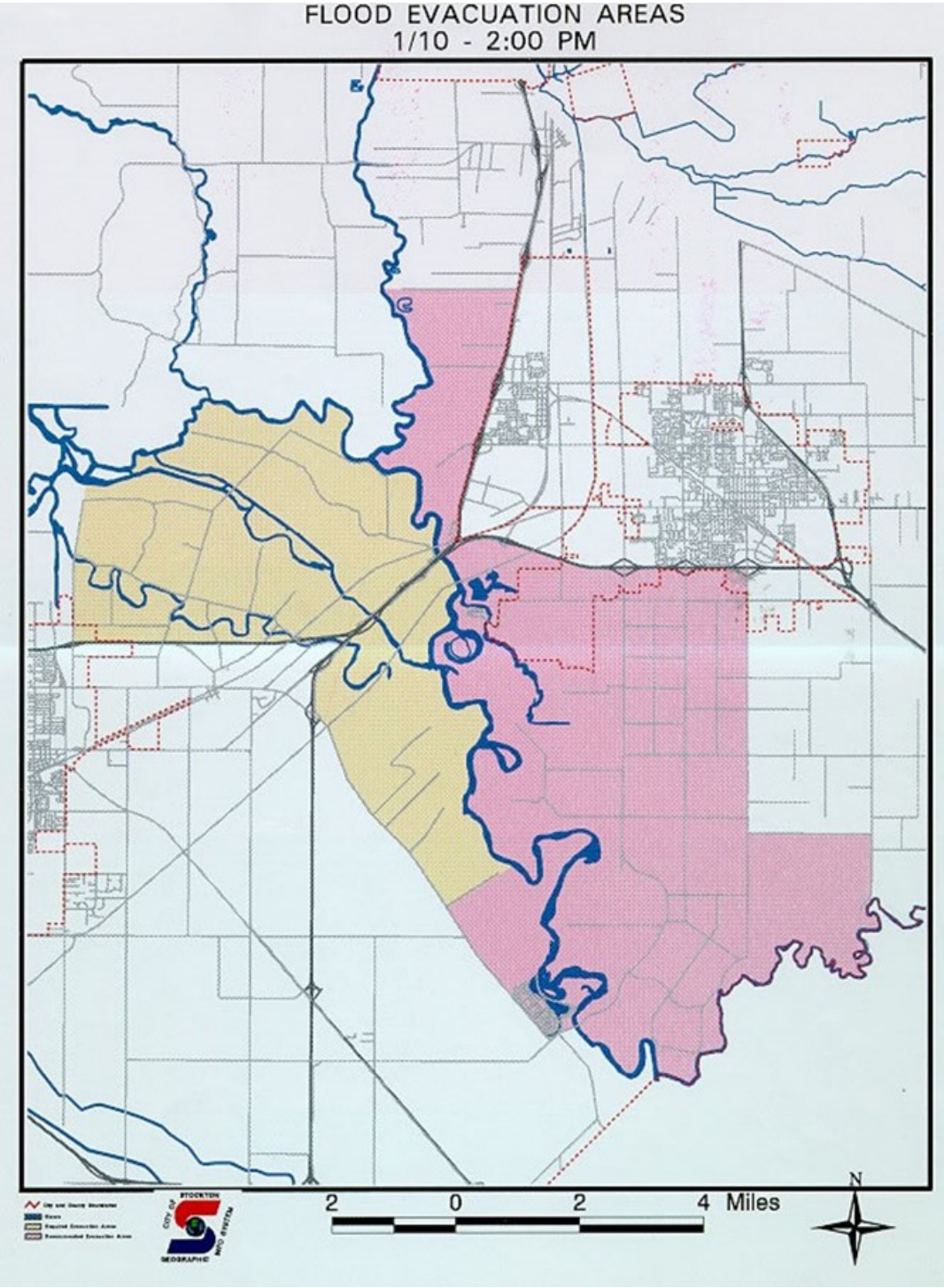

Image 8: San Joaquin County Flood Evacuation Map for January 10, 1997. Note, tan areas show areas of required evacuation and pink areas show areas of recommended evacuation. As shown on Image 9, even though evacuation was not mandatory, some of the area shown above in pink flooded. (*San Joaquin Co. OES*)

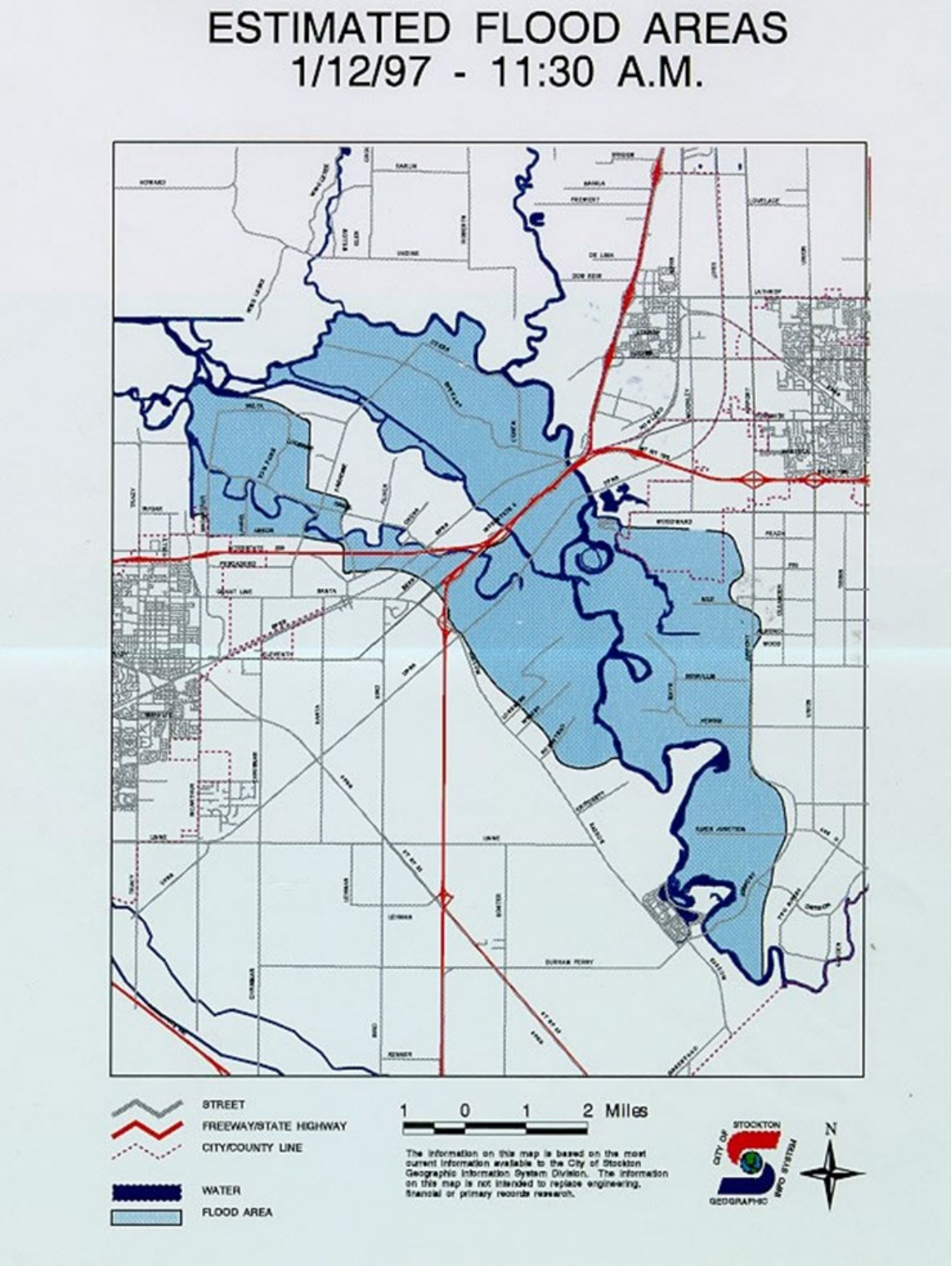

Image 9: Estimated Flood Areas for January 12, 1997. Compare with Image 8. (*San Joaquin Co. OES*)

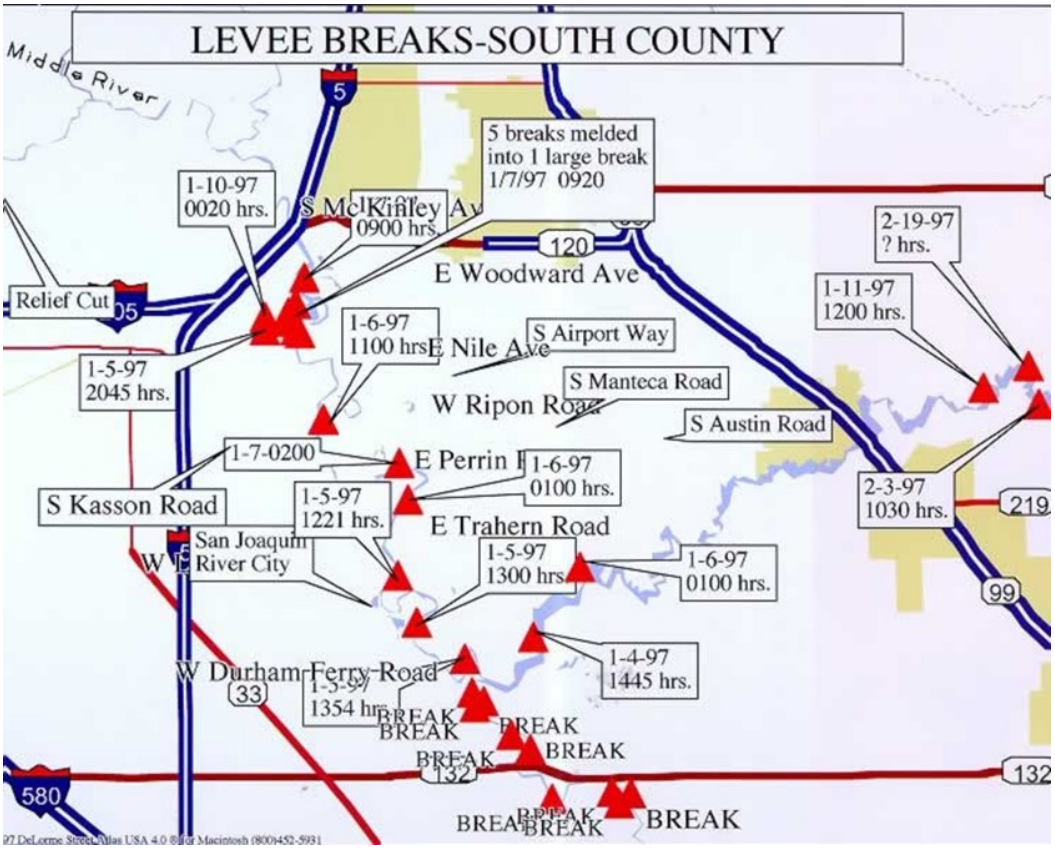

Image 10: Levee Breaks – South County. Many levee breaks occurred along the San Joaquin River upstream of Interstate 5 during the 1997 flood. (*San Joaquin Co. OES*)

2.7.2. *Early Settlement and Flood Management Facilities*

Prior to the rapid influx of settlers from the discovery of gold in 1848, the Lower San Joaquin River and Delta South regions were occupied by Native American tribes, which lived by subsistence off of the abundant and diverse resources in the valley and foothills, including salmon, waterfowl, deer, and elk. The low-lying portions of the valley were occupied by vast tule marshes, with riparian forests growing on the low, natural levees lining the meandering channels. At the higher elevations these marshes and riparian forests gave way to grasslands and oak woodlands. In this natural state, large portions of the Regions were often inundated by high tides and heavy rainfall/runoff events. The creeks, rivers, sloughs, and canals were sources of food for the early inhabitants.

The waterways were later modified for shipping. In the mid-nineteenth century, Captain Charles M. Weber was instrumental in developing the City of Stockton as the San Joaquin County seat and as a port of entry after California became the 31st state of the union in 1850. Today, ships still deliver cargo to and from the Port of Stockton by the channel that was created by Captain Weber in the 1800's.

The 1849 California gold rush fueled the economy in the Central Valley as well as the economy statewide. The gold rush attracted people from all over the world, which lead to rapid population growth, construction of new transportation structures to enhance trade, and an overall economic boom. As the gold rush subsided, a great effort to control and drain the Delta for agriculture began. The rich, fertile peat soil, ideal trade location, and moderating marine influence made San Joaquin County a prime location for agriculture. The combination of these conditions has resulted in revenues which are nearly 50% higher per acre of agriculture land in the Delta than California's average.

The first levees in the Regions were constructed by early settlers around private lands along the lower San Joaquin River and the eastside tributaries in an attempt to control floodwaters. The intent of these levees was to reclaim swampland so it could be converted to productive agricultural land. These levees were often very weak and fragile due to the lack of knowledge of subsurface conditions and soil mechanics necessary to design and construct reliable and resilient levees.

In 1861, the Reclamation and Swampland Act established an independent Board of Swampland Commissioners to develop a valley-wide flood control plan which reflected the topography of the valley, not individual land holdings. The Board of Swampland Commissioners formed reclamation drainage districts to fund and maintain the works within their districts.

It appears that the USACE constructed Paradise Cut and Paradise Dam (locals now call the dam a weir) in about 1888. Repairs of the dam were required in 1889. Paradise Cut did not have a north levee until one was constructed around Stewart Tract in about 1922. The USACE upgraded the Paradise Cut levees to project levees by 1963 (part of work described in Section 2.7.3). Responsibility for operation and maintenance of the Paradise Cut dam and channel is unclear.

SJAFCA has requested information on Paradise Cut maintenance and property holdings from the CVFPB.

2.7.3. *Modern Flood Management Efforts*

State oversight of flood control efforts in the San Joaquin Valley began in 1911, with the creation of the State Reclamation Board, which changed its name to the Central Valley Flood Protection Board (CVFPB) in 2007. In recent years, the CVFPB has cooperated with the US Army Corps of Engineers (USACE) to design, construct, and operate & maintain the completed works of the Sacramento and San Joaquin Flood Control Projects. Finally, the CVFPB has given assurances to USACE that the federally authorized project levees will be operated and maintained in accordance with specified criteria.

Overview of Historical Flood Projects

Table 6 summarizes the significant flood control projects which impact the Regions.

Work Completed Under the 1944 Flood Control Act

In 1944, the Pick-Sloan Flood Control Act (P.L. 78–534) authorized the modification and construction of dams and levees across the United States. Projects in the Regions authorized by this Act include: the Lower San Joaquin River and Tributaries Project, Bear Creek Levee Project, New Hogan Dam, Duck Creek Diversion, and RD 17 levee improvements.

The Lower San Joaquin River and Tributaries Project provides flood protection to about 120,000 acres of fertile agricultural lands; to the City of Stockton and neighboring communities; to other areas developed for residential and industrial purposes; and to two major highways. The project made possible the reclamation of areas that were developed to a higher degree when protection against flood hazard was assured. The project was completed in 1968, except for the west bank levee along the San Joaquin River which was completed in 1972. The project provided protection up to the design water surface profile from the 1955 flood profiles (see the CVFPP website http://www.cvfpb.ca.gov/profiles/index.cfm). Numerous individual projects were constructed pursuant to the Flood Control Act of 1944.

The Bear Creek Levee Project was also authorized by the 1944 Flood Control Act. The improvements were constructed by the USACE, and finished in July 1964. The project is located in the San Joaquin Valley halfway between Stockton and Lodi, starting at Disappointment Slough and extends for about 7.5 miles east. This segment along Bear Creek contains prime agricultural land, suburban developments, the Alpine Packing Company, Highway 99, Interstate 5, two railroads, and several county roads. Project details included clearing and excavating a 7.5 mile channel along both levee banks, installing irrigation & drainage structures along the levee, designing a channel flow of 5,500 cubic feet per second.

Table 6 – Summary of Significant Historical Flood Control Projects on the San Joaquin River

Time Period	Description
Early Development (19th Century)	• Early settlers converted many of the secondary channels to canals that conveyed surface water flows from the San Joaquin River for water supply • Private diversions from the San Joaquin River for irrigation purposes were constructed • Private levees were established along many segments of the San Joaquin River to protect private property from high flows
Early 1900's (1900 – 1950)	• 1911: State Reclamation Board established • 1930: Hogan Dam Completed by the City of Stockton for flood control. • 1944: Pick-Sloan Flood Control Act
Late 1900's (1950 – 2000)	• 1951: The Delta-Mendota Canal was completed and the Exchange Contractors began diverting small quantities of imported Delta water • 1951: The Duck Creek Project was completed that provided improvements to Duck Creek and the Littlejohn Creek from French Camp Road to Escalon-Bellota Road • 1952: Farmington Dam and Flood Control Basin were completed • 1964: New Hogan Dam and Lake was completed providing flood control and water supply to the region • 1964: The Bear Creek Project was completed providing protection to agricultural lands adjacent to the channel and to industry adjacent to the channel • 1968: The Mormon Slough Project was completed providing protection to farmland and orchards, and to the urban area of Stockton • 1989: RD17 levees improved to provide 100-yr flood protection for the Weston Ranch • 1995: SJAFCA created • 1997: SJAFCA improved levees along Bear Creek, Pixley Slough, Mosher Slough, Mosher Creek, Mosher Creek Diversion, South Paddy Creek, Mormon Channel, Potter Creek, Calaveras River, and the Stockton Diverting Canal as part of the Flood Protection Restoration Project (FPRP) • 1997: Seepage repairs made to RD17 levees following the 1997 flood event • 1998: NRCS certified Mosher Slough and Little Bear Creek levees as part of FPRP • 2000: USACE certified levees improved as part of the FPRP
2000 - Present	• 2006: Proposition 1E and 84 approved $5B in flood control improvements in the State of California • 2006: FEMA accreditation of Stewart Tract levees • 2007: RD 17 began the seepage repair project • 2009: Lower San Joaquin River Feasibility Study initiated to study system deficiencies • 2009 – 2010: RDs and SJAFCA Submitted PAL Compliance Documents to FEMA for: o Shima Tract (P375, P378, P379) o Levees east and southeast of Shima Tract (FEMA segments P375, P378 and P379) o RD 2126/Atlas Tract Dryland Levee (P459) o Fourteen Mile Slough Levee, north bank, east of I-5 (P124) o Lower Calaveras River Levees (P454, P356, P357, P140, P1401) o RD 403/Rough and Ready Island Levees (P222, P223, P259) o Walker Slough Levee (P268) o RD17 and Mossdale Tract (P450, P449, P153, P29, P342, P338, and P339) • 2011: FEMA Approved CLOMR for Smith Canal Gate • 2012: Letter from USACE rescinding certification • 2012: RD 404 slurry wall project • 2013: Levee Certification started for Bear Creek and Calaveras systems • 2013: Smith Canal Gate Design started

The New Hogan Dam Project replaced the existing Hogan Dam with a new, taller dam to provide irrigation water, municipal and industrial water supply, and flood storage space. The New Hogan Dam and Reservoir are located on the Calaveras River, about 28 miles east of Stockton. The objectives of building the taller dam included limiting flows in the Calaveras River to 7,000 cubic feet per second and increasing the New Hogan reservoir storage to 237,000 acre-feet. Construction of the dam began in November 1960 and was completed by June 1964.

In 1948, studies indicated that the New Hogan Reservoir would need a capacity of 325,000 acre-feet and required a downstream flow capacity of 12,500 cubic feet per second to safely convey flood flows. The USACE implemented the Mormon Slough Calaveras River project which consisted of channel enlargements & realignments on Mormon Slough and the Stockton Diverting Canal below New Hogan Dam. The channel enlargements increased flow capacity to 12,500 cubic feet per second. The project was authorized in 1962. Construction began in September 1967, and was finished in September 1968. The Mormon Slough Project is a system designed to convey Calaveras River flood flows safely through the highly productive agricultural lands downstream of New Hogan Dam and through suburban Stockton. The system consists of a diversion of the Calaveras River near Bellota to Mormon Slough, then to the Stockton Diverting Canal to the east side of Stockton, then back to the Calaveras River through Stockton.

The Duck Creek Diversion Works is a project that is a part of a larger flood control effort called the Farmington Plan, which was designed by USACE and authorized by the 1944 Flood Control Act. The diversion works are located about 3 miles northwest of Farmington Dam and 15 miles south-west of the City of Stockton. With construction beginning in July 1949 and completing in November 1951, this diversion works was designed to reroute flood waters to a safer flow path, protecting the City of Stockton and the rural towns of French Camp and Farmington. The diversion works is made up of a group of projects, the first of which is a low compacted earth diversion dam across Duck Creek. This dam has an outlet structure that allows a maximum flow of 500 cfs to Duck Creek downstream of the works, which has a channel capacity of 700 cfs. A concrete lined spillway, designed to divert flows greater than 500cfs from Duck Creek to a diversion channel was also constructed. This diversion channel extends about a mile south from the diversion works to a point on Littlejohn Creek four miles downstream from Farmington Dam. The diversion channel has a flow capacity of 2000 cfs. Additional downstream improvements include two dikes that block flow from Duck Creek to Mormon Slough and 14 miles of channel enlargements along Duck Creek downstream from the diversion dam.

Improvements to levees protecting RD 17 were authorized under the 1944 Flood Control Act. Levees along the left bank of French Camp Slough, those along the right bank of the San Joaquin River and those along the right bank of Walthall Slough were completed as part of this project by USACE in 1963.

Other RD 17 Projects

In the late 1980's, the RD 17 levees, including those authorized as part of the 1944 Flood Control Act, were improved as a part of the development of Weston Ranch in the City of Stockton. The purpose of the improvement project was to meet FEMA's 100-year flood protection requirements for urban development. FEMA accredited the levees in February 1990.

During a high-water event on the San Joaquin River in January 1997, seepage and boils occurred at a number of locations along the RD 17 levees. USACE, DWR, CVFPB, and RD 17 actively and successfully contained the seepage and boils and the levees withstood the flood. After the 1997 event, USACE, CVFPB, and RD 17 funded a project to repair the seepage and boil areas under the PL 84-99 Rehabilitation Assistance Program. The project referred to as "Reconstruction of the California Central Valley Levees San Joaquin Basin #4, Reclamation District #17" consisted of the installation of landside drainage stability berms. Design and construction was performed by the USACE and was completed in 2001.

Reclamation District 17 has also been implementing a Levee Seepage Repair Project since 2008. This project addresses seepage concerns along the east side of the San Joaquin River from Stockton to Manteca. Improvements along RD17 generally consist of seepage berms and chimney drains along the landside toe of the existing levee which achieves 100-year protection. Phases 1 and 2 have been constructed and Phase 3 is in the permitting phase. A DWR EIP grant plus a local assessment are paying for the project.

Creation of SJAFCA

In 1995, the San Joaquin Area Flood Control Agency (SJAFCA) was created as a Joint Powers Authority between the City of Stockton, San Joaquin County and the San Joaquin County Flood Control and Water Conservation District for the purpose of addressing flood protection for the City of Stockton and surrounding County area.

SJAFCA's first endeavor was to prevent the possible de-accreditation of levees and to improve project levees to meet Federal Emergency Management Agency (FEMA) standards. As a result, SJAFCA constructed the Flood Protection Restoration Project (FPRP) which consisted of flood wall and levee improvements along 40 miles of existing channel levees, 12 miles of new levees, modifications to 24 bridges and the addition of two major detention basins and pumps.

Construction of the FPRP was completed in 1998. SJAFCA formed an assessment district to finance the $70 million project. In addition, SJAFCA established an annual Operations and Maintenance assessment for the upkeep of FPRP improvements. Maintenance of these FPRP levees and improvements are carried out by the San Joaquin County Flood Control and Water Conservation District.

In 1998, SJAFCA received a reimbursement of $12.6 million from the State of California for a portion of the non-federal cost of the project. Subsequently, USACE determined per Section 211

of the Water Resources Development Act of 1996 that $33.5 million federal reimbursement was due to SJAFCA. An Agreement for Reimbursement between the two agencies was signed in 2002 to allow USACE to initiate reimbursements, subject to the availability of annual appropriations and other limitations set forth in the agreement. To date, SJAFCA has received $22.9 million in federal reimbursements. These State and federal reimbursements resulted in cash refunds and assessment reductions to property owners within the assessment district, and the remaining was placed in reserve.

Due to federal budget constraints, SJAFCA is now looking into the implementation of Section 1022 Credit In Lieu of Reimbursement for the remaining $10.6 million federal reimbursement. These credits may be applied to other flood damage reduction projects or studies in which SJAFCA is currently engaged.

The majority of the FPRP levees were USACE project levees, but the portion of the improvements along Mosher Slough from about 1000 feet downstream of Highway 99 to Don Avenue were National Resources Conservation Service (NRCS) facilities. Little Bear Creek (a tributary to Mosher Slough) was also an NRCS system improved as part of the FPRP.

Table 7 and Figure 6 show the levee segments certified by NRCS in July 1998 and by USACE in March 2000.

Table 7 – USACE and NRCS Certified Levee Segments

USACE Segments
Potter Creek from Jack Tone Road downstream to the mouth, and upstream transition feature
Mormon Slough from 700 feet upstream of Potter Creek downstream to the Stockton Diverting Canal
Stockton Diverting Canal from Mormon Slough downstream to the Upper Calaveras River
Upper Calaveras River from the Central California Traction Railroad downstream to the Stockton Diverting Canal, and upstream transition feature
South Paddy Creek from Jack Tone Road downstream to the mouth, and upstream transition feature
Paddy Creek from South Paddy Creek downstream to the mouth
Upper Mosher Creek from Jack Tone Road downstream to the Mosher Creek Diversion, and upstream transition feature
Mosher Diversion from upper Mosher Creek downstream to the mouth
Bear Creek from Paddy Creek downstream to the mouth
Pixley Slough from Lower Sacramento Road downstream to the mouth, and upstream transition feature
NRCS Segments
Mosher Slough from 1000 feet downstream of Hwy 99 to Don Avenue
Little Bear Creek from Davis Road to the confluence with Mosher Slough

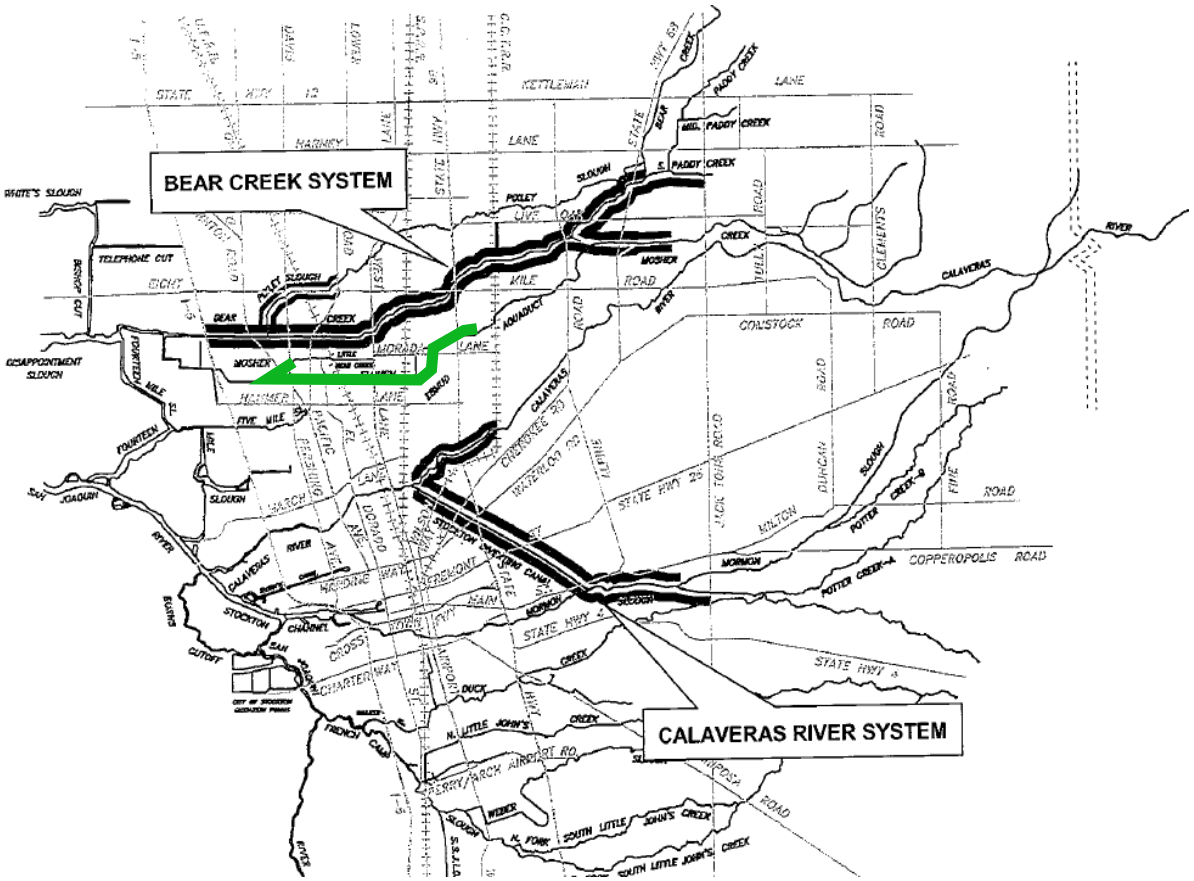

Figure 6 – USACE and NRCS Certified Levee Segments

Provisionally Accredited Levee Effort

A Provisionally Accredited Levee (PAL) is used for a levee system when FEMA has previously accredited the levee system is awaiting data and/or documentation that will demonstrate the levee system's compliance with Section 65.10 of the NFIP regulations.

In 2006, FEMA notified the City of Stockton and San Joaquin County that they would be re-evaluating floodplains in light of their Map Modernization (MAPMOD) program. The MAPMOD program required local agencies to collect technical data to prove levees provided 100-year flood protection in order to maintain levee certification. However, FEMA

underestimated the time it would take for State and local agencies to gather the information needed to recertify levees, and subsequently modified the PAL process to provide an additional 24 months to gather the needed documentation to demonstrate compliance with current federal standards through a PAL agreement. Based on this information, local agencies signed and submitted PAL agreements.

Below is the list of levees for which accreditation documentation / LOMRs submitted to FEMA:

- Levees east and southeast of Shima Tract (FEMA segments P375, P378 and P379)
- RD 2126/Atlas Tract Dryland Levee (P459)
- Fourteen Mile Slough Levee, north bank, east of I-5 (P124)
- Lower Calaveras River Levees (P454, P356, P357, P140, P1401)
- RD 403/Rough and Ready Island Levees (P222, P223, P259)
- Walker Slough Levee (P268)
- RD17 and Mossdale Tract (P450, P449, P153, P29, P342, P338, and P339)

SJAFCA also completed an interior drainage analysis for RD 404 to use for the PAL process, but a PAL has not yet been completed for the RD 404 levees. RD 404 is actively seeking accreditation for levees P266, P267, P451, and P452.

Additionally, FEMA stated its intention to RD 17 to confirm full accreditation of the RD 17 levees as meeting the 100-year FEMA requirements in 2006. However, on June 19, 2007, DWR wrote the City of Lathrop (and copied FEMA) stating that it could not support recertification of the RD 17 levees or the granting of provisional accreditation due to concerns regarding seepage exit gradients. On the basis of DWR's concern, FEMA denied full accreditation and instead granted PAL status.

In the fall of 2007, RD 17 initiated a seepage repair project and requested State funding through the DWR Early Implementation Program (EIP). By 2010, the two phases of the RD17 levee improvements were complete, and FEMA re-accredited the levee system.

Levee Certification

In April of 2012, SJAFCA received a letter from USACE regarding the rescission of certification on levee segments previously certified by USACE. The affected levees were part of SJAFCA's Flood Protection and Restoration Project certified by USACE in March of 2000. The rescission of certification was brought about by Engineering Circular (EC) No. 110-2-6067 entitled "USACE Process for the National Flood Insurance Program (NFIP) Levee System Evaluation" issued on August 10, 2010. Among the provisions of the EC, a USACE certification of a levee system has a 10-year period of validity and must meet current USACE standards to remain valid. USACE recommended re-evaluation of these levees for FEMA accreditation for NFIP purposes.

FEMA was notified of these levee de-certifications but indicated that it could take a few years for new Flood Insurance Rate Maps to be issued. This bought SJAFCA time to have DWR complete the hydraulic modeling of these streams to ensure the results were consistent.

In September 2013, SJAFCA began the process of accrediting the levees affected by the USACE rescission to ensure area residents would not be mapped into the floodplain with the next FEMA map revision. The levee certification effort should be completed in late 2014.

Lower San Joaquin River Feasibility Study

The Lower San Joaquin River Feasibility Study (LSJRFS) was initiated by USACE to study deficiencies in the flood control system for the lower San Joaquin River from the confluence with the Stanislaus River downstream to the Lodi wastewater treatment plant. The LSJRFS also includes the eastside tributaries to the lower San Joaquin River. The LSJRFS aims to address deficiencies to this segment of flood control facilities due to settlement, subsidence, sedimentation, and erosion. The LSJRFS is anticipated to be complete in spring-2016 and will include selected project features that are found to have a positive net benefit and are in the federal interest.

Reclamation District 404 Critical Levee Repairs

Critical erosion and seepage issues (sand boils) were identified in the east levee of the San Joaquin River, just south of Highway 4 in 2007. In 2008, rock slope protection was added, along with a riparian bench with trees and other environmental measures. These issues did not address seepage or stability issues.

In June of 2012, Reclamation District 404 (RD404) received approval from the Central Valley Flood Protection Board for a 1,600-foot long, 3-foot wide, 45-foot deep slurry wall in the right bank of the existing levee south of Highway 4 along the San Joaquin River. RD404 also proposes to widen the existing levee, and install a 700-foot long seepage berm on the right bank near River Mile 42.3.

Delta Islands and Levees Feasibility Study

The Delta Islands and Levees Feasibility Study (DILFS) study is being led by DWR and USACE and aims to improve flood risk management and ecosystem restoration in the Sacramento-San Joaquin Delta (extents include the Legal Delta and Suisun Marsh). The tentatively selected National Environmental Restoration (NER) plan would restore 89.5 acres of intertidal marsh habitat in the Delta at a cost of $29 million.

Recent State Funding

Proposition 1E and Proposition 84, approved by California voters in November, 2006, authorized the State to expend $4.9 billion in bond funds for improved flood protection. As a result, DWR

has been able to substantially accelerate flood risk reduction projects, launch the FloodSAFE initiative, and implement numerous flood risk management projects in California.

Also, significant flood system improvements have been made in the Delta South Region with assistance from State funding of the Delta Levees Maintenance Subventions Program and the Delta Levees Special Flood Control Projects Program.

2.8. The Regional Flood Management System

The flood management system in the Regions include levees, channels, bypasses, floodways, pump stations, drainage facilities, detention ponds, reservoirs, and emergency responders. It also includes the multitude of State and federal agencies, programs, policies, and procedures which affect how future regional flood management elements are designed, financed, and constructed, how the system is operated and maintained, and how the economic stability and environmental quality of the Regions are improved over time. Each of these elements is discussed in this section.

2.8.1. *Structural Elements*

The flood management system which currently provides protection to the Lower San Joaquin River Region and Delta South Region includes reservoirs with active flood control space (upstream of the RFMP boundary), levees along the major flood control channels, and drainage facilities which pump interior runoff and seepage from levee protected areas back into the flood control channels.

State Plan of Flood Control (SPFC) levees exist along portions of: Bear Creek, the Calaveras River, Mosher Slough, Mormon Slough, and the Stockton Diverting Canal, Littlejohn Creek, French Camp Slough, Paradise Cut, and the San Joaquin River downstream of Vernalis. The Regions also have a bypass facility known as Paradise Cut that spills flood water out of the San Joaquin River and into the Grant Line Canal. A description of all SPFC facilities in the Regions can be found in DWR's State Plan of Flood Control Descriptive Document (DWR 2010). The Regions also rely on many non-SPFC levees. Figure 7 shows SPFC and non-SPFC levees in the Regions.

2.8.2. *Non-Structural-Elements*

Non-structural flood risk management elements include a wide range of measures which limit the risk of flood damage primarily by avoiding or reducing the exposure to damaging flood waters. These elements include raising and waterproofing structures so that they will be above anticipated flood levels, limiting development in floodplains through the acquisition of agricultural conservation easements, open space easements, regulatory constraints, and incentive programs. Restoration of floodplains where feasible, to provide additional flood channel storage and conveyance capacity, is often regarded as a non-structural element because it reduces, rather than increases, the confinement of floodwaters in existing channels.

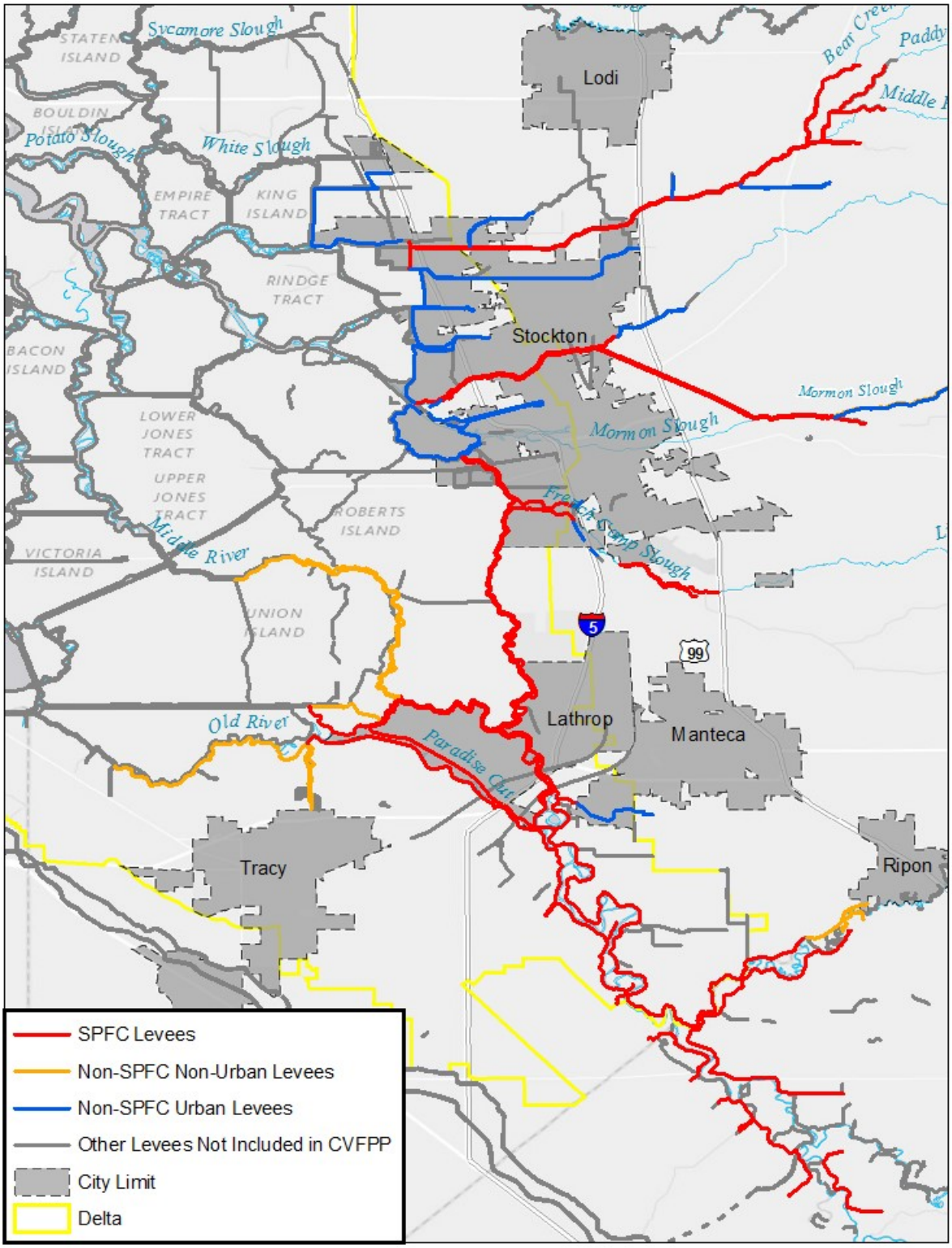

Figure 7 – SPFC and non-SPFC Levees included in the 2012 CVFPP

NFIP & Community Rating System

One of the most significant non-structural flood risk reduction programs is FEMA's National Flood Insurance Program (NFIP), which includes mapping flood hazard areas nationwide, and requiring that homes and other structures with federally backed mortgages must carry flood insurance if the flood risks warrant it. San Joaquin County, the City of Stockton, and other cities within the Regions participate in the NFIP program which provides community residents with flood insurance, provided the permitting agencies meet certain requirements. If a community does not participate in the NFIP, residents within that community are not able to purchase flood insurance.

The reduction in flood insurance rates depends on the Community Rating System (CRS) rating. The purpose of the CRS is to provide incentives for flood insurance customers in the form of premium discounts if the community meets or exceeds the minimum floodplain protection requirements. The rating system works by dividing discount levels in classes with Class 10 communities receiving the least discount (5%) and Class 1 communities receiving the largest discount (45%). Class level can vary based on numerous flood preparedness measures. A community's class level is determined once an application is reviewed by FEMA. Within the Regions, the City of Stockton and San Joaquin County participate in the CRS via floodplain building restrictions, and are rated as Class 8 and 6, respectively. For Stockton, this results in a 10% reduction in flood insurance rates for properties within a Special Flood Hazard Area (SFHA), and a 5% reduction in flood insurance rates for properties outside a SFHA. For San Joaquin County, this results in a 20% reduction in flood insurance rates for properties within a SFHA, and a 10% reduction in flood insurance rates for properties outside a SFHA.

Delta Levee Maintenance Subventions Program

The Delta Levees Maintenance Subventions Program is a State cost sharing program meant to provide technical and financial assistance to Local Maintaining Agencies[1] (LMAs) in the Sacramento – San Joaquin Delta. Authorized by the California Water Code Sections 12980 et seq., and managed by DWR, this program is designed to reimburse local agencies for eligible costs. Eligible costs include maintenance and rehabilitation costs, as well as costs associated with disaster. In order to do this, the Central Valley Flood Protection Board reviews and approves DWR's recommendations and enters into reimbursement agreements with the local agencies. Nearly all LMAs in the Delta South Region participate in the State's Delta Subventions Program.

To qualify for assistance under the program local agencies within the Delta must submit an application to the CVFPB each fiscal year. Agencies are then eligible to receive up to 75% reimbursement of eligible maintenance costs incurred in excess of $1,000 per mile for all of its

[1] The LMAs in the Regions consist of the individual Reclamation Districts and the San Joaquin County Flood Control and Water Conservation District.

levees. A levee maintenance and inspection report for these levees is required before reimbursement may take place.

Delta Levees Special Flood Control Projects Program

The Delta Levee Special Flood Control Projects Program, managed by DWR's FESSRO, was initiated in 1988 to address flood problems on islands of special State interest. It is detailed in CWC §12310 through §12318. Until FY 2007-08, the funding for Special Projects was focused on the legislated scope of levee work on eight western Delta islands and the towns of Thornton and Walnut Grove though authorization has been available since 1996 to extend Special Projects funding to other Delta islands and to 12 miles of Suisun Marsh levees bordering northern Suisun Bay from Van Sickle Island west to Montezuma Slough. With the availability of bond funding from Propositions 84 and 1E of 2006, that broader scope is being implemented. Any local public agency that manages eligible project or non-project levees in the Delta Primary Zone, or non-project levees in the Secondary Zone, is eligible to apply for Special Project funding. Grant applications are received in response to Project Solicitation Packages (PSP), released in accordance with the "*Delta Levees Special Flood Control Projects Final Near-Term Guidelines for Providing Funding to Local Public Agencies*," periodically offered by DWR to accomplish specific objectives of the department as discussed in the "Framework for DWR investments in Delta Integrated Flood Management."

Public Law 84-99 (PL84-99) Program

PL84-99 is another program in the Regions which aims to mitigate flood risk. The financial benefits associated with PL84-99 are indirect; levee systems that are compliant with PL84-99 are eligible for assistance to repair levees, in the event of damage during a flood event.

PL 84-99 gives USACE the authority to provide emergency management services to State and local agencies in need. Acting for the Secretary of the Army, the Chief of Engineers is authorized to undertake activities including the following:

- Disaster preparedness
- Advance measures
- Emergency response operations rehabilitation of flood control works threatened or destroyed by flood

Many levees in the Lower San Joaquin River Region are project levees, and therefore participate in the PL 84-99 program. In order to benefit from the federal funding of rehabilitation, a federal flood protection system (i.e. project levee) must be enrolled in the PL 84-99 program prior to the flood event. An eligible system would be restored to its pre-disaster status at no cost to the owner (typically the owner of a project levee is the State of California).

In order to remain eligible for PL 84-99 damage assistance, project levees need to receive an Acceptable or Minimally Acceptable rating. If any part of a project receives an Unacceptable

rating, the project is put on probation, and if it receives another Unacceptable rating the following year, it is placed on "inactive" status and is then ineligible for the PL 84-99 program until the problem is fixed. As discussed later in this report, several LMAs have received Unacceptable ratings for one or more of a variety of reasons, jeopardizing their eligibility in the program.

Flood System Repair Project

DWR has developed the Flood System Repair Project (FSRP) to help Local Maintaining Agencies reduce flood risks in non-urban areas. Through FSRP, DWR will assist LMAs by providing them with technical and financial support to repair documented critical problems with SPFC flood control facilities in non-urban areas. Eligible projects include erosion repairs, access road repairs, hydraulic control structures and weir repairs, channel capacity restoration, and general levee repairs. The objectives of the FSRP are to:

- Repair documented critical problems.
- Repair deteriorated levee patrol roads that provide all-weather access to the levees. These roads enable effective emergency response that manages residual flood risks.
- Repair minor levee problems proactively, such as erosion sites shorter than 50 feet.

DWR is working with LMAs to finalize a list of critical repair sites and identify the levee patrol road reaches that require gravel or repair. After the list of critical sites and levee patrol road repair reaches is finalized:

1. DWR will issue a notice of eligibility to LMAs describing the eligible critical sites prioritized based on flood risk.
2. Interested LMAs will submit an "intent to participate" letter to DWR.
3. DWR and interested LMAs will work together to develop project agreements that describe the percentage of cost-share and the roles and responsibilities for each of the entities in implementing the repairs.
4. After the project agreements are finalized, DWR will commit funds for the repair projects. Funds will be released based on progress of planning, design, and construction activities.

Flood Emergency Response Structure

The response to floods has a unique characteristic that makes multi-agency coordination more complex than other types of disaster response. This difference arises from the historic reliance on special-purpose districts (Reclamation Districts) to maintain flood control levees. This additional jurisdictional layer to local government was put in place in the 19th Century primarily to facilitate reclamation activities by multiple landowners in distinct overflow areas.

The separation of the traditional county and city local governments from responsibility of the levees adds complexity to flood emergency response by creating two separate and distinct

components to an emergency response. These components are levee flood fight operations and general public safety operations. Recognition of this dichotomy in response jurisdiction is important to any evaluation of the overall response system since each component is performed by a different group of jurisdictions/agencies, has very different response issues and challenges, and is organized at distinctly different geographical scales.

The levee flood fight operations component includes emergency activities aimed at preventing failure of a levee during a flood or containing flood waters in the event a levee does fail. Such activities include levee patrol, basic remedial actions involving the placement of sandbags and plastic visquine, and the acquisition of private vendors or bulk materials for more substantive remedial actions on a levee. Reclamation Districts have the primary jurisdiction for performing these operations as part of their day-to-day levee maintenance responsibility. DWR and USACE have clear authority to assist with these operations.

The general public safety operations component includes response activities such as public warning, evacuation, rescue, fire suppression, and recovery that are may be conducted in the area protected by a levee. Traditional law, fire, and emergency medical agencies with jurisdiction within the areas protected by the levees perform these operations separately, but parallel to, the flood fight activities.

In a large flood, the geographic scale at which these different groups of agencies establish command and control or organize their response often varies due to differences in agency jurisdictional boundaries and internal protocols, which makes ensuring efficient coordination of the two response components a major challenge. The jurisdictional situation also creates policy issues concerning the provision of assistance between jurisdictions responsible for each component, particularly direct financial assistance needed for many flood fight activities. The San Joaquin County Flood Emergency Response Preparedness Strategy put in place in the late 1990's was consciously developed to address this unique inter-agency coordination challenge as well as to help improve the response capability of specific agencies or jurisdictions.

Recent State Flood Preparedness Initiatives

The passage of flood-related bonds in 2006 initiated an expanded State planning process for improving flood protection in the State and Central Valley that has continued to the present. This State-managed planning process has led to the development of specific new State priorities, requirements, and funding mechanisms specific to local flood emergency response planning. The need to address new State requirements prompted San Joaquin County and its cities in 2012 to revise elements of the current flood preparedness strategy to comply with specific mandates and the overall State preparedness strategy coming into place. Two key State actions specific to emergency response planning was the passage of AB156 in 2008 and the issuance of the first grants to local governments for flood preparedness activities in 2013.

Overview of San Joaquin County Emergency Response Strategy

1. The San Joaquin County Flood Emergency Response Preparedness Strategy 1998 to 2012

During the period from approximately 1998 to 2012 the San Joaquin County Office of Emergency Services implemented a comprehensive strategy for improving flood emergency response in the County. This "San Joaquin County Flood Emergency Response Preparedness Strategy" was formulated locally from lessons learned in the 1997 and previous floods. This strategy has been implemented over 13 years as funding allowed. Primary funding came from the San Joaquin County General Fund and a small on-going FEMA grant. As of 2012, a significant portion of the strategy had been implemented.

The key products of this comprehensive flood preparedness strategy included:

- Flood contingency maps
- Urban evacuation maps
- Acquisition of flood fight supplies and key response equipment
- Improved San Joaquin Operational Area logistics policies and procedures
- Improved flood fight command and control

2. Flood Contingency Maps

A key objective of the developing flood contingency maps was to improve levee flood fight operations conducted by LMAs. Experience had shown that LMAs either had not committed their knowledge and procedures to paper, or they had their own plans in differing formats and content. Much historical information such as locations of past boils was not being documented and the knowledge base of the experienced individuals that each district tended to rely upon to organize their efforts remained verbal. While LMAs could organize their levee patrols and basic levee problem remediation efforts adequately, there was a lack of formal procedures for ensuring proper coordination with outside agencies and neighboring districts during a flood.

An intentional breach (relief cut) of a levee is often needed to help drain a flooded island. LMAs had some ideas of relief cuts and other steps which could address flooding concerns, but never had a formal written plan. DWR had also not thought about these issues in a specific way since this was thought to be the LMAs responsibility. When levees ultimately did break, many officials argued over what to do, despite the fact that these relatively straight-forward engineering issues could have been discussed before the flood. Flood contingency plans include locations of pre-engineered relief cuts where appropriate. This allows for quick response as the relief cuts have already been designed.

The County emergency management organization subsequently crossed jurisdictional boundaries to help correct this situation by funding the preparation of LMA flood contingency maps (FCMs). These maps displayed historic, topographical, and flood fight plans in an experimental format that it was felt would be more easily used in the difficult field environment of flood

emergency response. Twenty-six maps, some covering multiple interdependent districts, were planned and 18 were completed by 2012. Maps were made available on a dedicated website for download by users (http://www.sjmap.org/oesfcm/). Figure 8 shows the status of flood contingency mapping in the Regions.

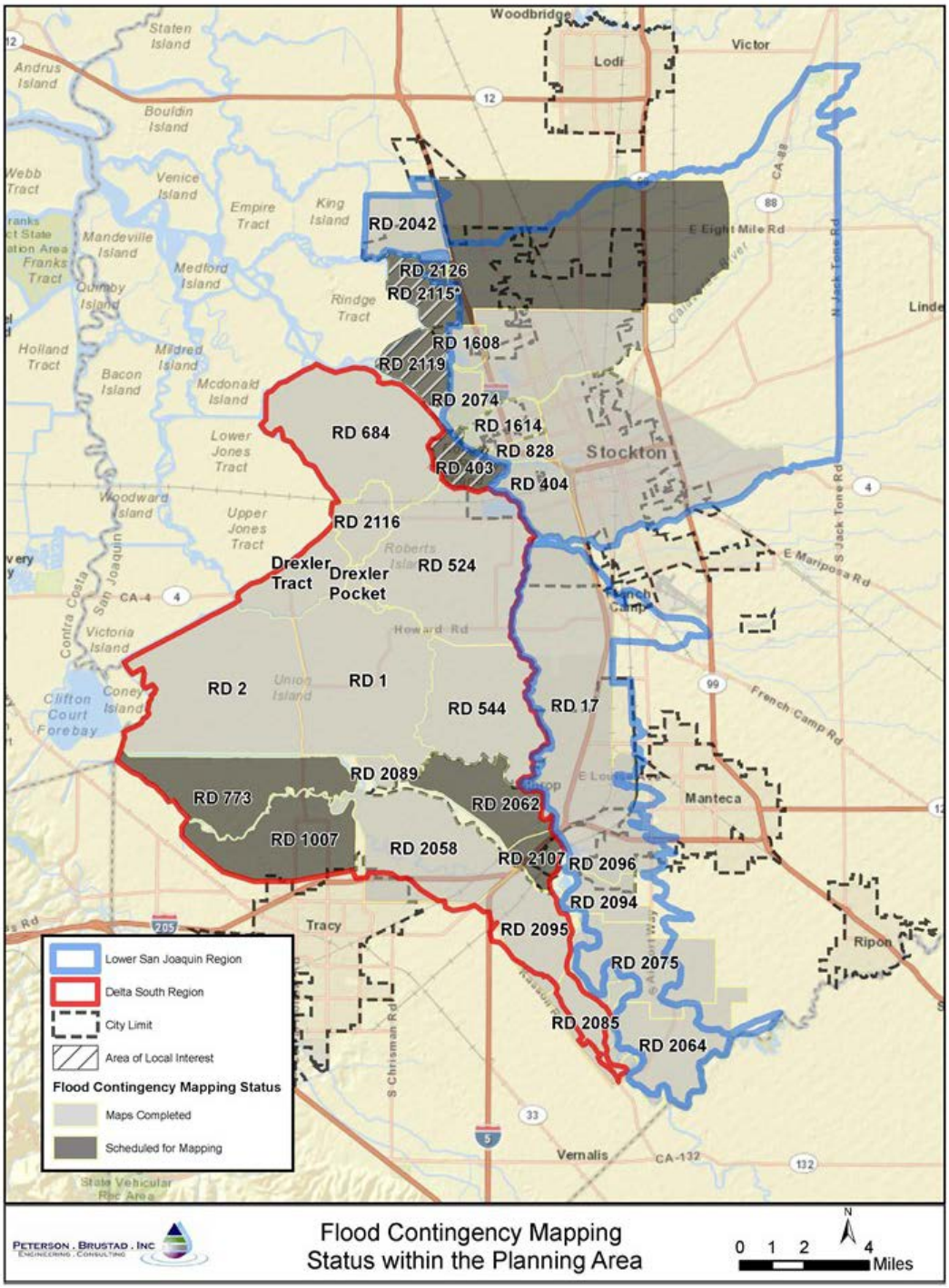

Figure 8 – Flood Contingency Mapping Status

3. Urban Evacuation Maps

In the case of rural LMAs, some limited information for organizing evacuations is placed on the LMA flood contingency map. However, in the case of urban areas this approach was considered to be inadequate. Therefore, the County funded separate evacuation maps for urban areas to be prepared by public safety agencies responsible for public safety operations.

Completed urban evacuation maps display pre-planned evacuation routes, field command post locations, and other information that public safety agencies would use to organize and conduct evacuations of pre-identified evacuation "zones". The maps also displayed locations of vulnerable populations and information on specialized equipment available to responders. Twenty-two maps were planned (some with a set of smaller-scale sector maps) and 19 were completed as of 2013. These maps were also posted for easy access on a dedicated website that had other functionalities useful for organizing an effective response.

4. Flood Fight Supplies and Response Equipment

Another element of the preparedness strategy was the acquisition of additional flood fight supplies and specialized equipment to supplement LMA supplies and public safety equipment. Over several years a significant supply of sandbags, polyethylene plastic sheeting, stakes, twine, and other supplies were obtained. Evacuation and rescue equipment was also provided.

Most acquired materials were loaded in seven 20-foot containers purchased by the County and placed at the California Youth Authority facility at French Camp under agreement with that State agency. Four of these containers are equipped with lights and power outlets. Containers can be moved to the field for easier supply distribution or for use as field offices by responders.

The County also acquired three mobile low-power radio transmitters which were deployed with the City of Stockton, City of Manteca, and County OES to improve the ability to provide emergency information to the public in areas threatened by flooding. This equipment supplemented other command and control equipment procured through the Homeland Security Program.

5. Improved Logistics Policies and Procedures

In the early 1990's a San Joaquin Operational Area Agreement was developed to improve inter-agency coordination. This agreement, signed by local jurisdictions including reclamation districts, allows, among other things, the San Joaquin County Purchasing Agent to make emergency purchases on behalf of other jurisdictions in a proclaimed disaster. This provision had been added specifically to streamline and expedite acquisition of needed supplies in a flood emergency.

This new protocol was first used extensively in the 1997 floods to expedite acquisition and movement of materials, supplies, rented equipment, and other resources on behalf of reclamation districts conducting flood fight operations. The County subsequently funded a new custom computerized logistics tracking system to capture information needed for State and federal disaster reimbursement claims after the emergency.

6. Improved Flood Fight Command Structure

Command, control and coordination with multiple levee maintaining agencies and the many supporting agencies was identified early on as a difficult challenge in widespread flood events. In order to improve coordination between multiple local agencies and State and federal agencies, the San Joaquin County Office of Emergency Services established as part of its flood preparedness strategy four pre-planned flood fight unified commands. Each command has a pre-established membership and field command post location. A unified flood fight command map showing the boundaries and command posts of these pre-established commands is posted with the flood contingency maps.

7. The San Joaquin County Enhanced Flood Emergency Response Preparedness Strategy

In 2012 and 2013 several new State flood preparedness initiatives stimulated revisions to the San Joaquin County Flood Emergency Response Preparedness Strategy and its specific products. Funding from Prop 1E is also now providing an opportunity for the County to implement this new strategy going forward. The enhanced flood preparedness strategy is now coming into place (see description on later in this section).

8. Lower San Joaquin/South Delta Regions Flood Safety Plan Status

The heart of the Enhanced San Joaquin County Flood Emergency Response Preparedness Strategy is the conversion of existing flood contingency maps and evacuation map products into integrated flood safety plans meeting AB156 standards. In some cases these products must be created from scratch since previous maps were never done. In most cases, it will involve updating existing products to the new standards and adding needed additional items (LMA emergency operations plans, separate evacuation maps for rural areas, etc.). Table 8 shows the status of the Lower San Joaquin/South Delta Regions in regard to meeting these new flood safety plan standards.

Table 8 – Flood Preparedness Status

Flood Contingency Map Name	LMAs Covered by Map	Public Safety Agencies w/jurisdiction	Flood Plans in Place	Actions Needed to meet AB156 Standards
Eight-Mile Corridor	RD2042 RD2029 RD2044	City of Stockton Sheriff	FCM Evacuation Map (RD2042)	Update FCM Rural Evacuation Map(s) LMA EOPs
North Stockton	RD2115 RD2126 Bear Creek (Zone 9)	City of Stockton Sheriff WMFD	None	FCM and LMA EOPs Evacuation Map(s)
Central Stockton	Calaveras River (Zone 9)	City of Stockton SJC FCD	CS FCM CS Evacuation Maps	Update FCM LMA EOP
Wright-Elmwood	RD2119	City of Stockton Sheriff	None	FCM and LMA EOP WE Evacuation Map
Lincoln Village West	RD1608	City of Stockton	FCM Evacuation Map	Update FCM LMA EOP
Sargent Barnhart	RD2074	City of Stockton	FCM Evacuation Map	Update FCM LMA EOP
Smith Weber Tract	RD828 RD1614	City of Stockton Sheriff	FCM Evacuation Maps	Inactive; removed levees from system
South Stockton	French Camp Creek System (Zone 9)	City of Stockton Sheriff MFD	None	FCM and LMA EOP Evacuation Map(s)
Rough and Ready	RD403	City of Stockton	None	FCM LMA EOP Evacuation Map
Boggs Tract	RD404	City of Stockton Sheriff	FCM and LMA EOP Evacuation Map	In Compliance with AB156
Roberts Island	RD524 RD544 RD684	City of Stockton Sheriff	FCM	Update FCM LMA EOPs Evacuation Map(s)
RD17	RD17	City of Stockton City of Lathrop City of Manteca Sheriff LMFD	FCM LMA EOP Evacuation Map	In Compliance with AB156
Stewart Tract	RD2062 RD2107	City of Lathrop Sheriff LMFD	None	FCM and EOPs Evacuation Map(s)
East Bank SJ River	RD2064 RD2075 RD2094 RD2096	Sheriff LMFD	FCM	Update FCM LMA EOPs Evacuation Map(s)
West Bank SJ River	RD2058 RD2085 RD2094	Sheriff TRFD	FCM	Update FCM LMA EOPs Evacuation Map(s)
Union Island	RD1 RD2 RD2089	Sheriff	FCM	Update FCM LMA EOPs Evacuation Map(s)
Old River	RD773 RD1007	Sheriff TRFD	None	FCM LMA EOPs Evacuation Map(s)

San Joaquin County Enhanced Flood Emergency Response Preparedness Strategy

San Joaquin County has been a leader within the Central Valley in flood response readiness. The County is one of the few agencies that has actively engaged Reclamation Districts within its boundary to improve communication and lines of authority/responsibility in the event of a flood event.

In early 2012, the County and cities issued a draft AB156 Compliance Package outlining the process for updating existing flood emergency response products to meet the new AB156 standards. Future preparedness activities by San Joaquin County jurisdictions were to conform to these new standards. In 2013, San Joaquin County and affected cities approved a written agreement that institutionalized these new standards and streamlined the process for meeting the plan adoption requirement of the law. LMAs join this agreement through approval of an exhibit to the Agreement by their boards.

These actions and the specific proposed projects of a joint application to a new DWR flood preparedness grant has resulted in the development of a new San Joaquin County "Enhanced" Flood Emergency Response Preparedness Strategy based on the pre-existing strategy revised to conform to the new State requirements. In order to begin implementation of this new strategy, the San Joaquin County Office of Emergency Services submitted a joint application in September 2013 for the first DWR flood preparedness grant for the Delta to be issued from the 2006 bonds. Thirty-eight LMAs and most cities submitted letters of commitment to participate in the implementation of this joint flood preparedness project. The application was structured to meet specific DWR priorities and requirements laid out in the grant guidance and the AB156 requirements.

The key changes to the existing flood preparedness products created under the previous San Joaquin County Flood Emergency Response Preparedness Strategy are itemized below:

- **Flood Safety Plans** – Flood contingency maps and evacuation maps for urban areas had been implemented previously as complementary but separate products in the previous program. In addition, under the previous strategy separate evacuation maps had been prepared only for urban areas. In the enhanced strategy these products will be integrated into a single "flood safety plan" template meeting AB156 standards. A new written element, LMA emergency operations plans, is also added. This new template will be applied throughout the County even though technically only urban areas must comply with AB156. This new "flood safety plan" template is designed to meet both AB156 and DWR requirements.

- **Regional Flood Fight Supply System** - In the previous preparedness strategy, the San Joaquin County Office of Emergency Services only took action to acquire additional supplies and equipment to supplement supplies maintained by the LMAs or cities. OES did not attempt to determine sufficiency of the supplies for first response maintained by

other jurisdictions and only preliminary attempts were made to develop a regional perspective for placement of supplies.

In response to the DWR grant guidance encouraging development of regional response systems, the new enhanced emergency response preparedness strategy calls for development of a single comprehensive regional supply and equipment system. Funding from the first Delta grant will allow San Joaquin County and its jurisdictions to jointly develop a multi-layered supply and depot system to better support flood fight activities at any specific location. This regional system will be integrated with improved logistics tracking and mutual aid systems put in place through the previous preparedness strategy.

- **Training and Exercises** – A new element was added to the enhanced flood improvement strategy as a result of DWR initiatives. There is now an objective of developing a consistent and comprehensive training and exercise program for LMAs and agencies that would work with those jurisdictions. In addition, as part of the new LMA flood safety plan, each district will produce a training policy laying out a reasonable approach to meeting NIMS training requirements in line with district staffing, structure and resources. A single regional exercise program will also be developed through the grant program to ensure effective testing and maintenance of response systems.

In early 2013, two San Joaquin County LMAs revised their existing plans to conform to the new structure required by the AB156 Compliance Package. Those new plans were submitted to the Department of Water Resources and the Central Valley Flood Protection Board as required by law for review. In August 2013 the Department of Water Resources indicated that the new flood safety plan template that forms the core of the enhanced San Joaquin County flood preparedness strategy met AB156 requirements and was, in fact, a preferred model for meeting the "local tactical flood plans" step identified in their grant guidance.

Operations and Maintenance Programs

Flood control facilities are subjected to natural forces that can reduce their effectiveness over time. O&M helps conserve the original design and reliability of flood control systems and involves activities including: routine inspections of flood control facilities, erosion control, vegetation removal, debris and sediment removal, and control of burrowing animals. Coupled with long-term flood risk reduction projects, O&M strengthens the structural integrity of the levee systems in the Regions. O&M activities are typically performed by the LMA responsible for specified segments of levee systems. Figure 9 shows the LMAs in the Regions. Table 9 shows the O&M funding by reclamation district.

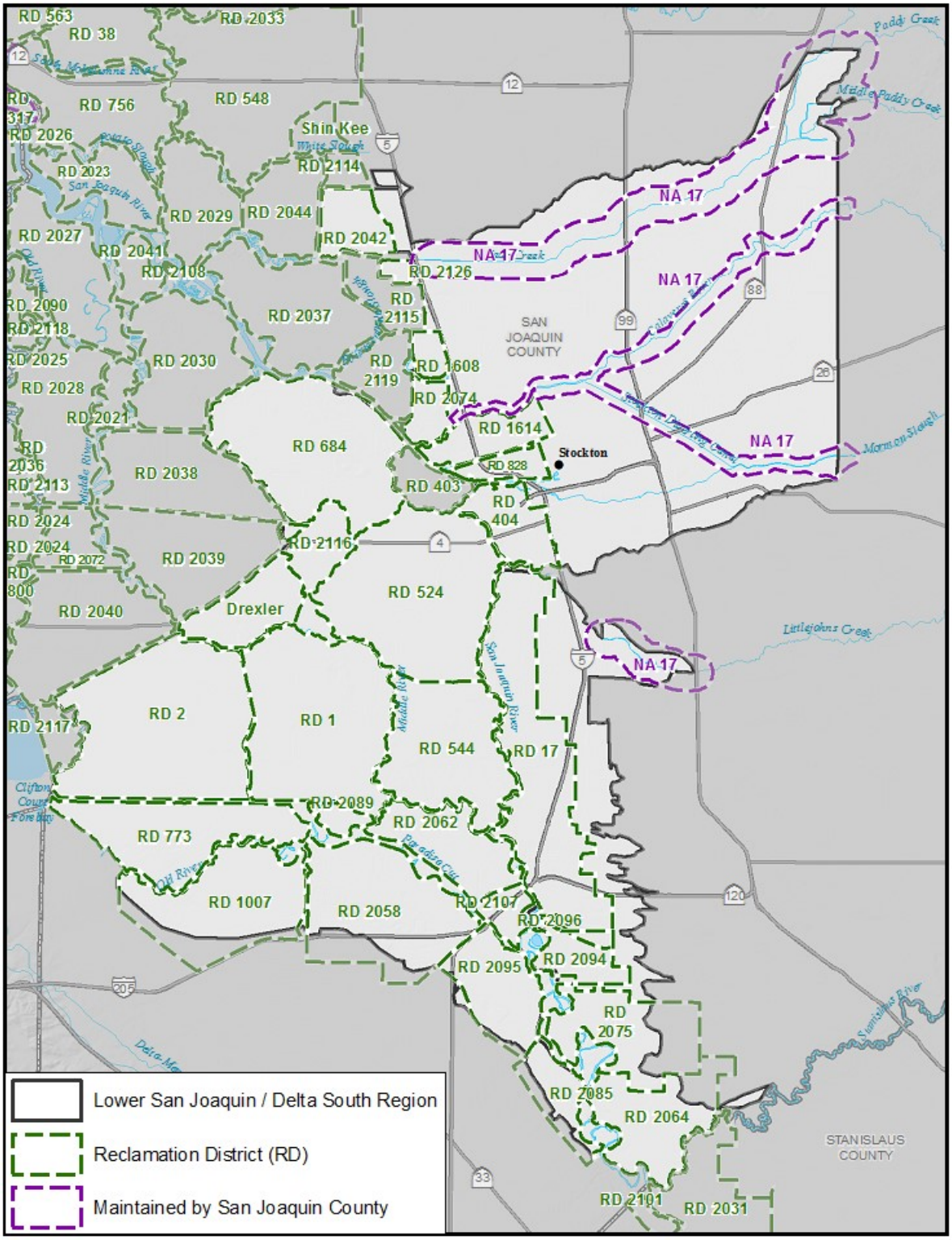

Figure 9 – Levee Maintaining Agencies in the Regions

Table 9 – O&M Funding by RD

RD #	Approx. Annual Assessments	Approx. Annual O&M Expenditure	Primary O&M Activity
1	$97k	$170k	Erosion control (rock); veg. removal
2	$93.5k	$240k	Rodent control; veg. removal
17	$2.9M	$550k	Erosion control; veg. control; encroachment control; rodent control
403	Self-funded	$25k - $100K	Erosion control; Rodent and weed control
404	$600k	$150k	Erosion control; veg. control; encroachment control; rodent control
524	$44.7k	$51.4k	Erosion control (rock)
544	$76k	$121k	Rodent and veg. control
684	$491k	TBD	TBD
773	$106k	$225k	Erosion control (rock); veg. control; Rodent control
828*	$53k	TBD	TBD
1007*	$26k	TBD	TBD
1608	$300k	$550k	General admin fees to operate the District & staff salary; Legal & Engineering Fees; General O&M; Specific Levee Repair; Yearly Contribution to RD2119; LSJRFS
1614	$380k	$100k to $150k	Erosion control (rock)
2042	$590k	$125k	Erosion; veg. control; rodent control
2058*	$745k	TBD	Veg. control
2062*	$176k	TBD	TBD
2064*	$0	TBD	TBD
2074	$650k	TBD	TBD
2075	$60k	$30k-$40k	Veg. control; erosion control
2085*	$90k	TBD	Seepage and Erosion control (rock)
2089	$21.4k	$25.2k	Veg. control; erosion control
2094*	Inactive		
2095*	$47k	TBD	Seepage and Erosion control (rock)
2096*	$22k	TBD	TBD

2107*	$23k	TBD	TBD
2115	None	25k - 100k	Erosion control (rock); veg. control
2116*	$0	TBD	TBD
2119	$250k to $300k	$230k	Erosion control (rock); pay down $2M in debt
2126	None	$42k	Erosion control (rock); veg. & rodent control
***Information obtained from the 2013 California Controllers Annual Report**			

Wave action and high water events cause erosion on the waterside of levees, thereby altering the levee geometry and reducing a levee's overall effectiveness. LMAs work to mitigate these issues by placing rock on the waterside of the levee to reduce the erosive forces. To a lesser extent, slope grading/dragging can be done to repair minor depressions in the levee slopes.

Burrowing animals also threaten the structural integrity of levees in the Regions. Burrowing rodents can create extensive networks of tunnels throughout levee systems, creating a path for water to get from the waterside to the landside of the levee. LMAs have employed measures such as grouting, baiting, and hunting to remove burrowing animals from their levees.

Additionally, thick vegetation on levees reduces the ability to visually inspect a levee. Therefore, LMAs trim/remove trees/shrubs and mow grass to meet guidelines established by USACE and DWR. It is noted that vegetation requirements differ between USACE and DWR.

2.9. Regional Partners

Major flood management initiatives in California have historically been undertaken by local, State, and federal agencies in an evolving cooperative relationship. Beginning in the 1850's, levee improvements were initiated as entirely local undertakings, with sporadic efforts to provide State coordination and oversight. Federal participation in flood management in California was first authorized with the Caminetti Act of 1893. State oversight of flood control improvements began in the early 1900's with the creation of the Central Valley Flood Protection Board (formerly the State Reclamation Board).

2.9.1. *Local Agencies*

- **The San Joaquin Flood Control Agency (SJAFCA)** - The San Joaquin Area Flood Control Agency (SJAFCA), a joint powers agency formed in May 1995 by San Joaquin County, the City of Stockton, and the San Joaquin County Flood Control and Water Conservation District. SJAFCA has the authority to finance and construct regional flood control improvements. SJAFCA is currently working with USACE on the Lower San Joaquin River Feasibility Study to evaluate and recommend improvements to levees on the Calaveras River, the Delta front, and the San Joaquin River.

- **San Joaquin County Office of Emergency Services Flood Contingency Mapping (SJC OES)** - The SJC OES provides planning, mapping standards, and emergency response guides to help mitigate future flood damages through the Delta and surrounding areas. Additionally, the SJC OES provides maps for critical flood zones in the Delta, cities, and reclamation districts. These maps contain the flooding history, locations of critical facilities, locations of levee failures &repairs, evacuation plans, drainage plans, supply delivery points, flood contingency options, and a plan of action for each respective levee in the case of flooding. The SJC OES aims to improve flood control operations to prevent levee failures during floods and to limit flood damages.

- **San Joaquin County Flood Control and Water Conservation District** - The San Joaquin County Flood Control and Water Conservation District was formed in 1956 to construct, operate, maintain and plan flood control, water supply, drainage and groundwater recharge projects in order to protect life, property, and health of San Joaquin County residents and ensure the economic, environmental and social viability of the community. This entity performs maintenance of flood control systems along Bear Creek and the Calaveras River systems.

- **Stockton East Water District** - The Stockton East Water Agency (SEWD) was created in 1948 to ensure proper management of the underground water basin and provide supplemental water supplies. SEWD provides surface water for both agricultural and urban uses. Since 1978, the SEWD drinking water treatment plant has produced nearly a million acre-feet of water for urban use. The U.S. Army Corps of Engineers owns and operates New Hogan dam which is the major surface water supply to SEWD.

- **Local Maintaining Agencies (LMAs)** - Local levee districts and RDs, known collectively as Local Maintaining Agencies (LMAs), regularly patrol, maintain, repair, and conduct flood fights as needed on the levees within their jurisdictions. Figure 9 shows the locations of the LMAs in the Regions.

- **Southern Delta Levee Protection and Channel Maintenance Joint Powers Authority** - The Southern Delta Levee Protection and Channel Maintenance JPA was formed between RD 2062 and South Delta Water Agency. Its mission is to assist local Reclamation Districts in flood protection activities, mostly through the provision of supplemental funding. The JPA manages funds derived from the River Islands project. Funding of the JPA is currently limited.

2.9.2. *Relevant State Agencies and their Responsibilities*

The local agencies are supported in their flood management missions by key State agencies.

- **Central Valley Flood Protection Board (CVFPB)** - In 1911, the Legislature created the California State Reclamation Board, which was given regulatory authority over the Sacramento Valley LMAs, with the objectives of (1) assuring a logical, integrated system

for controlling flooding along the Sacramento and San Joaquin Rivers and their tributaries in cooperation with USACE, (2) cooperating with various agencies in planning, constructing, operating, and maintaining flood control works, and (3) maintaining the integrity of the flood control system. In 1913 the Reclamation Board was given regulatory authority over San Joaquin Valley LMAs. In this same year, the Legislature created the Sacramento-San Joaquin Drainage District to give the Reclamation Board the authority to acquire the necessary property and easements for flood control.

In 2007 the Legislature restructured the Reclamation Board and renamed it the "Central Valley Flood Protection Board." The legislation gave the Board the responsibility to review and adopt the 2012 CVFPP. Legislation approved in 2009 granted new authorities to the CVFPB and reiterated the importance of its encroachment enforcement powers for flood control.

The CVFPB has given assurances to USACE that the federally authorized project levees will be operated and maintained in accordance with specified criteria. The CVFPB has the authority to serve as the non-federal sponsor for capital improvement projects for levees in the Regions, regulates encroachments, and works to assure that the various components function as a system.

- **California Department of Water Resources (DWR)** - DWR, primarily acting through the Division of Flood Management, is responsible for State-level flood management in the Regions, including cooperating with USACE in project planning, design, and funding, cooperating with the National Ocean and Atmospheric Administration in flood and water supply forecasting, operating the Flood Operations Center, providing flood fight assistance, and maintaining portions of the flood management system.

  DWR's levee maintenance responsibilities include portions of the system designated for State maintenance in the California Water Code, and operating Maintenance Areas (MAs) when local agencies cannot, or choose not to meet the maintenance obligations established under the assurances given to the CVFPB and USACE. Under these authorities the DWR will assume responsibility for levee maintenance.

- **California Office of Emergency Services (Cal OES)** - The California Office of Emergency Services (Cal OES) has overall State emergency response management authority, which among other things, includes assuring that State and local agencies operate in accordance with the Standardized Emergency Management System (SEMS).

- **California Department of Fish and Wildlife** - The California Department of Fish and Wildlife administers State laws and regulations regarding the protection of fish and wildlife resources, and as such exerts permitting authority over flood control project

construction, operation, and maintenance activities, as well as managing State wildlife areas.

- **Sacramento-San Joaquin Drainage District (SSJDD)** – Property rights for SPFC lands are held by the SSJDD, which is under the jurisdiction of the CVFPP. SPFC property rights extend to about 18,000 parcels of land. All comprehensive property records, indexes, and mapping associated with SPFC lands are maintained by DWR's Division of Engineering, Geodetic Branch, Cadastral Survey Section. The SSJDD holds property rights for about 4,350 acres in San Joaquin County.

- **State Water Resources Control Board (SWRCB) & Central Valley Regional Water Quality Control Board (RWQCB)** - The State Water Resources Control Board (SWRCB) and the Regional Water Quality Control Board, Central Valley Region (RWQCB), administer State water rights and water quality laws and regulations. The SWRCB, given its authority over water rights, including stream diversions, may exert regulatory authority over flood control or environmental restoration projects that result in new diversions from existing channels. The RWQCB requires that construction projects, such as levee improvement projects, avoid injurious discharges from worksites to streams by preparing and adhering to Stormwater Management Plans and following Best Management Practices for chemicals, diesel fuel, drilling fluid, and other typical construction fluids. The RWQCB also works closely with USACE when it issues Section 404 permits, which must include a certification by the RWQCB that water quality will not be impaired.

- **California Department of Conservation** - The California Department of Conservation (CDOC) is responsible for administering the California Surface Mining and Reclamation Act of 1975. It assures that local governments, such as cities and counties, adopt and administer ordinances compliant with the law. SMARA is an important consideration for most flood control projects, as it applies to any projects which disturb more than one acre of land or move more than 1,000 cubic yards of material. SMARA compliance involves formulating projects which do not result in injurious discharges from the disturbed area during the mining operation, followed by a reclamation plan which restores the mined land to beneficial use.

  The CDOC also administers the Williamson Act, enacted in 1965, designed to help preserve agricultural land through property tax incentives and long-term contracts. It was enhanced in 1998 with the addition of Farmland Security Zone (FSZ) provisions, which offers additional incentives to extend the contract period from the normal ten-year period to twenty years. San Joaquin County participates in the Williamson Act program. San Joaquin County also participates in the FSZ provisions as well.

  The CDOC also administers various grant programs for the acquisition of agricultural and open space preservation. Such programs may work synergistically with non-structural

flood management projects, which may improve flood system capacity, reduce long-term risks to life and property, and improve resiliency through actions such as agricultural conservation easements, open space easements, levee setbacks and floodplain restoration, where locally supported and feasible.

- **Delta Protection Commission** - The Delta Protection Commission's mission is to adaptively protect, maintain, and where possible, enhance and restore the overall quality of the Delta environment consistent with the Delta Protection Act, and the Land Use and Resource Management Plan for the Primary Zone of the Delta. This includes, but is not limited to agriculture, wildlife habitat, and recreational activities.

2.9.3. *Federal Agencies and their Responsibilities*

- **U.S. Army Corps of Engineers (USACE)** - At the federal level, USACE is primarily responsible for planning, designing, and constructing federally authorized flood management facilities, including dams, levees, and other structures. It also develops the operational rules for federally funded flood control reservoirs, which includes most of the major reservoirs on Central Valley streams. Following the Hurricane Katrina Gulf Coast disaster of 2005 USACE has implemented a National Levee Safety Program, promulgated strict vegetation management guidelines, and strengthened its national levee inspection program.

- **National Weather Service (NWS)** - The National Weather Service (NWS), a part of the National Oceanic and Atmospheric Administration, operates centers throughout the United States which monitor and forecast climate, weather, severe storms, and runoff. In California the NWS weather forecasting centers are supplemented by the California Nevada River Forecast Center which cooperates with DWR to issue flood and water supply forecasts. These forecasts are critically important to the Regions, because under winter storm conditions, the Calaveras and San Joaquin rivers and local streams can rapidly generate enormous flows, creating conditions of extreme peril for residents and damageable property in the levee-protected areas of the Regions. Accurate and timely flood forecasts are an important component of the Regions' flood risk management system.

- **NOAA Fisheries** - NOAA Fisheries is responsible for the protection of anadromous fisheries, including salmon and steelhead, which migrate through, and spawn in channels of the Bear Creek, Mosher Slough, the Calaveras River and Mormon Slough, and Littlejohns, Duck, and the French Camp Slough, as well as some local creeks. NOAA Fisheries regulate Central Valley steelhead, and the Green sturgeon and play an important role in the flood project planning process, providing guidance on ways to design and operate flood control works to minimize impacts and enhance fisheries habitat. USACE and other project proponents must consult with NOAA fisheries in all phases of federal

flood management project planning, design, and construction which have the potential for impacting the species of concern which NOAA Fisheries administers. In administering various federal statutes and regulations protecting migratory species of concern, NOAA fisheries may also impose conditions on the operation of multi-purpose dams and reservoirs with federal participation, including the major reservoirs.

- **U.S. Fish and Wildlife Service (USFWS)** - The USFWS plays a similar role as that of NOAA Fisheries, with a focus on terrestrial, avian, and resident fish species and their habitats. The USFWS operates under two separate authorities. The Fish and Wildlife Coordination Act (FWCA) authority requires consultation of federal water resource development projects regardless of the presence of listed species. The endangered Species Act (ESA) authority comes into play when there is a listed species and requires a consultation separate from the FWCA authority. In the Regions some of the key species of concern are the riparian brush rabbit, and the delta smelt. Directly south of the regional boundary designated critical habitat occurs for the Vernal Pool Fairy Shrimp, and the Conservancy Fairy Shrimp. USFWS plays an important role in the flood project planning process, providing guidance on ways to design and operate flood control works to minimize impacts and enhance fish and wildlife habitats. USACE and other project proponents must consult with USFWS in all phases of federal flood management project planning, design, and construction.

- **The Federal Emergency Management Agency (FEMA)** - The Federal Emergency Management Agency plays a multitude of flood management roles, including managing the National Flood Insurance Program (NFIP), which includes mapping of and classification of flood hazards in the Regions. FEMA administers the Disaster Mitigation Act of 2000 (DMA 2000), which requires that local communities evaluate the natural hazards within their boundaries and develop mitigation plans for those hazards in order to maintain eligibility for its Pre-Disaster Mitigation (PDM) and Hazard Mitigation Grant Programs (HMGP). FEMA also provides federal disaster recovery assistance in the event of federal emergency declarations or disaster declarations. Federal emergency management efforts are structured in accordance with the National Incident Management System (NIMS).