



Floods

in the Ventura River Watershed

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February, 2013

Highway 33
at North Fork Matilija Creek
1969
(Photo courtesy of Ventura County Star)

Many Factors

- Rainfall amounts and patterns
- Steep mountains
- Erosive mountains
- Floodplain encroachment
- Flood protection infrastructure
- Channel condition
- Recent fires
- More

Flooding Profile - Overview

- Types of floods
- Past floods
- Flood protection infrastructure

Ventura Ave. looking north, near
Ventura's water treatment plant
2005
(Photo: Ventura Water)



Types of Floods



- Riverine
- Alluvial fan
- Coastal
- Urban drainage
- Dam failure

Coastal Flooding at Surfer's Point, 1995
(Photo: Paul Jenkin)

Riverine Flooding

Overflowing stream or river channels

Ventura River

San Antonio Creek

Lions Creek

Cañada Larga

Coyote Creek

East Ojai Creeks

Canada Larga, 2005
(Photo: Ventura Water)



Riverine Flooding

Frequent

A major or moderate flood occurs **once every five years** on average.

Major flood peak flows:

40,000 cfs +

Moderate flood peak flows:

20,000 cfs–39,999 cfs

As measured at Foster Park.

Riverine Flooding

Flashy

In the flood of 1992, the rate of flow of the Ventura River rose from less than 100 cfs to 46,700 cfs within about 3 hours. (Keller and Capelli 1992)

**A 46,600% increase
in 3 hours.**

Ventura River rescue, 1992
(Photo courtesy of Ventura County Star)



Riverine Flooding

Damaging



Sewer overflowing in San Antonio Creek, 2005
(Photo: Ojai Valley Sanitary District)



San Antonio Creek, 2005
(Photo: Paul Jenkin)

Riverine Flooding

Damaging



City of Ventura's Nye Well 1A, Jan. 2005, which replaced Nye 1 lost in a previous flood. The Feb. 2005 flood took out the rest of the well.

(Photo: Ventura Water)

Riverine Flooding

Damaging

1992 Flood – Estimated Damages (in 1992 dollars)

\$1,000,000 - Ventura Beach RV Resort

\$40,000 - Emma Wood State Beach Group Camp

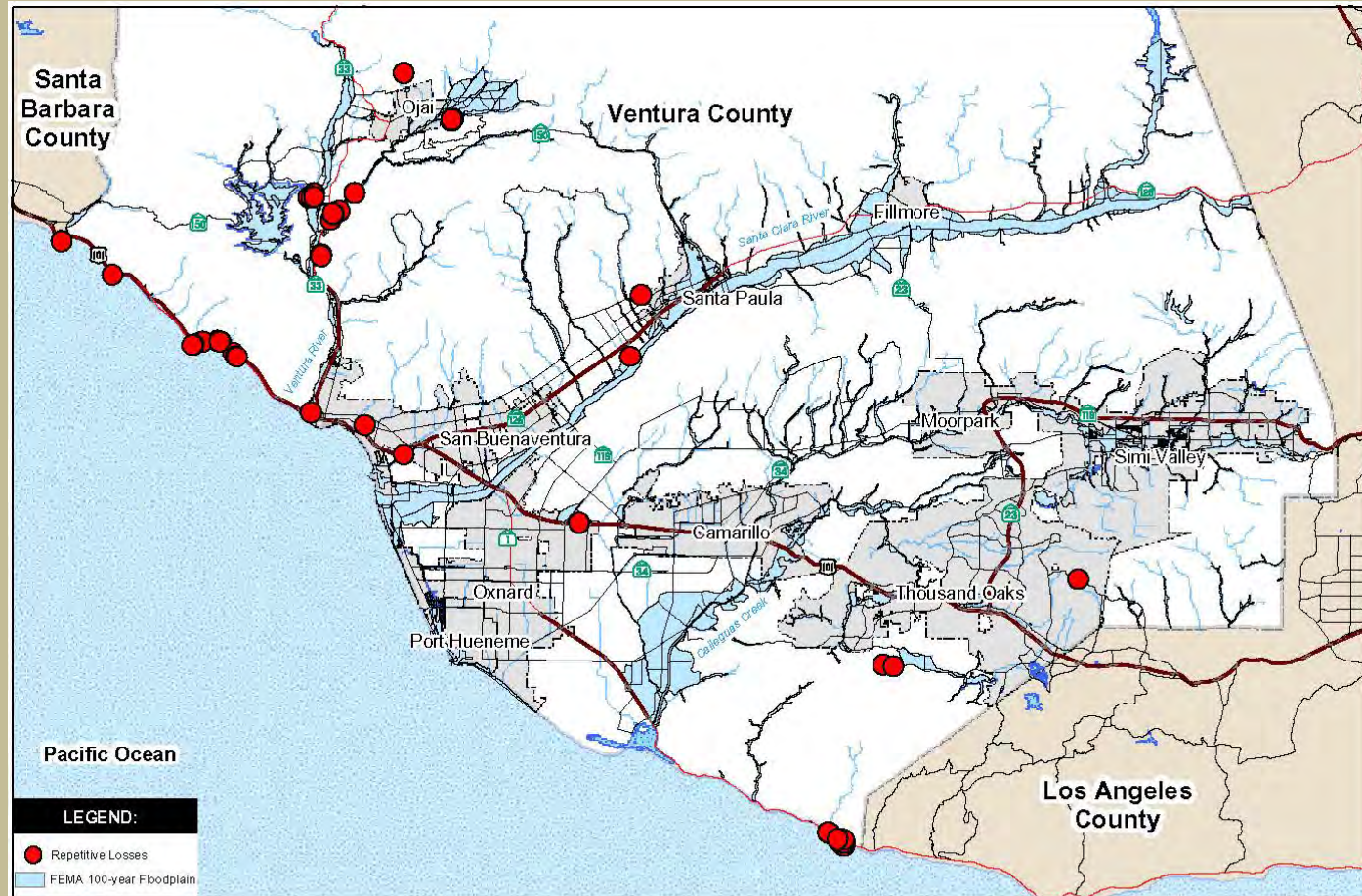
\$28,000 - Immediate emergency services (city of Ventura)

\$24,000 - Post-flood clean-up and repairs (city of Ventura)

The bulk of the local emergency services (largely unreimbursable) costs were incurred by the Ventura County Sheriff and Fire Departments for police and helicopter rescue services. (Keller and Capelli 1992)

Riverine Flooding

Damaging



0 2.5 5 Miles

County of Ventura

Prepared by URS for the County of Ventura - Information Systems Department - GIS Division

State Plane Coordinate System California Zone V - NAD 27

This map was compiled from records and computations

Printed on : September 2, 2004

Fig. 4-7 Repetitive Loss Structures



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(Map: Ventura County
Office of Emergency
Services website)

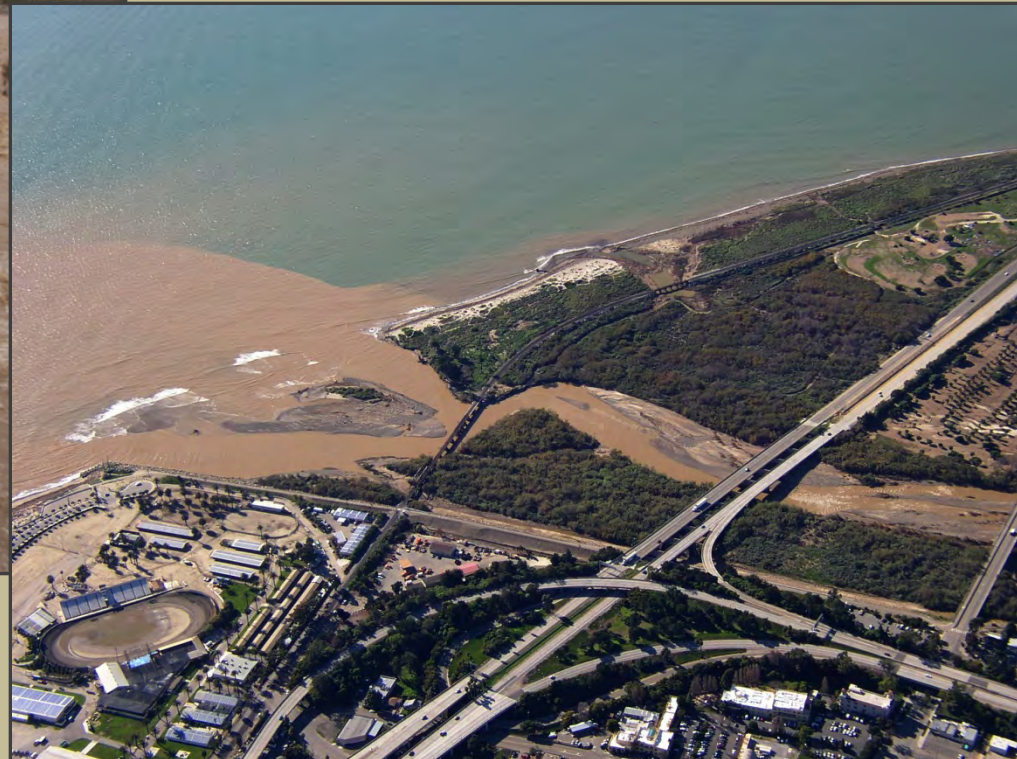
Riverine Flooding

About sediment as much as water

Sediment flowing out to ocean,
Ventura River, 2005
(Photo: Copyright David L. Magney)



Upstream of Hwy 150 Bridge,
Ventura River, 2005
(Photo: Copyright David L. Magney)



Riverine Flooding

About sediment as much as water

The Ventura River has the highest suspended and bedload yield of sediment per unit area of watershed in Southern California. (Brownlee and Taylor, 1981; Taylor, 1983)

Riverine Flooding

About sediment as much as water



Thacher Creek in Siete Robles neighborhood,
2005

(Photo: Ventura County Watershed Protection District)

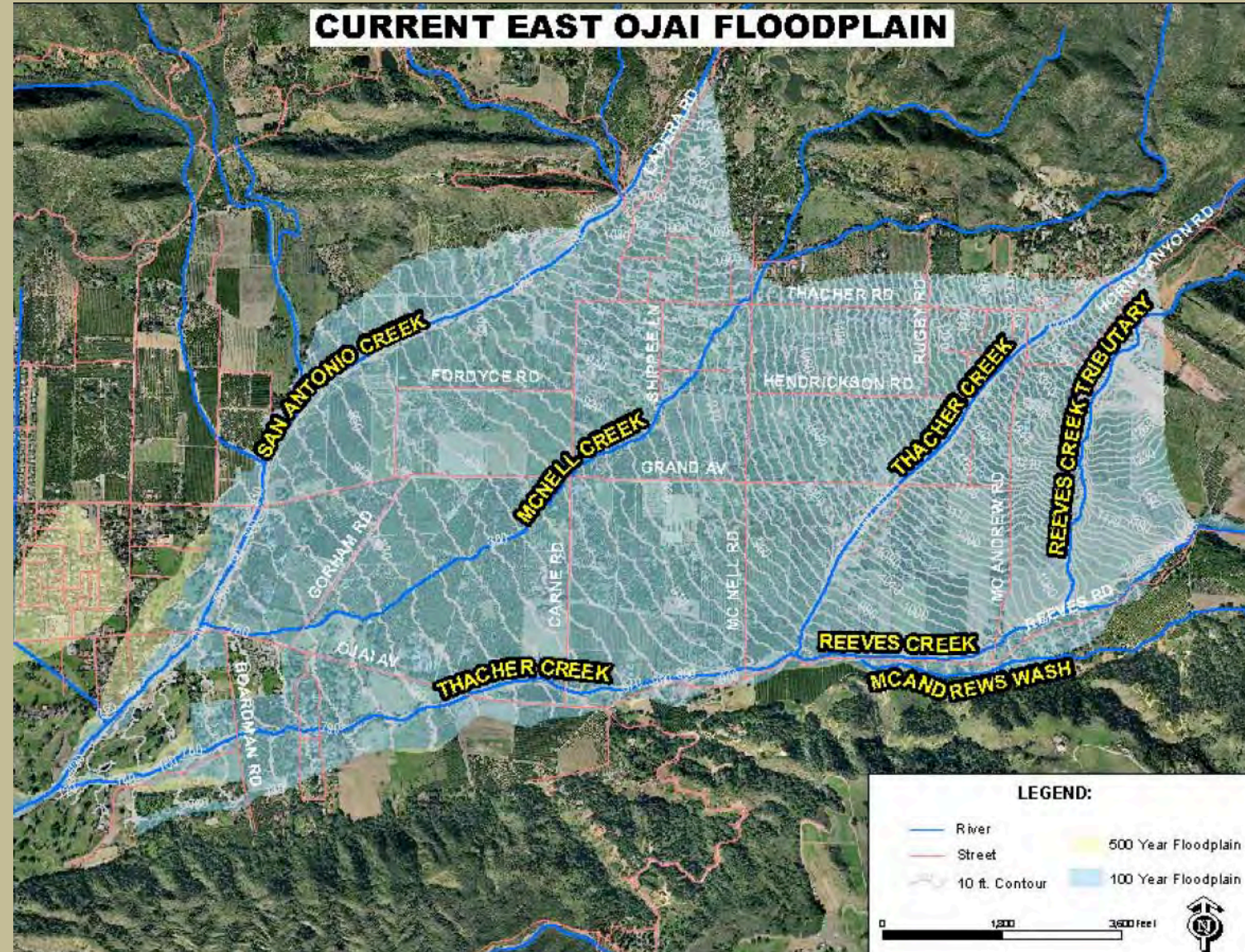


Stewart Canyon Debris Basin full, 2005

(Photo: Copyright David L. Magney)

Alluvial Fan Flooding

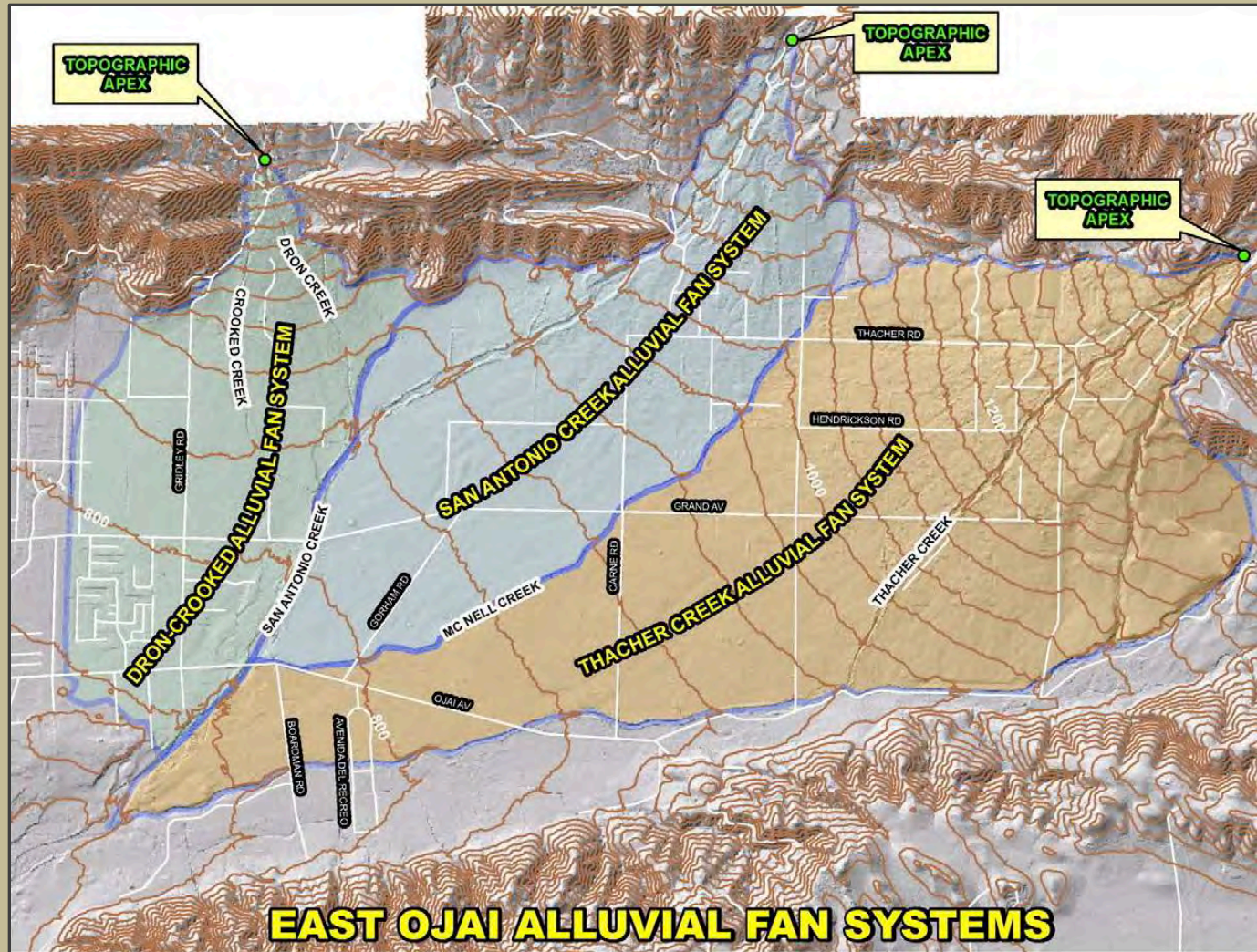
CURRENT EAST OJAI FLOODPLAIN



(Map: Ven. Co. WPD,
East Ojai FLO-2D
Floodplain Study)

Alluvial Fan Flooding

Alluvial Fans:
Fan-shaped deposits of rock and sediment that accumulate on valley floors adjacent to steep, erosive mountains, typically in dry climates.



(Map: Ven. Co. WPD, East Ojai FLO-2D Floodplain Study)

Alluvial Fan Flooding

High velocity



Soule Park Golf
Course, 2005
(Photo: Ventura Co. Watershed
Protection District)

Alluvial Fan Flooding

Full of debris



Siete Robles neighborhood,
located in the “active”
depositional area of the
alluvial fans

(Photo: Ventura County Watershed
Protection District)

Alluvial Fan Flooding

Unpredictable



The stream channels associated with alluvial fans are shallow, not well defined and unpredictable.

East Ojai Avenue, 1969
(Photo courtesy of Ventura County Star)

Coastal Flooding

Ocean driven onto land by

- **Storm surges**
- **Storm-generated wind**
- **Tides**
- **Waves**
- **Tsunamis**
- **Rising sea level**

Ventura Pier, 1998
(Photo: Paul Jenkin)



Coastal Flooding

Erosion is a key concern



Ventura Fairgrounds, 1972 & 2008

(Photo: Copyright (C) 2002-2013 Kenneth & Gabrielle
Adelman, California Coastal Records Project,
www.Californiacoastline.org)

Coastal Flooding

Erosion is a key concern



Surfer's Point, 1995
(Photo: Paul Jenkin)

Urban Drainage Flooding

Though generally presenting less danger, urban storm drains can also be overwhelmed by storm flows and cause flooding.

Ventura Avenue
(Photo: Lorraine Walter)



Dam Failure Flooding

The watershed has four dams that pose a potential failure hazard and are subject to dam safety regulations.

Dam	Owner	Capacity (acre-feet)	Flood Route
Casitas Dam	Dept. of Interior, Bureau of Reclamation	254,000	Coyote Creek, Ventura River
Matilija Dam	Ventura Co. Watershed Protection District	500*	Matilija Creek, Ventura River
Senior Canyon Dam	Senior Canyon Mutual Water Company	78	Senior Canyon, San Antonio Creek
Stewart Canyon Debris Basin	Ventura Co. Watershed Protection District	64.6	Stewart Canyon Creek channel, Stewart Canyon Creek, San Antonio Creek

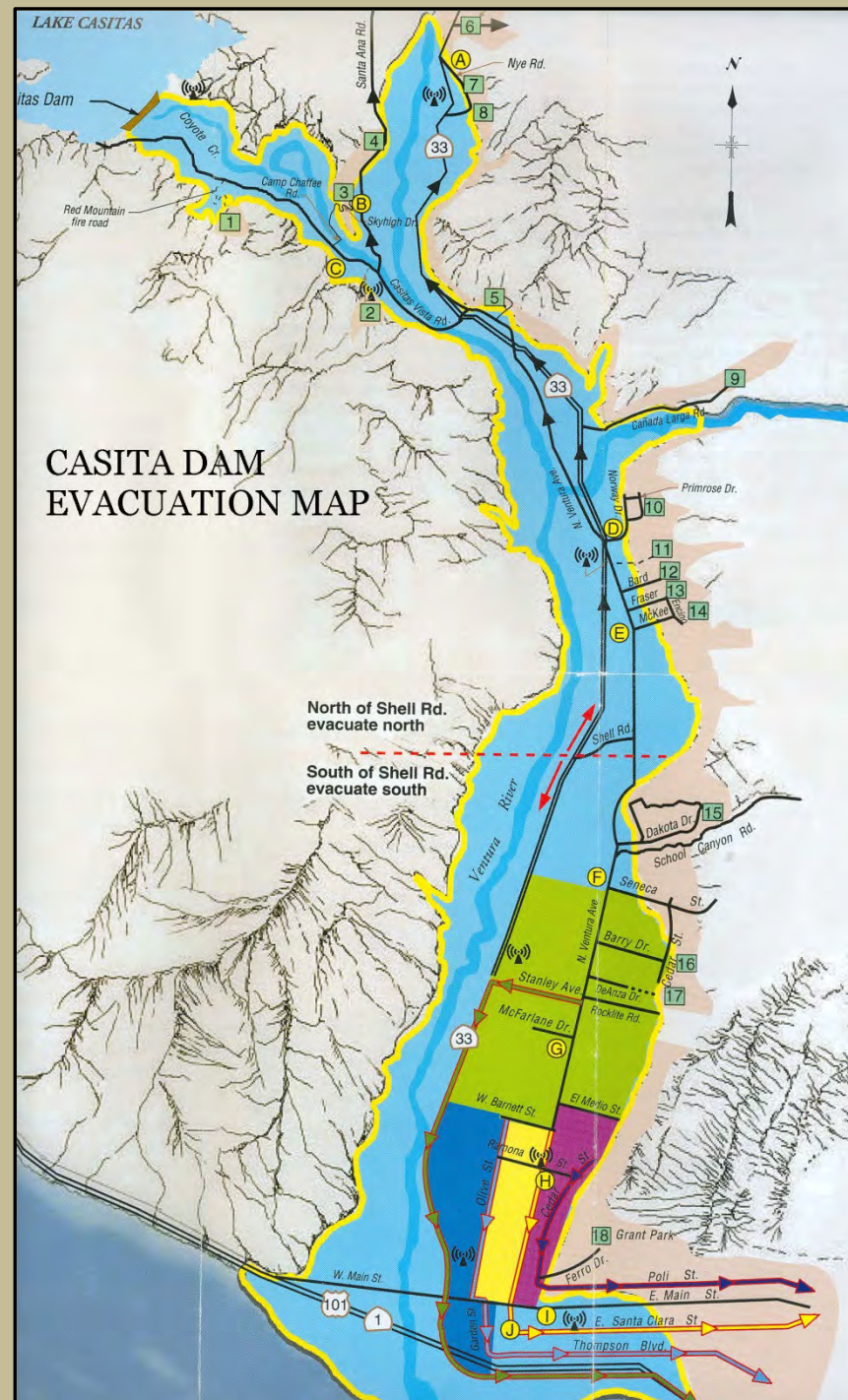
*The 6,000,000 cy of sediment behind the dam, which has displaced the water, also poses a significant dam failure hazard.

Dam Failure Flooding

Disaster coordination and planning is the responsibility of the Sheriff's Office of Emergency Services (OES).

OES maintains the County's Dam Failure Response Plan.

Liquefaction, as a result of an earthquake, is one of the primary dam integrity concerns for the Casitas Dam.



Past Floods

Date	Water Year	Peak Flow (cfs)*	% Annual Exceedance Probability	Flood Category**
1978, February	1978	63,600	1.5%	Major
1969, January	1969	58,000	2.2%	Major
1992, February	1992	45,800	5.2%	Major
1995, January	1995	43,700	6.0%	Major
2005, January	2005	41,000	7.3%	Major
1969, February	1969	40,000	7.8%	Major
1938, March	1938	39,200	8.2%	Moderate
1998, February	1998	38,800	8.5%	Moderate
1980, February	1980	37,900	9.0%	Moderate
1943, January	1943	35,000	11.0%	Moderate
1952, January	1952	29,500	16.1%	Moderate
2005, January	2005	29,400	16.2%	Moderate
1983, March	1983	27,000	19.1%	Moderate
1952, March	1952	24,600	22.5%	Moderate
1934, January	1934	23,000	25.2%	Moderate
1986, February	1986	22,100	26.8%	Moderate
2004, December	2005	20,600	30.9%	Moderate
1944, February	1944	20,000	32.9%	Moderate
2011, March	2011	19,100	32.9%	Flood
2001, March	2001	19,100	33.8%	Flood
2005, February	2005	18,800	38.1%	Flood
1958, April	1958	18,700	41.6%	Flood
1945, February	1945	17,000	43.1%	Action
1969, January	1969	16,600	45.5%	Action
1973, February	1973	15,700	47.1%	Action
1941, March	1941	15,200	50.2%	Action

*Peak flows as measured at Foster Park.

8 Presidentially-Declared Flood Disasters

1962, February (Kennedy)

1965, November-December (Johnson)

1967, November-December (Johnson)

1969, January (Nixon)

1983, February-March (Reagan)

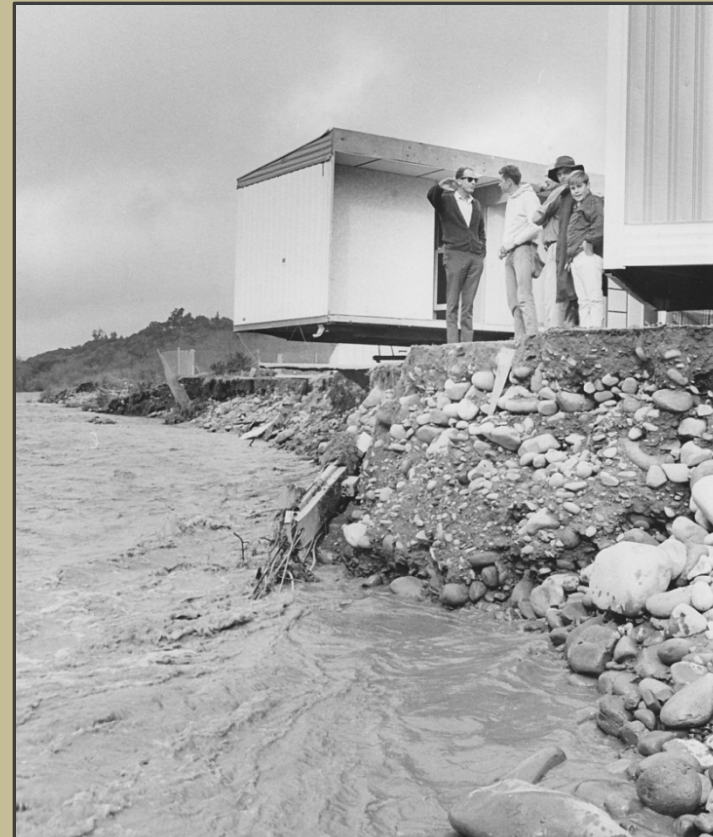
1992, February (Bush)

1995, January-March (Clinton)

2005, January (Bush)

Rancho Trailer Park, Casitas Springs
Ventura River, 1969

(Photo courtesy of Ventura County Star)



Significant Coastal Floods

1907, December

1939, September

1969, December

1977-78, Winter

1982-83, Winter

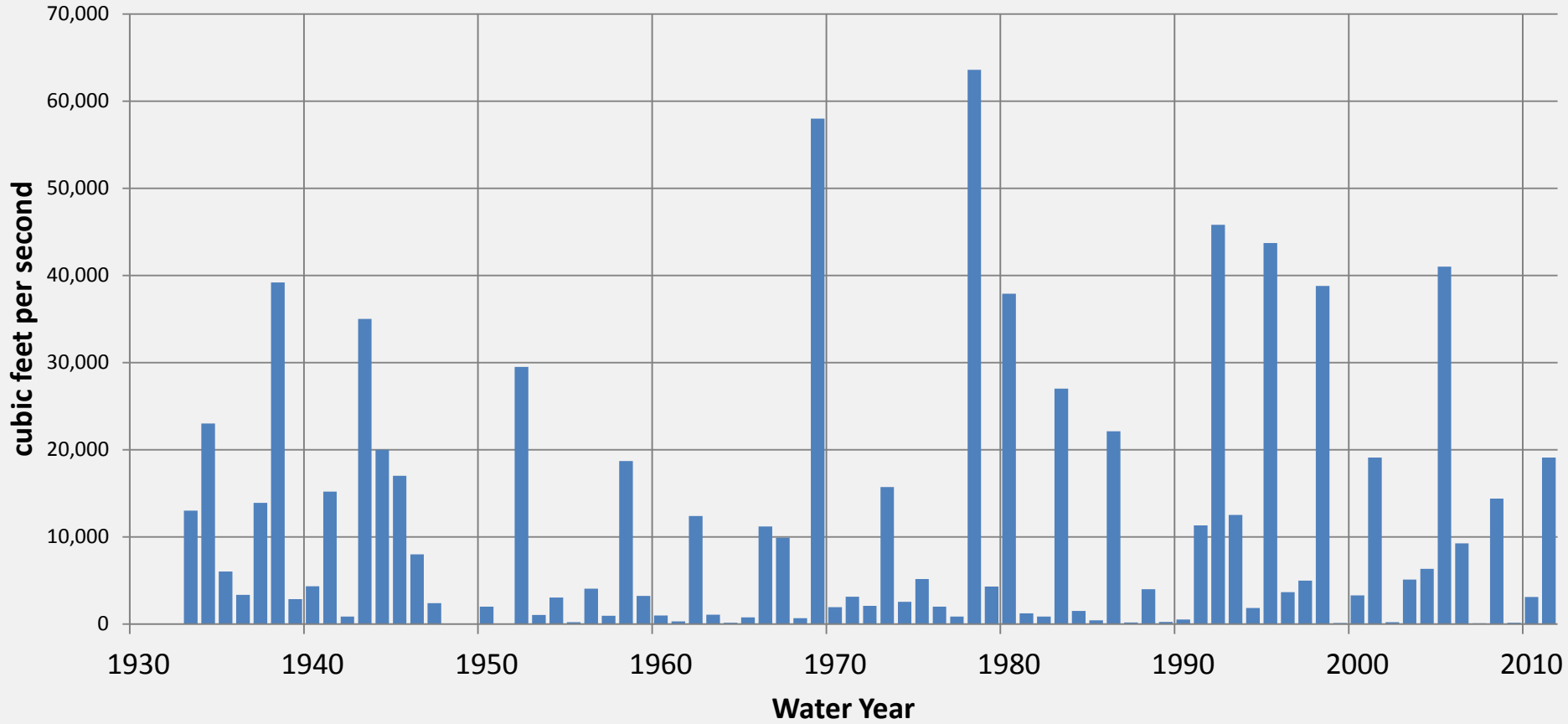
1988, January

1997-98, Winter

2010, January

The years of significant coastal flooding have not always been the same as those of significant riverine flooding.

Largest Annual Peak Flows at Foster Park



Flood Protection Infrastructure

- Levees
- Debris & Detention Basins
- Flood Control Channels

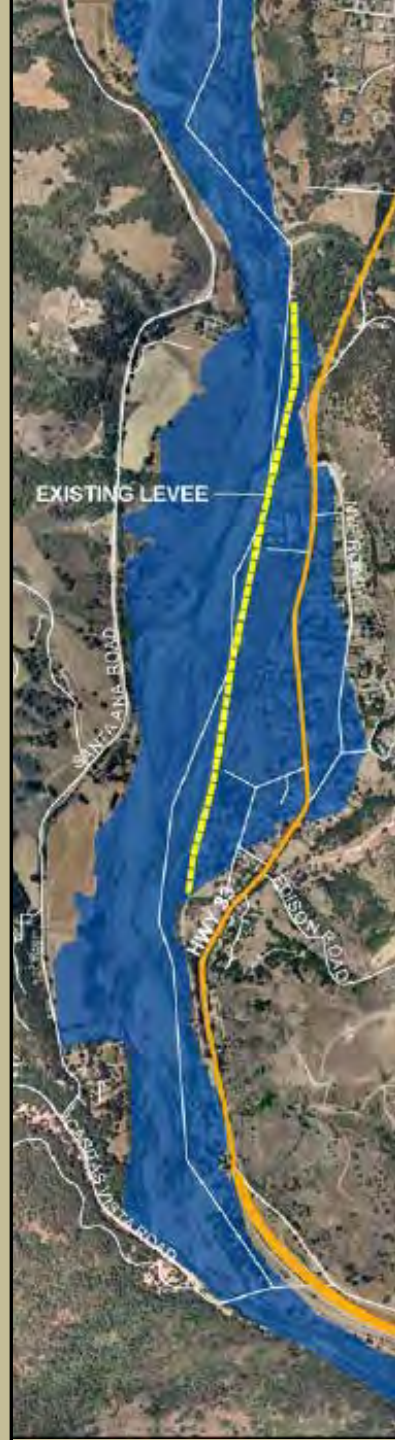
Levees

Levee	Year Built	Location	Length (miles)	Built to Protect
Ventura River Levee	1948	Ventura. From Pacific Ocean to Canada de San Joaquin	2.65	City of Ventura
Casitas Springs Levee	1979	Ojai. From Santa Ana Blvd north to Riverside Rd.	1	Casitas Springs
Live Oak Levee	1978	Oak View. From Santa Ana Blvd. Bridge to the Live Oak Diversion (~where Riverside Rd. meets Burnham Rd.)	1.28	Live Oak Acres

Ventura River Levee



Casitas Springs Levee



Live Oak Levee



Levees

All 3 levees in the watershed were found to have deficiencies such that they could not be certified, by a Nov. 2009 compliance deadline, as fully meeting federal standards.

Potential Consequence:

When new FEMA flood hazard maps are created, property owners behind the non-certified levees could be in a flood hazard zone, and those with federally-backed mortgages would be subject to mandatory federal flood insurance requirements.

Levees

Casitas Springs and Live Oak Levees

The Matilija Dam Ecosystem Restoration Project involves enhancing the Casitas Springs and Live Oak levees.

Design work in process now.

If sufficient construction funding can be secured for the levee rehabilitation projects, federal levee certification requirements should be met.

Levees

Ventura River Levee

Ventura County Watershed Protection District is engaged in preliminary design engineering work in support of levee retrofit/enhancement and is researching possible sources of funding.

FEMA Regulation Changes

At the same time, FEMA is also reassessing their requirements in an effort to improve flexibility as well as precision. These eventual regulatory changes may affect local levee certification positively.

Debris & Detention Basins

Typically placed at canyon mouths, debris basins capture the sediment, gravel, boulders and vegetation that are washed out of canyons during storms.



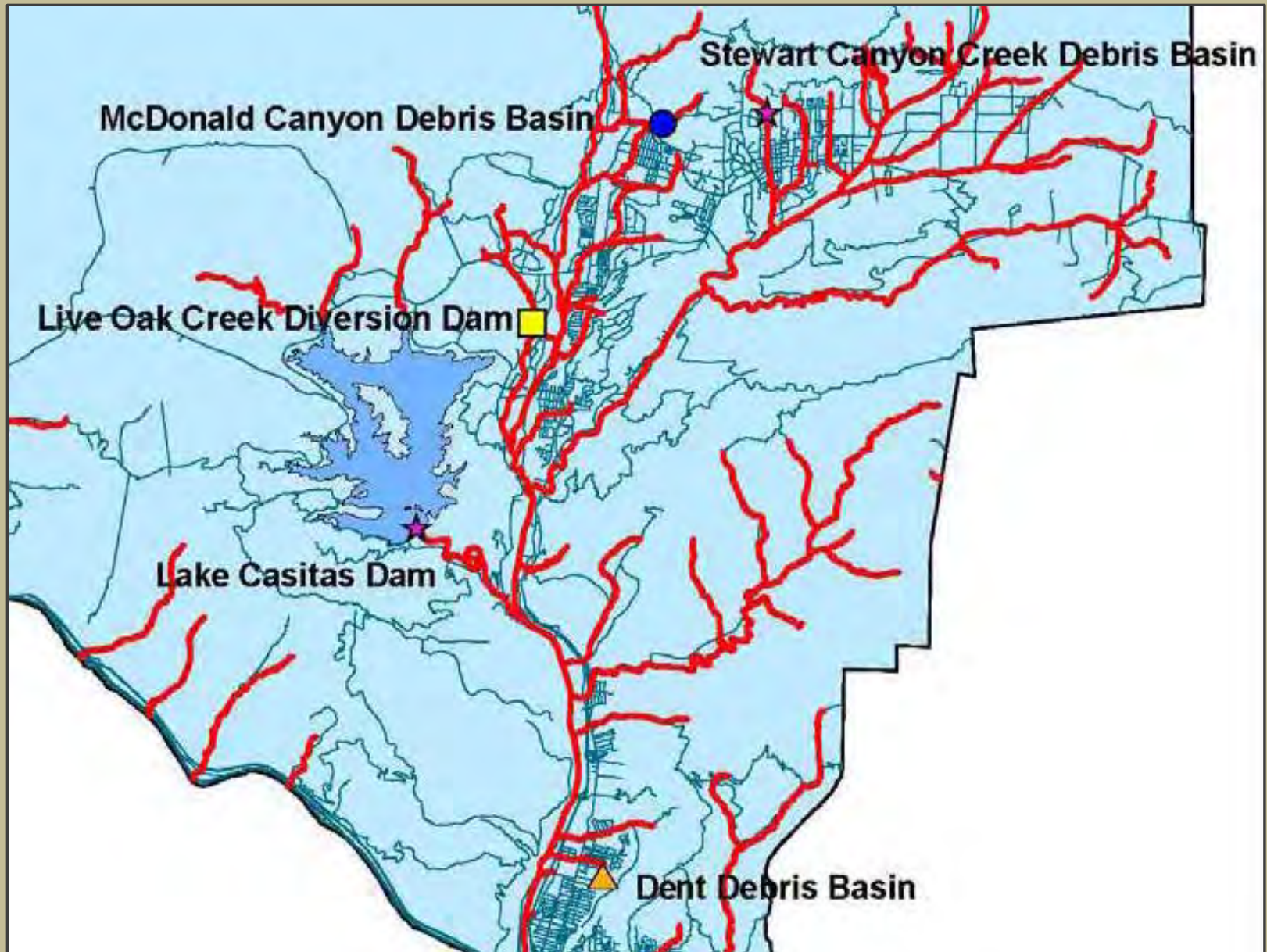
Stewart Canyon
Debris Basin, Ojai
10 acres in size,
328,300 cy
capacity
(Photo: Lisa Brenneis)

Debris & Detention Basins

Basin	Year Built	Location*	Watershed Area (acres)	Maximum Debris Storage Capacity (cubic yards)	Expected Debris Production for 1% AEP* Flood (cubic yards)
Dent Debris Basin	1981	Ventura, behind De Anza Middle School	19	4,100	1,624
Live Oak Diversion Dam	2002	Oak View, west of Burnham Rd. between Santa Ana Rd. and Hwy 150	794	28,700	20,952
McDonald Canyon Detention Basin	1998	Meiners Oaks, east of Hwy 33/Fairview Rd junction	573	23,400	20,179
Stewart Canyon Debris Basin	1963	Ojai, at north end of Canada St.	1,266	328,300	209,000

*Annual Exceedance Probability

Debris & Detention Basins



Flood Control Channels



Fox Canyon Barranca, 2005
(Photo: Copyright David L. Magney)

The End



Hwy 101, Jan 2005
Associated Press