

President's Day Weekend Flood Report

Feb. 15-22, 2017



The devastation of floods

**Our community is compassionate,
strong, and resilient.**

**Those impacted by the recent flood deserve
nothing less than our full commitment to
improve our ability to prevent, prepare for
and respond to flood emergencies.**

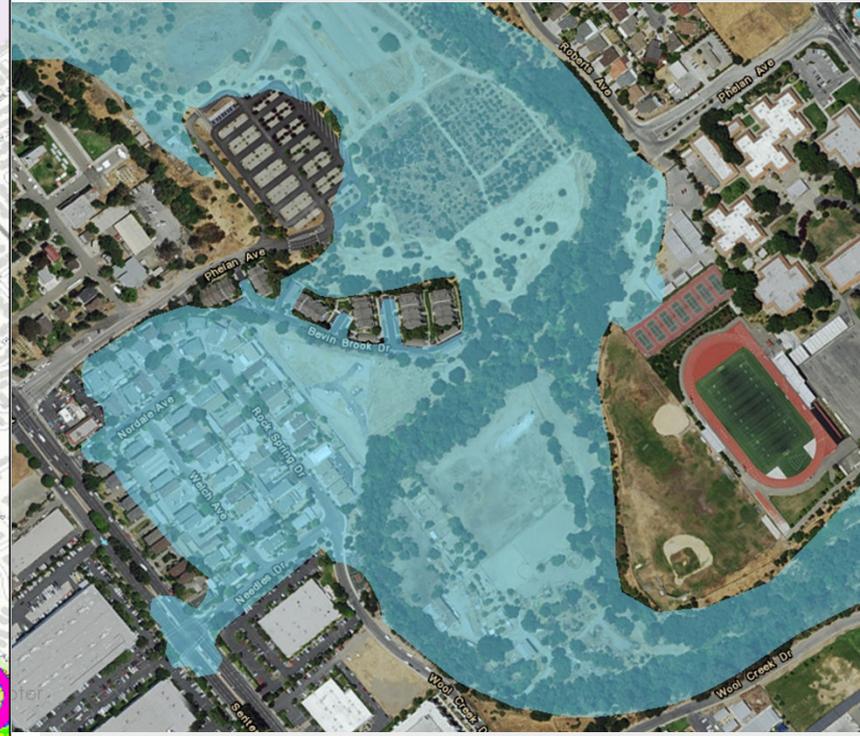
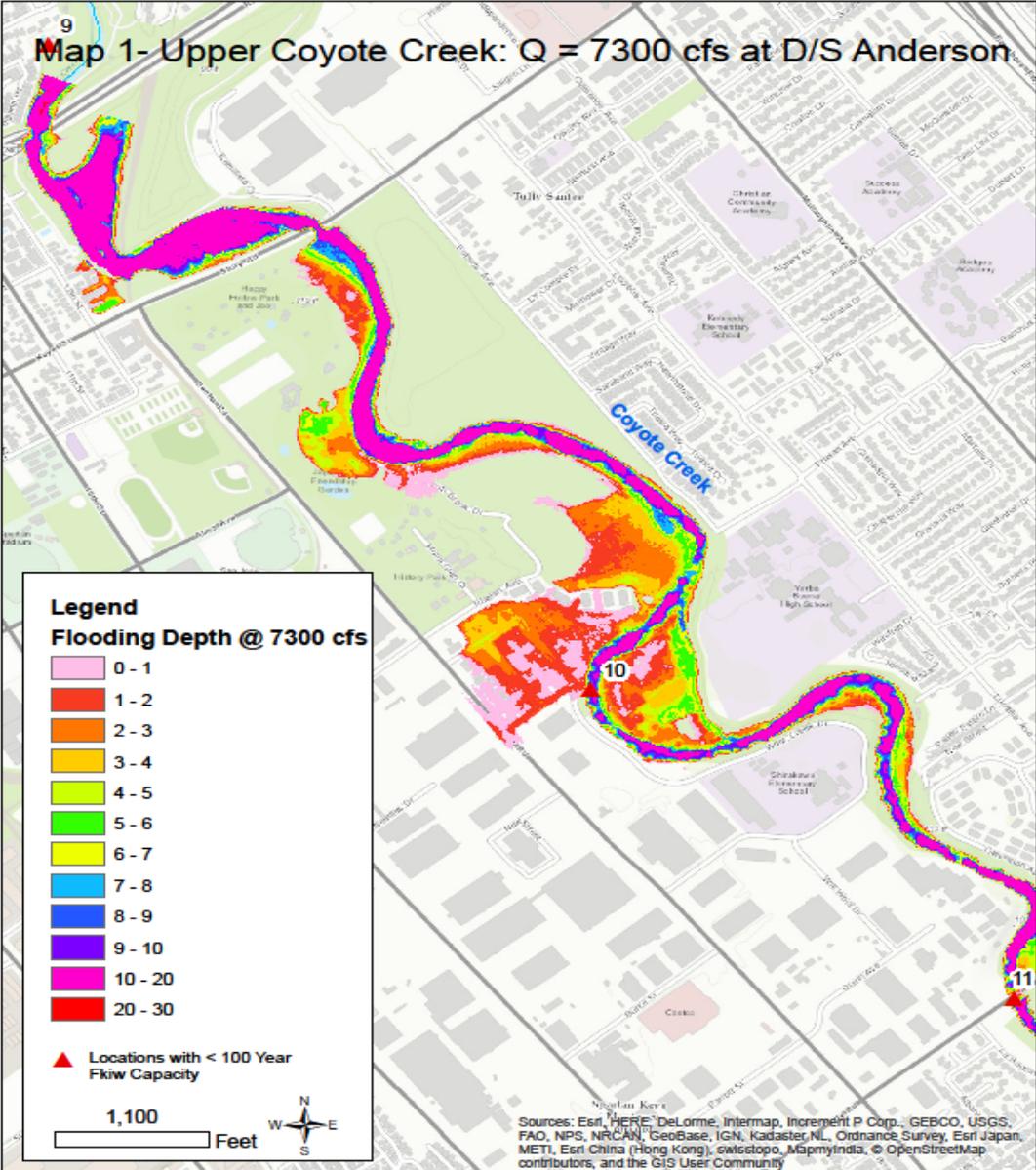
Summary

- ▶ The winter of 2016-2017 was extraordinary.
- ▶ The Santa Clara Valley Water District's primary role is to reduce the risk and impacts of flooding.
- ▶ The District and the National Weather Service provided useful and valid information, data and forecasts leading up to the flood.
- ▶ Numerous indicators showed the potential for flooding on Coyote Creek.

Lessons learned

- ▶ Technical data misunderstood and/or discounted by others
- ▶ District and San Jose City need to be better partners on reducing flood risks
- ▶ Joint emergency action plans with cities with high risk of flooding must be improved
- ▶ The District's EOC procedures and training, including communications, must improve

Observed flooding vs model-7300 cfs



Weather situation overview

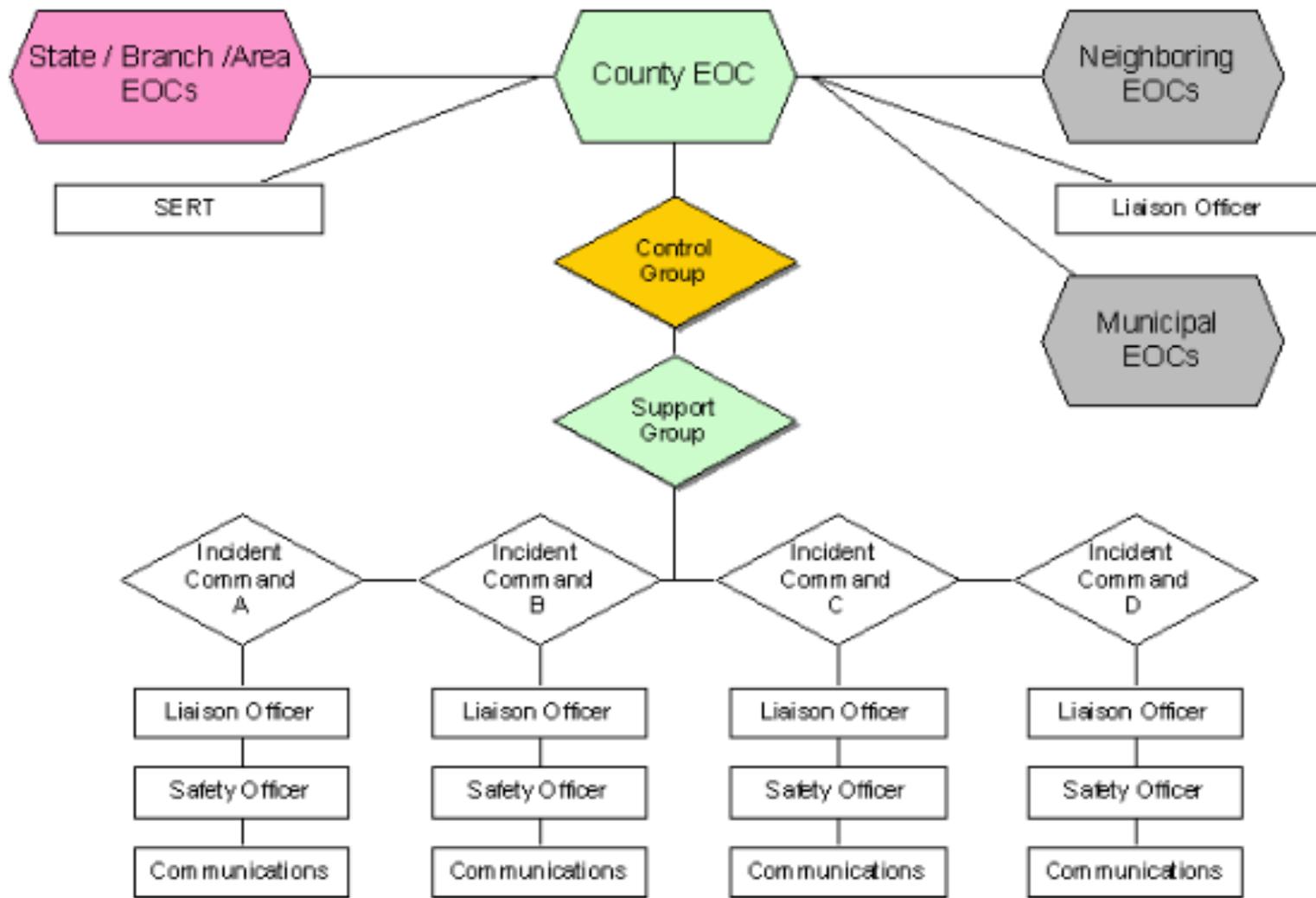
- ▶ Series of atmospheric rivers back-to-back (~200% of average)
- ▶ Oroville Dam spilled
- ▶ In Santa Clara County 8 out of 10 dams spilled
- ▶ Second highest seasonal rainfall at Coyote Reservoir rain gauge since 1936



Weather situation overview

- ▶ Half-empty Anderson Reservoir filled to the brim in a month-and-a-half
- ▶ Record spill over Anderson Dam in its 67-year history and continued spilling for 10 days
- ▶ Record flood water level
- ▶ Coyote Creek Edenvale Stream Gauge
 - ▶ Tuesday, Feb. 21 13.7 feet
 - ▶ Previous Record (1922): 12.8 feet

Emergency response roles



County roles and responsibilities

- ▶ Facilitate information and resources to the operational area (countywide agencies)
- ▶ Make public safety decisions for unincorporated areas

District roles and responsibilities

- ▶ Countywide District Infrastructure stabilization
 - ▶ 275 of the 800 miles of creeks
- ▶ Monitor and assess information
- ▶ Activate emergency plans
- ▶ Share information



City of San Jose role and responsibilities

- ▶ Assess local conditions
- ▶ Inform public and first responder agencies about evolving conditions
- ▶ Direct police, fire, EMS, public works and other human services functions
- ▶ Initiate, communicate and carry out safety actions such as evacuations
- ▶ Provide care, medical services, and shelter



NWS Overview

Weather Forecast Offices (WFOs)

- ✔ Issue all Local Forecasts and Warnings
- ✔ Build and Maintain Relationships With Local and State Governments
- ✔ Provide Expert Advice to Emergency Managers and other Decision Makers
- ✔ Solicit Customer Feedback on Products and Services
- ✔ Conduct Community Awareness and Education Programs
- ✔ Train Volunteer Observers and Storm Spotters



Coyote Watershed

322 square-miles, including 16 major creeks



Pre-season preparation

District readiness

- ▶ Inter Agency Coordination
 - ▶ Annual Winter Workshop
 - ▶ Anderson Dam Functional Exercise
 - ▶ Yellow Command
 - ▶ ArkStorm Tabletop



Loma Fire Operational Briefing, Base Camp
(9-29-16)

Pre-season preparations – June - Oct.

Sediment removal and bank stabilization

- Removed 84,000 cubic yards of sediment
- Over 10,000 truck loads
- Bank stabilization

Pre-season preparations – Coyote Creek

Vegetation management on Coyote Creek, downstream of Montague

- Removed 5 acres of in-stream vegetation
- Removed 7 acres of invasive vegetation



Pre-season preparations – June – Oct.

- 8,250 cubic yards of trash & debris



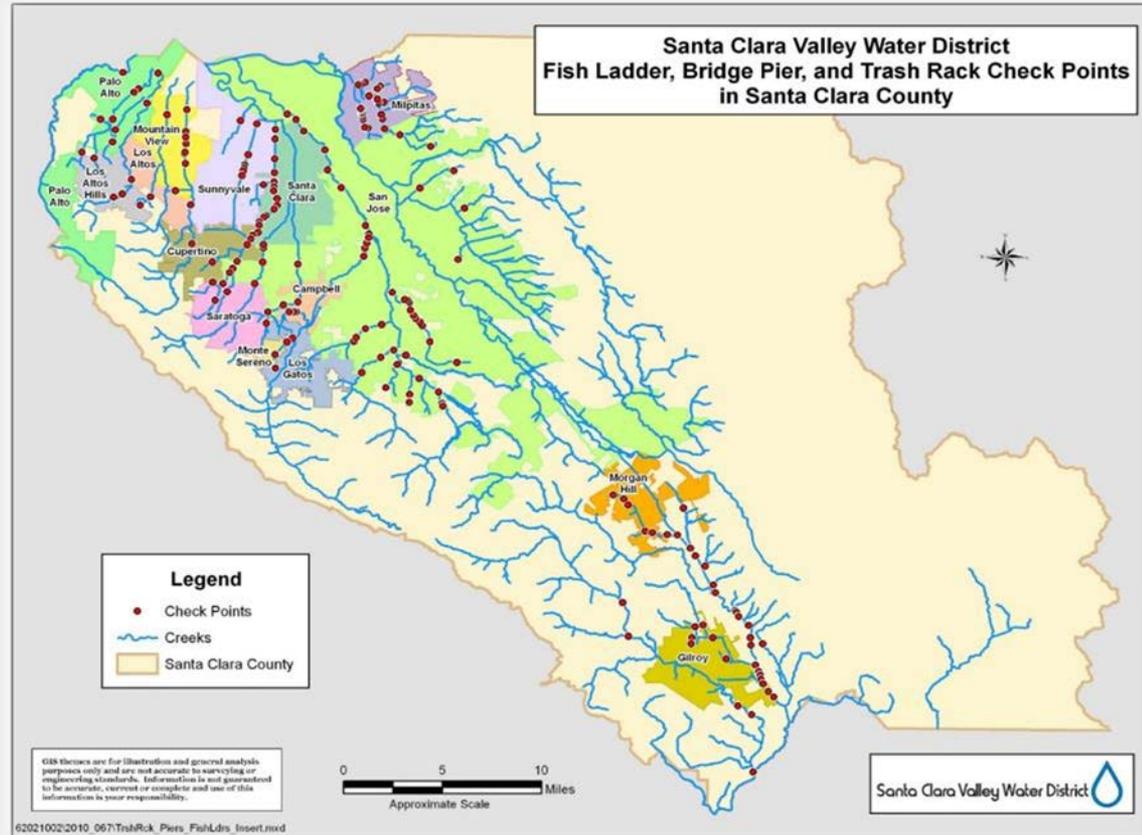
Winter preparedness – Oct.-Nov.

- Pre-storm inspections
- Preventative maintenance
- Respond to field conditions



Winter preparedness – Oct.- Nov.

- ▶ Hot spots
 - ▶ San Francisquito Creek
 - ▶ Coyote Creek
 - ▶ West Little Llagas Creek
 - ▶ Ross Creek



Winter preparedness - sandbags



Be FloodSafe with sandbags

BE PREPARED

Residents need to monitor water levels in creeks and storm drains near their homes as we enter the wet weather season. Major flood protection projects have been completed in Santa Clara County since 1982, but urban flooding can still occur along other portions of the rivers and creeks. Overflowing storm drains also can cause serious flooding.

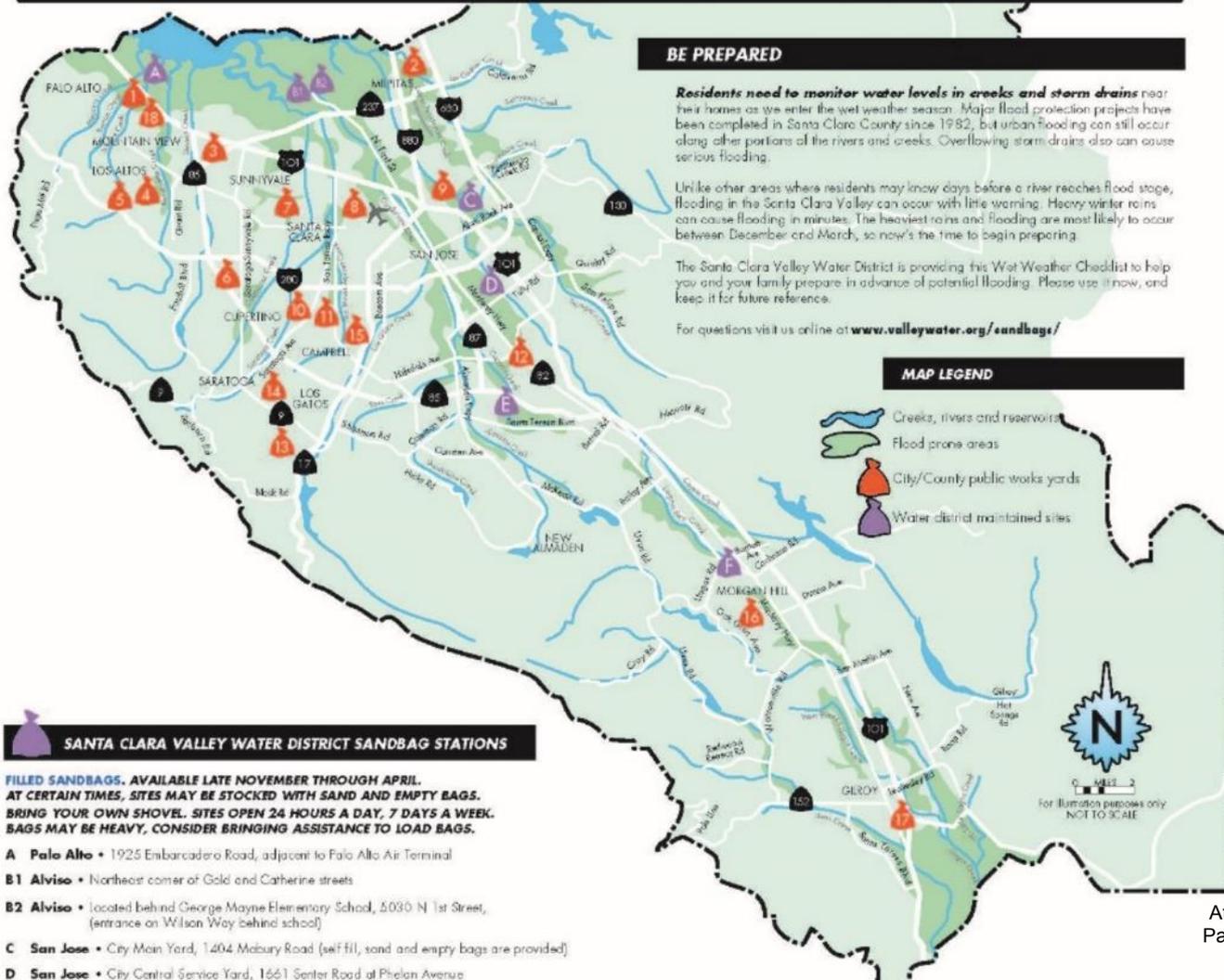
Unlike other areas where residents may know days before a river reaches flood stage, flooding in the Santa Clara Valley can occur with little warning. Heavy winter rains can cause flooding in minutes. The heaviest rains and flooding are most likely to occur between December and March, so now's the time to begin preparing.

The Santa Clara Valley Water District is providing this Wet Weather Checklist to help you and your family prepare in advance of potential flooding. Please use it now, and keep it for future reference.

For questions visit us online at www.valleywater.org/sandbags/

MAP LEGEND

- Creeks, rivers and reservoirs
- Flood prone areas
- City/County public works yards
- Water district maintained sites



SANTA CLARA VALLEY WATER DISTRICT SANDBAG STATIONS

FILLED SANDBAGS. AVAILABLE LATE NOVEMBER THROUGH APRIL. AT CERTAIN TIMES, SITES MAY BE STOCKED WITH SAND AND EMPTY BAGS. BRING YOUR OWN SHOVEL. SITES OPEN 24 HOURS A DAY, 7 DAYS A WEEK. BAGS MAY BE HEAVY, CONSIDER BRINGING ASSISTANCE TO LOAD BAGS.

- A Palo Alto** • 1925 Embarcadero Road, adjacent to Palo Alto Air Terminal
- B1 Alviso** • Northeast corner of Gold and Catherine streets
- B2 Alviso** • located behind George Mayne Elementary School, 5030 N 1st Street, (entrance on Wilson Way behind school)
- C San Jose** • City Main Yard, 1404 Mabury Road (self fill, sand and empty bags are provided)
- D San Jose** • City Central Service Yard, 1661 Senter Road at Phelan Avenue

Storm season 2017

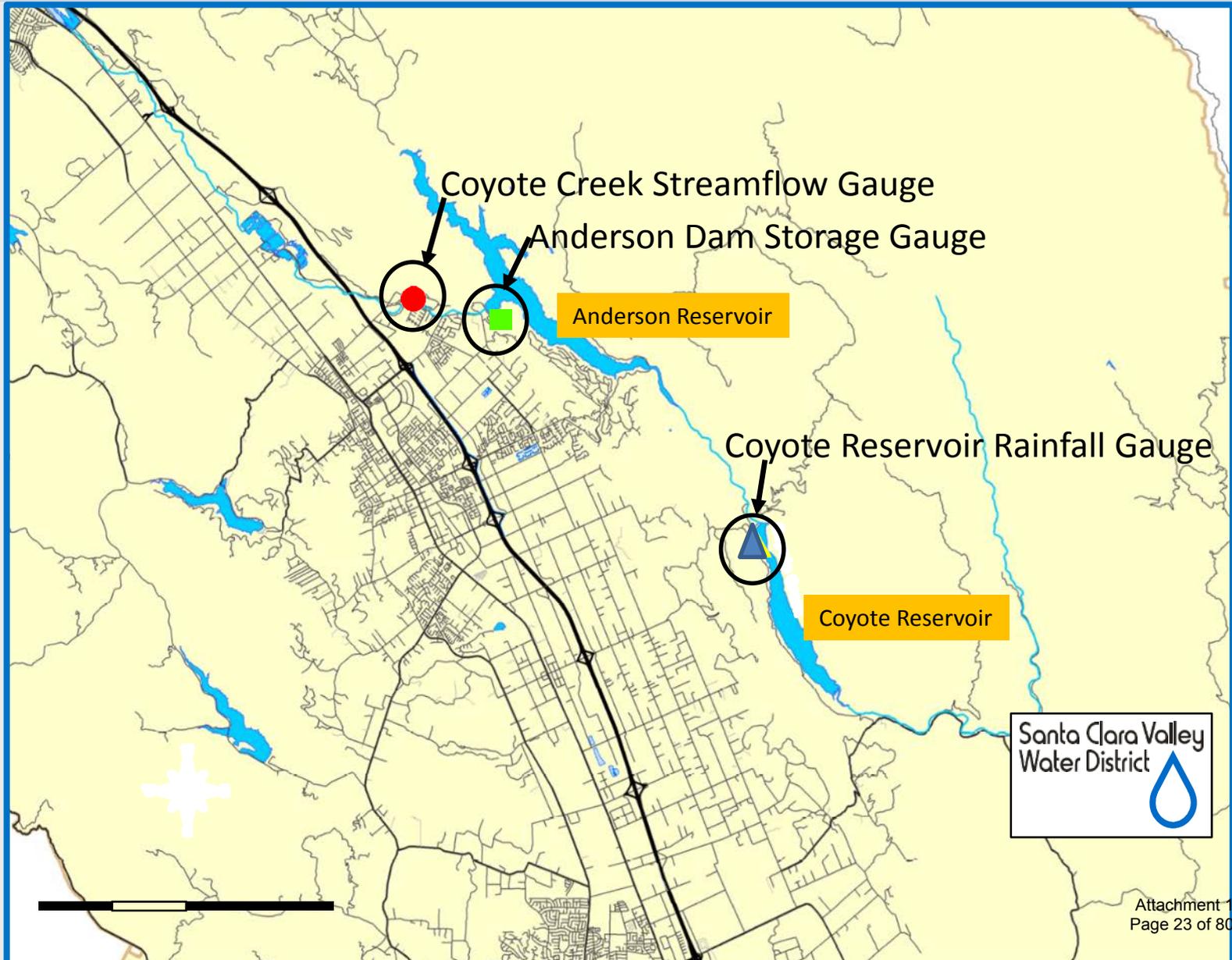


Anderson Dam operations – January 2017



- Anderson Reservoir less than half full Jan. 1
- Anderson outlet fully opened Jan. 9

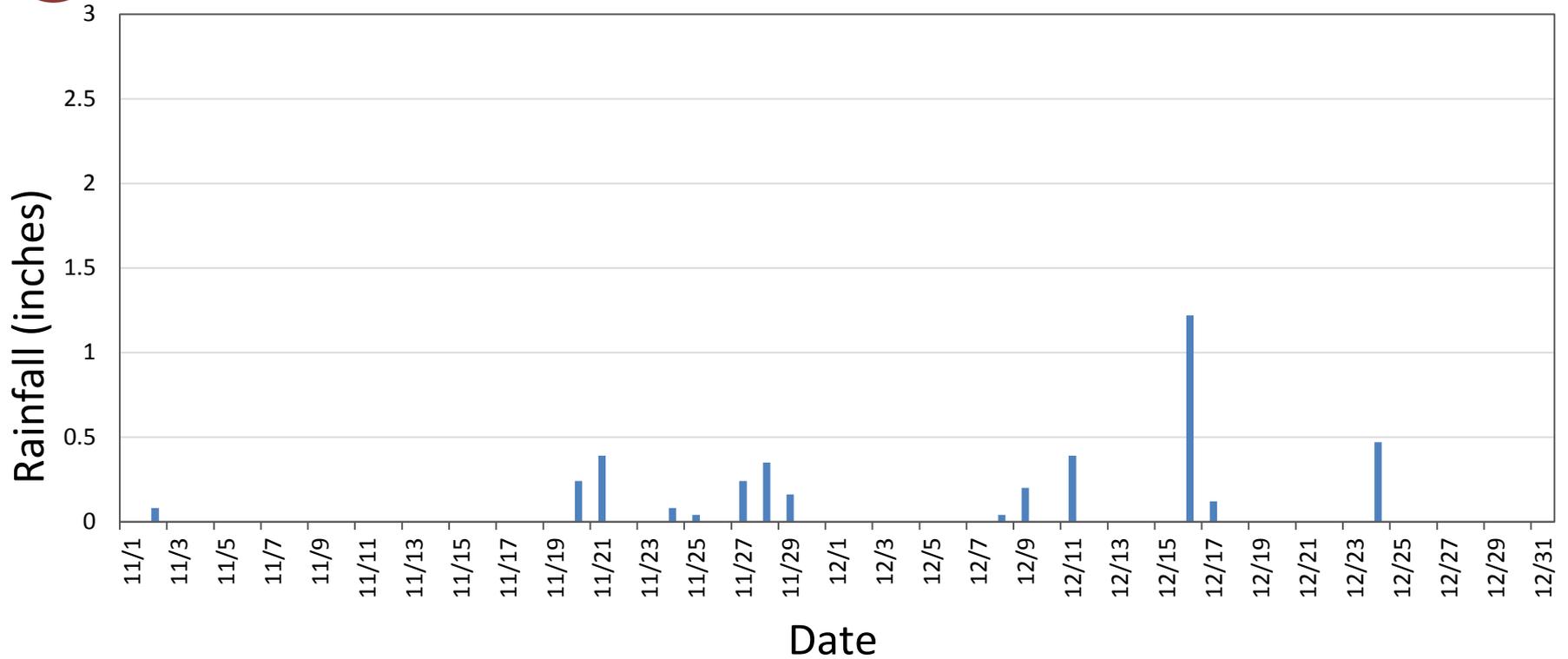
Map of gauge locations



Coyote Reservoir Rainfall: Nov. 1 – Dec. 30, 2016

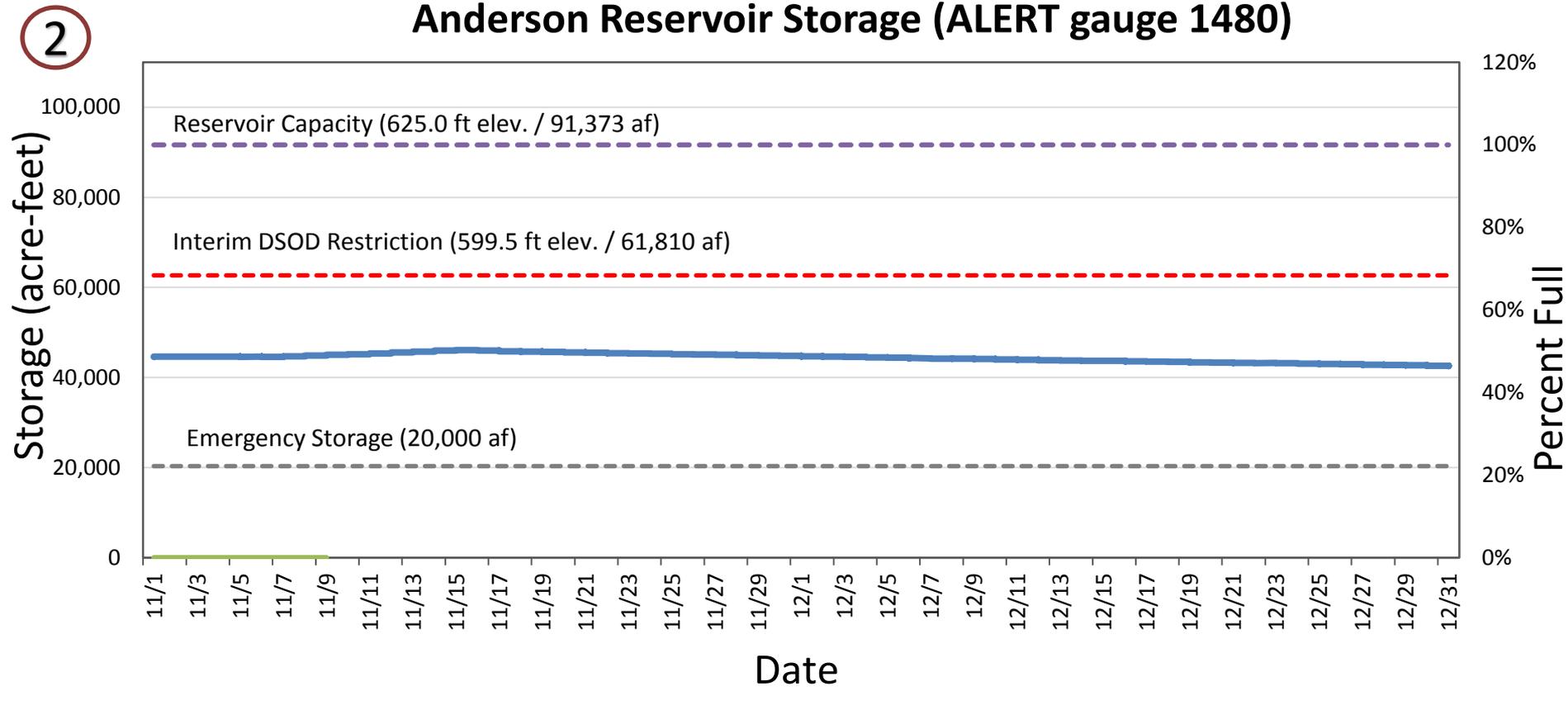
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Coyote Reservoir Precipitation Gauge (ALERT gauge 6021)



Anderson Reservoir Storage: Nov. 1 – Dec. 30, 2016

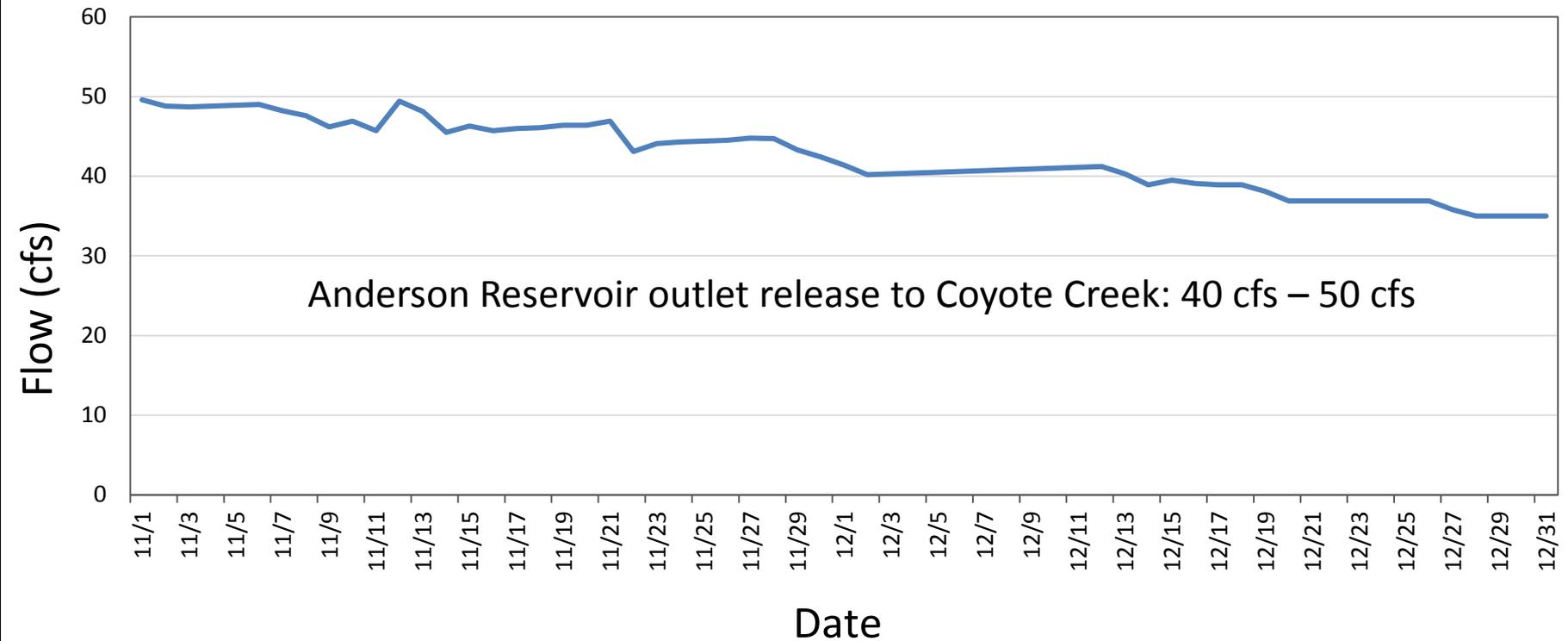
Note: Anderson Reservoir Actual Storage Level is **solid blue line**



Coyote Creek Flows: Nov. 1–Dec. 30, 2016

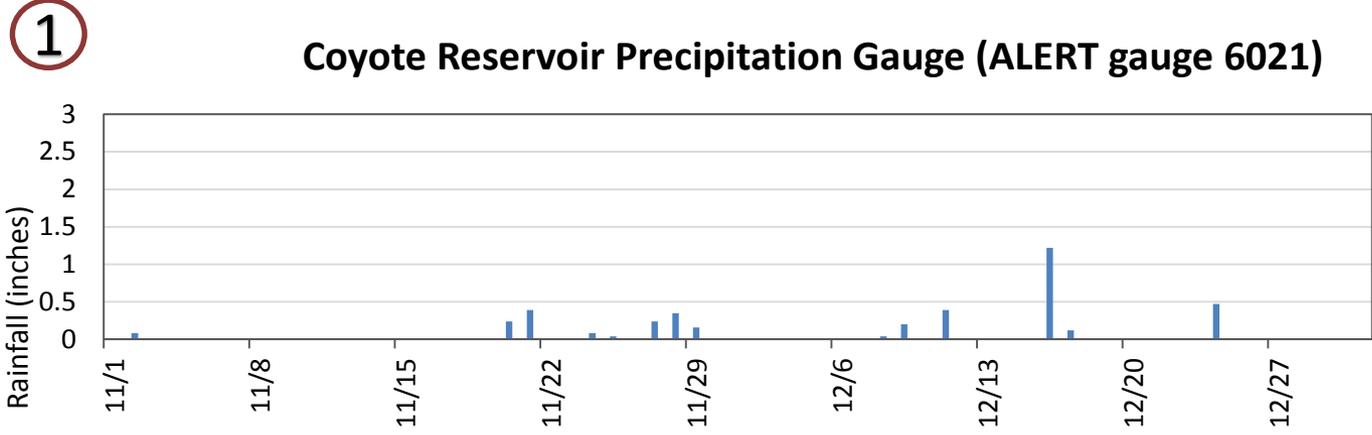
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Coyote Creek at Madrone Streamflow Gauge (ALERT gauge 5082)

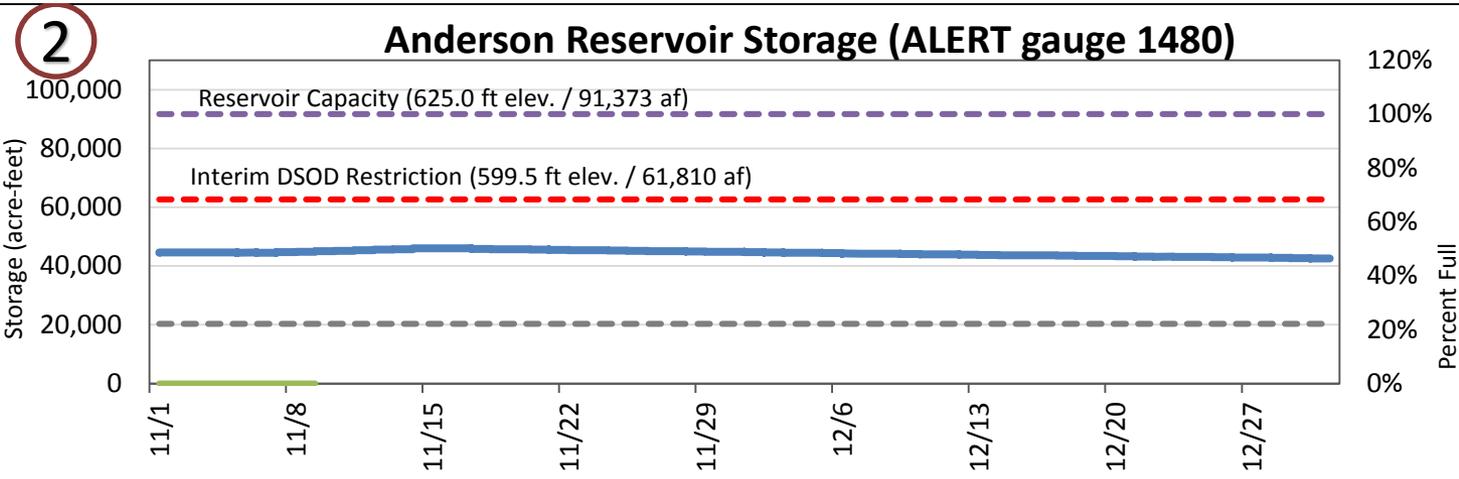


**November 1 to
December 30, 2016**

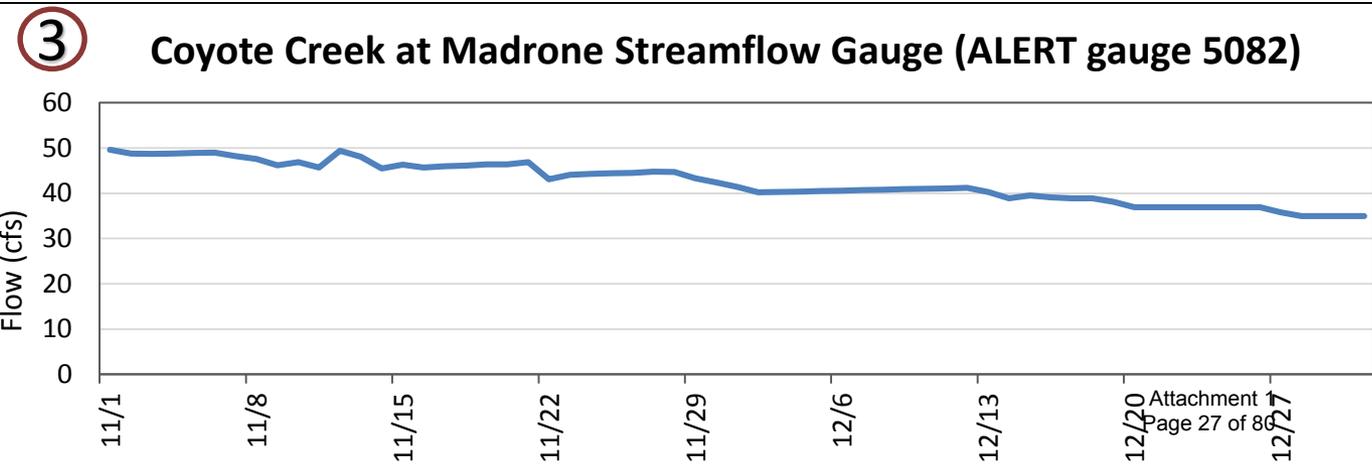
Rainfall



**Anderson Dam
Storage Levels
(blue line)**



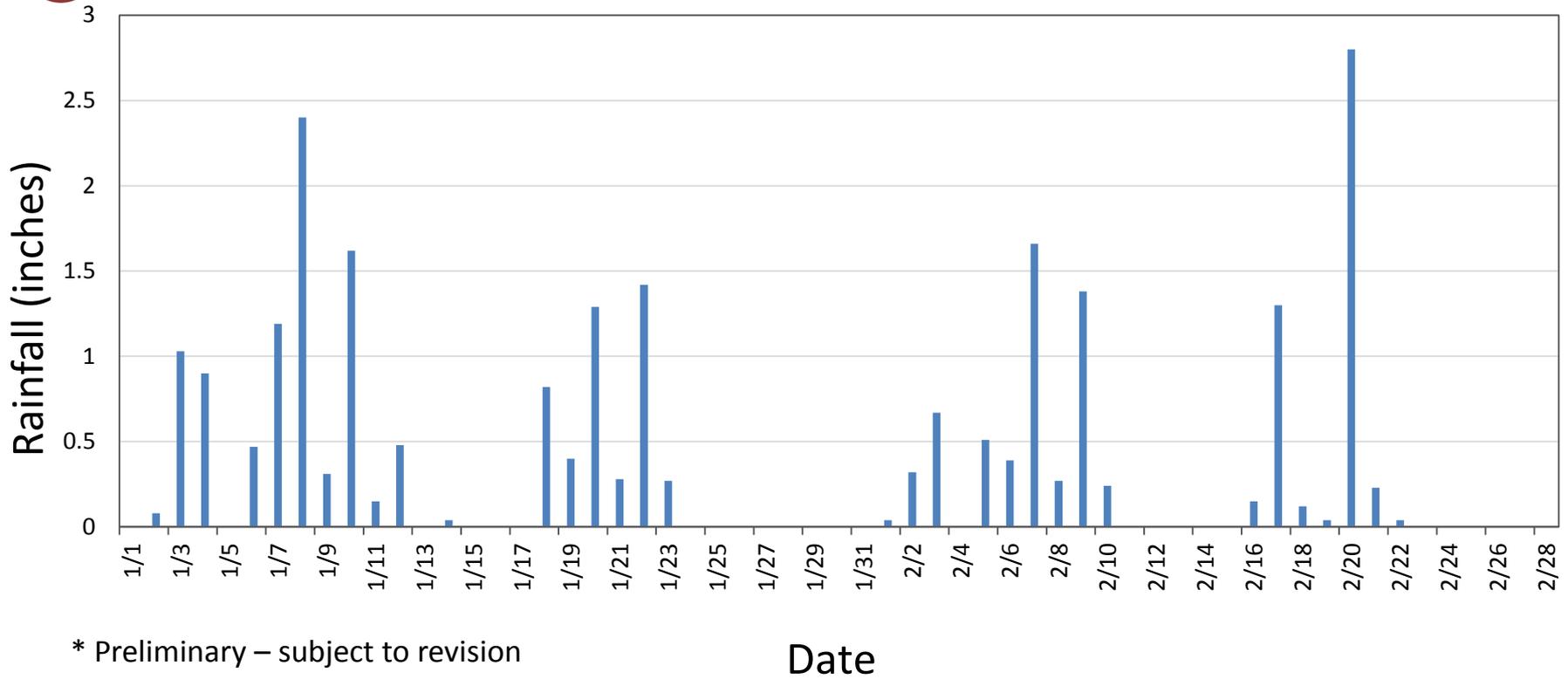
**Coyote Creek Flows
Downstream of
Anderson Dam**



Coyote Reservoir rainfall: Jan. 1 – Feb. 28, 2017

4

Coyote Reservoir Precipitation Gauge (ALERT gauge 6021)*

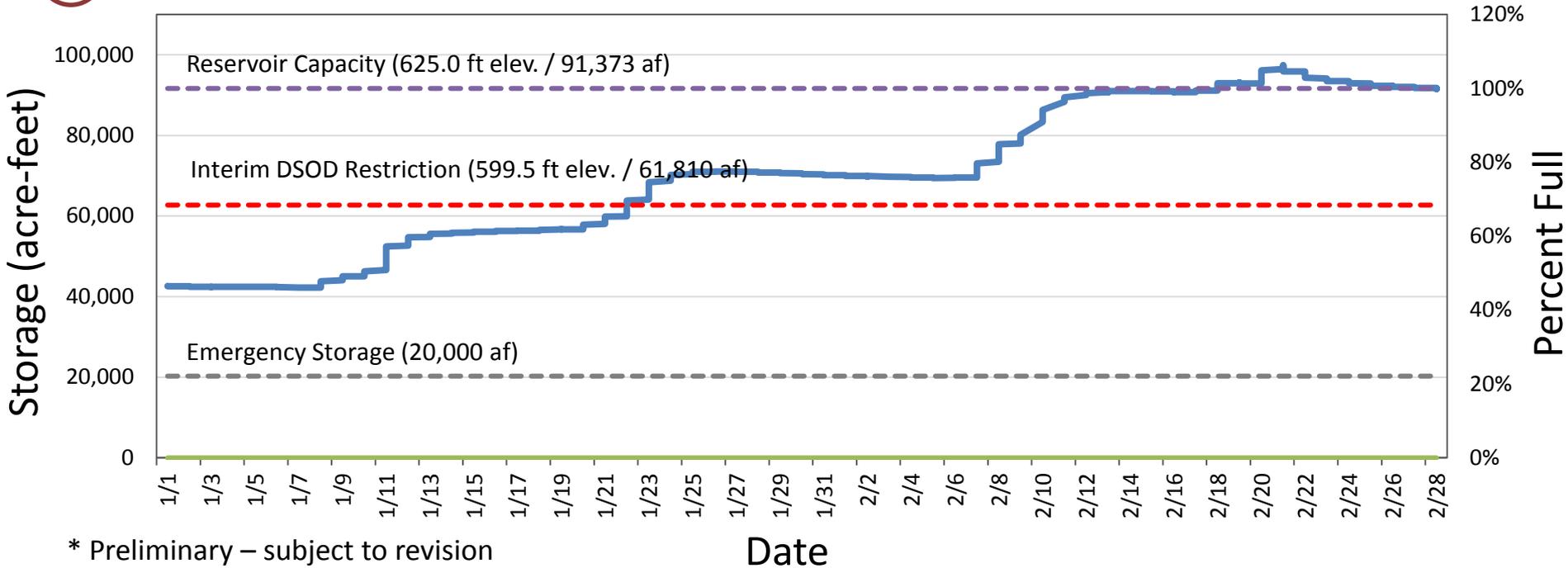


* Preliminary – subject to revision

Anderson Reservoir storage: 1/1-2/28

Note: Anderson Reservoir Actual Storage Level is **solid blue line**

5 Anderson Reservoir Storage (ALERT gauge 1480)*

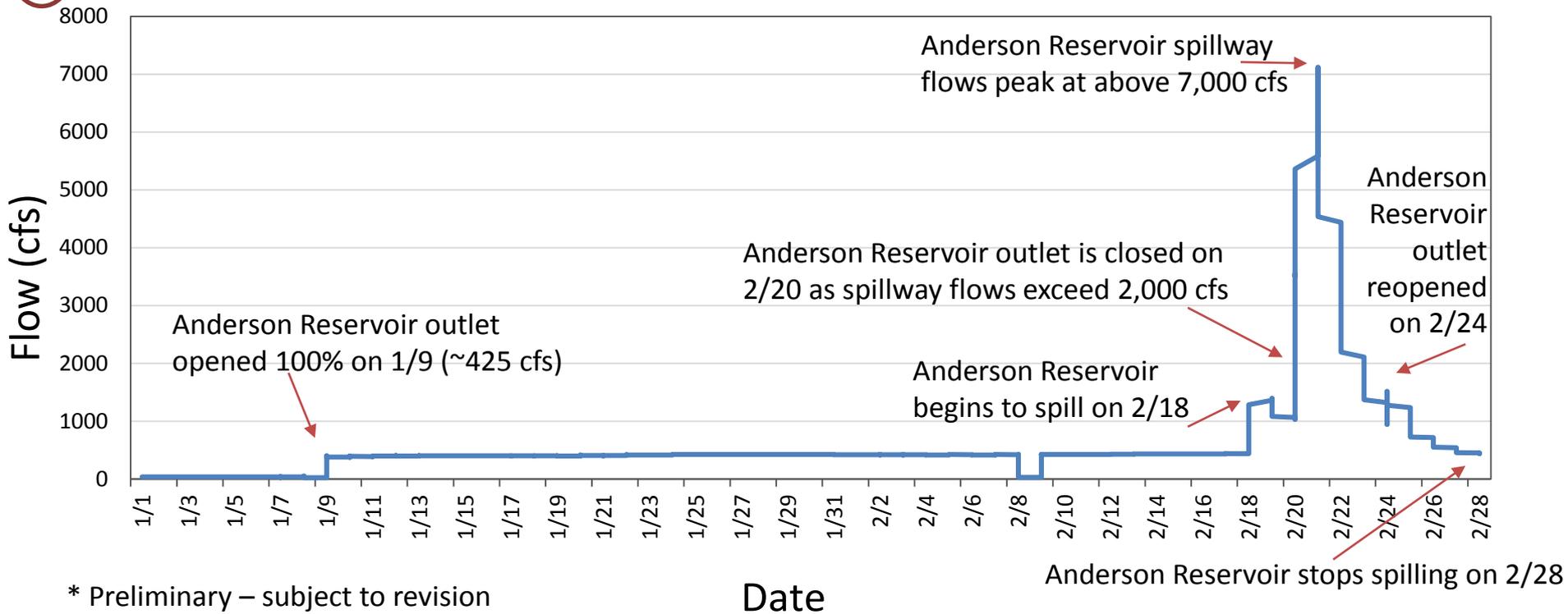


* Preliminary – subject to revision

Coyote Creek Flows: 1/1 – 2/28

6

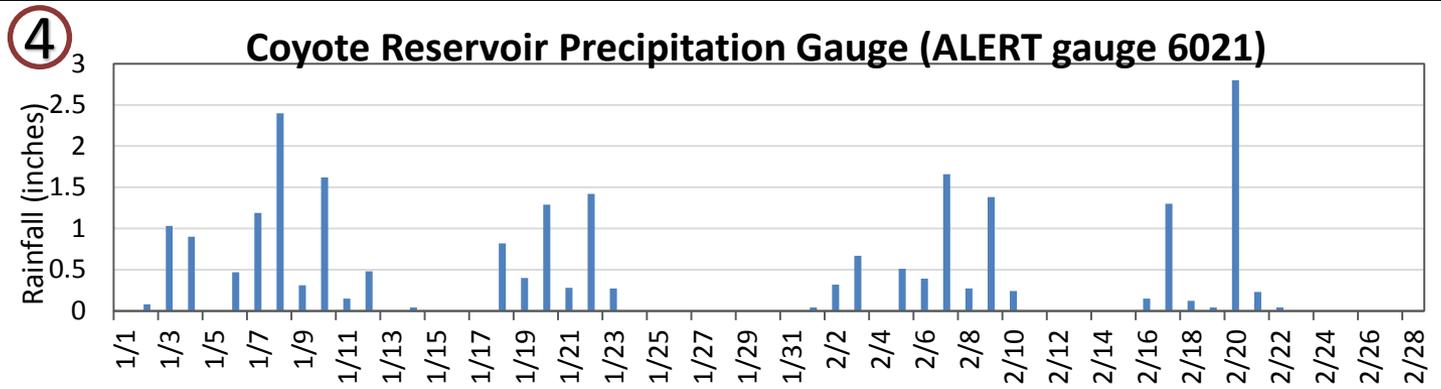
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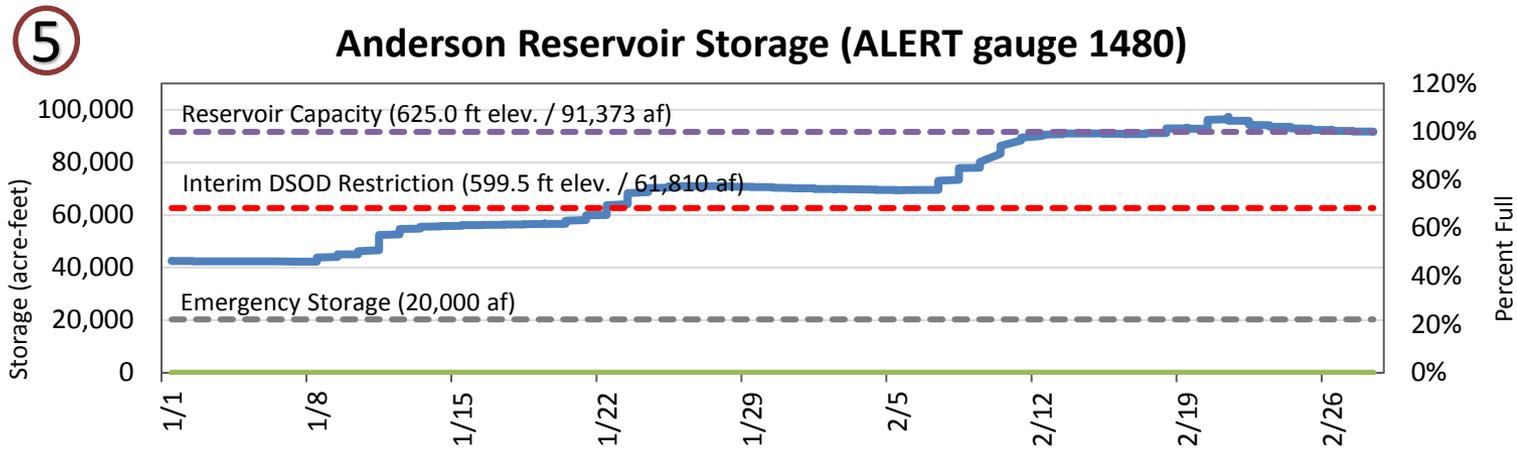
January 1 to February 28, 2017

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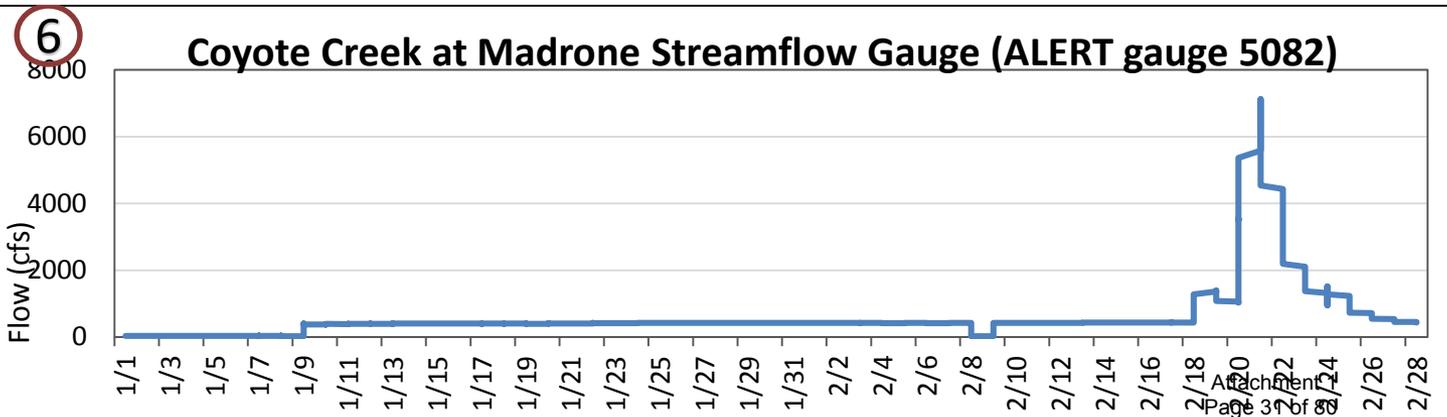
Rainfall



Anderson Dam Storage Levels (blue line)



Coyote Creek Flows Downstream of Anderson Dam



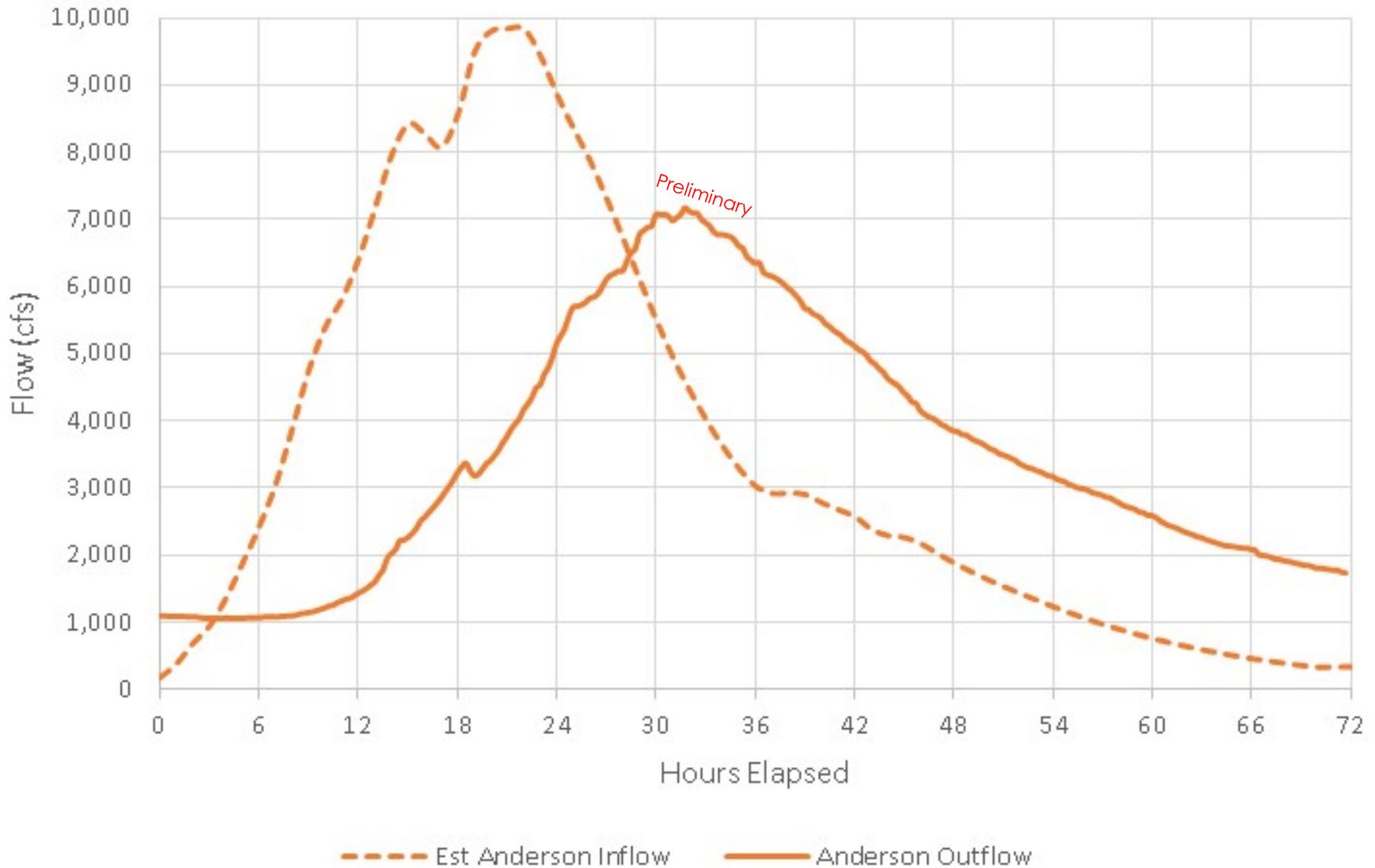
Anderson Dam operations summary

- Anderson outlet valve opened Jan. 9
- Maximum releases continue until Feb. 20
- Outlet valve fully re-opened on Feb. 24
- Anderson Reservoir at 85% full 3/24
- 2-3 weeks to reach restricted level



Anderson reduces peak flows

SUBTITLE



President's Day Storm Timeline



Storm coordination – Feb. 8-17, 2017

- ▶ 4 Operational area conference calls
 - ▶ Updating stream forecasts & gauge data
- ▶ Coordinating calls with San Jose Feb. 14 & 15
- ▶ National Weather Service (NWS) webinars
- ▶ Information via WebEOC and emails:
 - ▶ Overtopping location map and list
 - ▶ Ownership/jurisdiction maps
 - ▶ 7,300 cfs inundation maps

Overtopping location map and list

Coyote Creek- Channel Capacity and Description of Flooding which would occur shortly after channel capacity exceeded.

ID #	Overtopping CFS	Flooding Description
1	11099	Breakout on West Bank, DS Charcot, flow travels d/s, eventually flooding structures.
2	10286	Breakout on East Bank, US Charcot- flow moves downstream, eventually

3	3517	Mobile Home Park Begins to flood (via gap in levee/floodwalls);entire mobile home area eventually floods.
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4	2555	Glass Shop floods.
5	5599	Structures along west side of Coyote, South of Berryessa, North of Maybury, begin to flood.
6	9040	Parking Lot on West side begins to flood; structures affected at ~11000 cfs
7	4084	Park to the west of Coyote Creek Begins to flood. Park overtops & floods structures eventually.
8	11510	Selma Park on E Bank of Coyote has filled up; flow goes down S 19th St to flood homes to the NW;Selma park begins flooding at 6613 cfs.
9	11510	Williams St Park on W Bank of Coyote has filled up; flow begins to flood structures to the NW.
10	7400	Rock Spring Neighborhood starts to flood
11	11800	Tully Overtops
12	1000	Singleton Road Overtops (Less than 1000 CFS, starts the simulation inundated)
13	6700	Fontanoso Way Gap"" gap in floodwall protecting industrial park begins to flood
14	9870	Coyote Creek, North-West of Ogier Ponds floods, Coyote Valley Resort & RV, and some business on the creek side of Coyote begin flooding
15	5820	Scyamore Avenue that is protecting Santa Clara County Boy's Ranch overtops
16	5880	Sycamore Avenue Bridge
17	11870	Santa Clara County Justice Training Center begins to flood

Overtopping location map and list

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4	2533	Q=2533 cfs- Structure N Berryessa and West of Creek floods. Q = 4363 Auto Glass Shop floods.
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7

4084

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Engineered channels vs. natural creeks



- ▶ Engineered channels more predictable than natural creeks



Storm Timeline

Storm Approaching – Saturday 2/18

5:00 a.m.	Anderson reaches 100%, spillway flows begin (~450–1,300 cfs)
10:06 a.m.	NWS flood statement: increased flood risk
2:30 p.m.	National Weather Service (NWS) scheduled webinar <ul style="list-style-type: none">• Flood watch established Sunday p.m. to Monday p.m.• Probable flood warning to be issued late Sunday through Tuesday
3:30 p.m.	District staff monitoring from EOC

Storm Approaching – Saturday 2/18

5:30 p.m.	<p>Op Area call</p> <ul style="list-style-type: none">• NWS update: streams and rivers expected to swell from approaching storm• District forecast Anderson spillway 4,000 cfs Monday 6 a.m. ramping to 10,000 cfs Monday 11:30 p.m.• San Jose planning for possible evacuation and sheltering
8:00 p.m.	District staff updates the Board

Storm Approaching – Sunday 2/19

Anderson spillway flows continue: Forecast is 5,000-8,000 cfs on Monday

9:00 a.m. Staff monitoring from District EOC

District plugged Coyote Canal and excavated relief channels

Storm Approaching – Sunday 2/19

11:00 a.m.	Conference call with San Jose OES: City relying on Public Works for field observations to determine evacuations
12:15 p.m.	District internal storm assessment team conference call
2:02 p.m.	District sends 8,000 cfs inundation maps to partners via WebEOC

Storm Approaching – Sunday 2/19

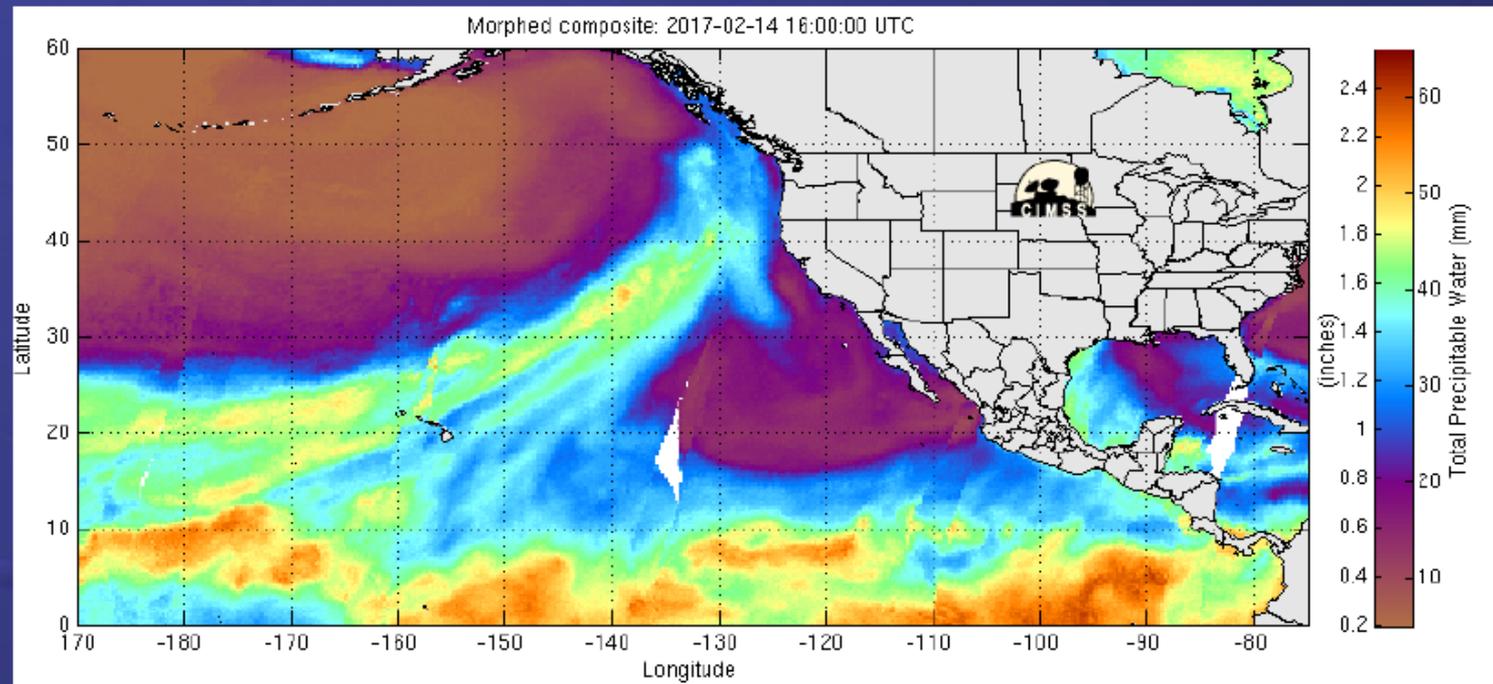
2:30 p.m.

NWS webinar

- Atmospheric river changes trajectory to Bay Area
- Minor to moderate flooding at Coyote Creek at Edenvale beginning early afternoon Monday, peaking Tuesday morning
- River forecast map showing 2 San Jose locations above monitoring stage, 1 above flood stage

Atmospheric river 2/17

National Weather Service San Francisco Bay Area Monterey Bay Area



Friday, 17 February 2017 @ 2:30 pm

Call in information Phone Number: 877-922-2490 – Participant Code: 424979

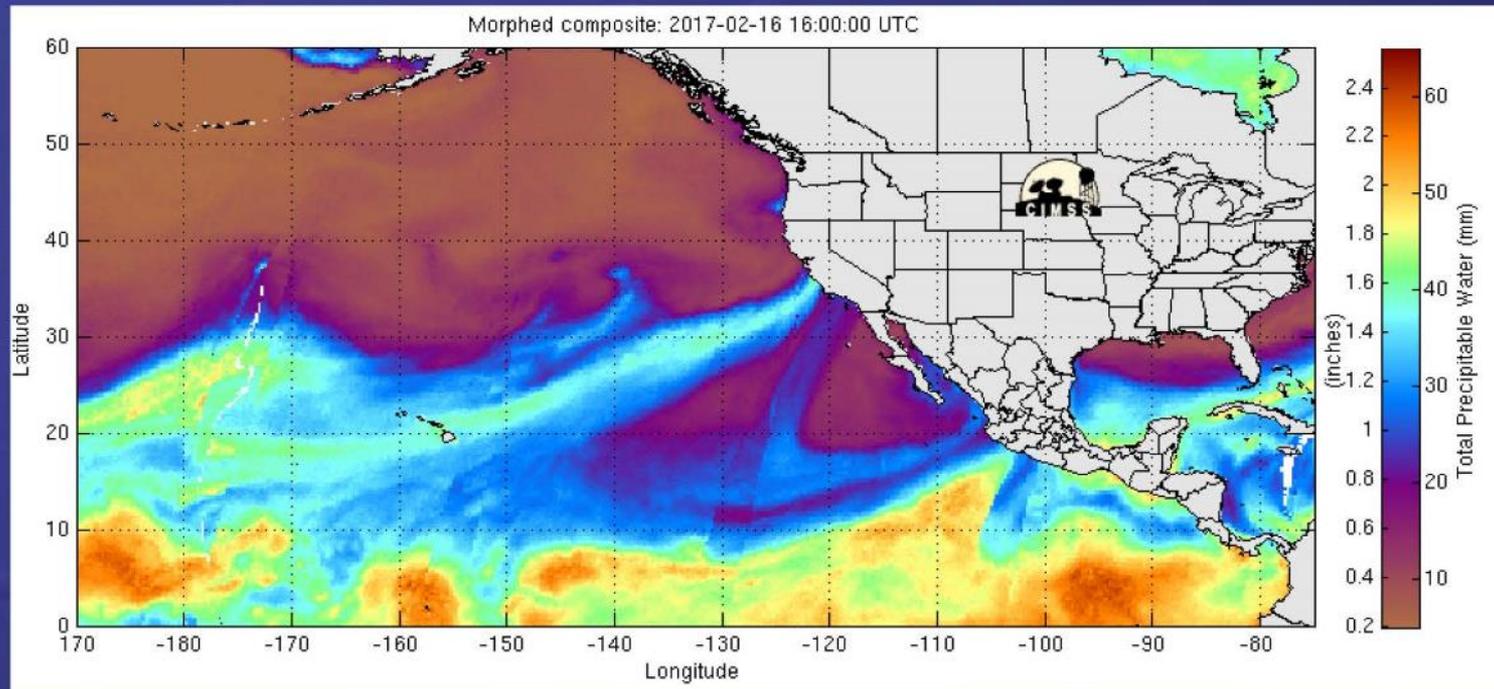
Presented by: Brian Garcia, Warning Coordination Meteorologist



Attachment 1
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NWS webinar – Sunday 2/19

National Weather Service San Francisco Bay Area Monterey Bay Area



Sunday, 17 February 2017 @ 2:30 pm

Phone: (631) 992-3221 Access Code: 999-387-224

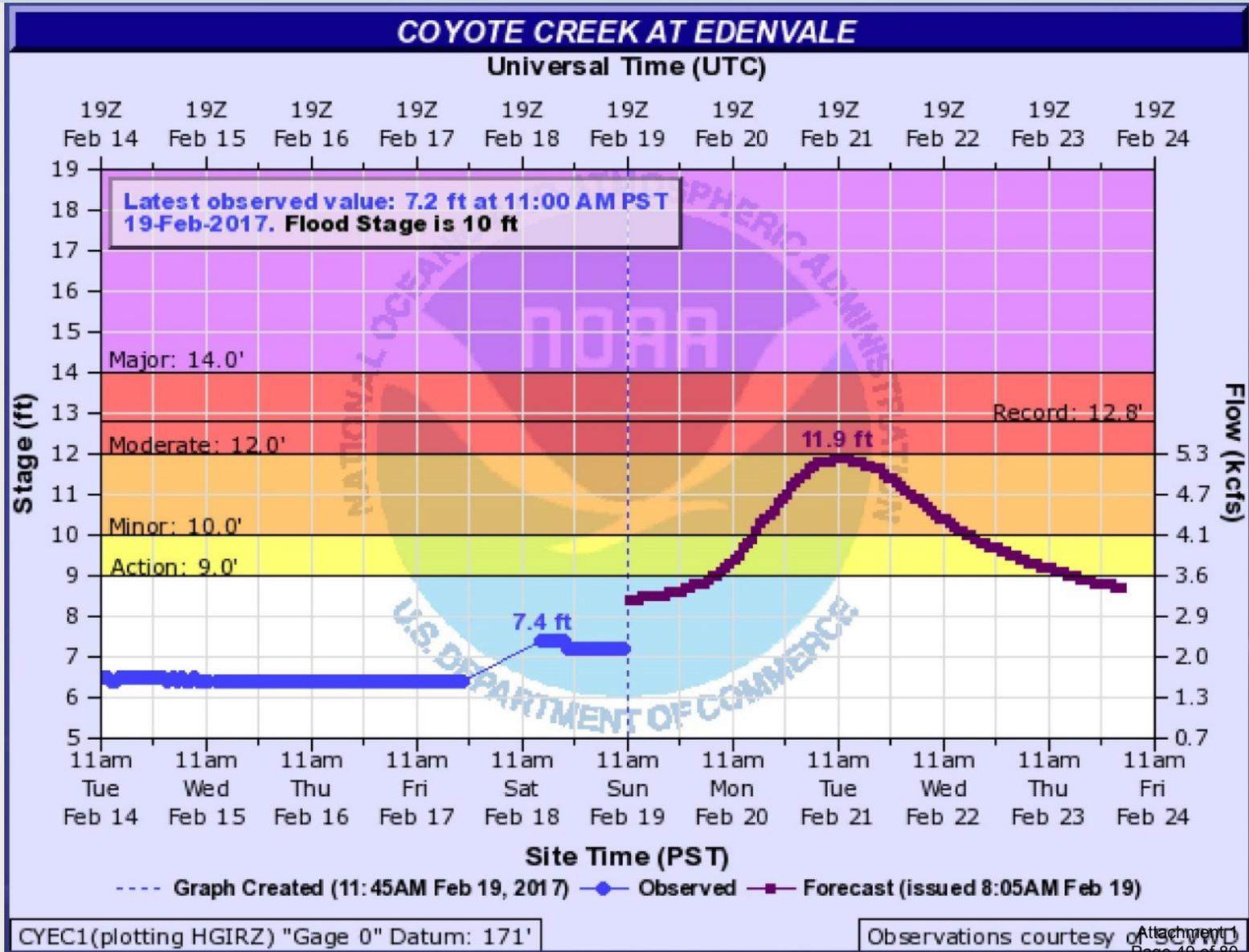
Presented by: Brian Garcia, Warning Coordination Meteorologist



Attachment 1
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NWS webinar – Sunday 2/19

SUBTITLE



Storm Approaching – Sunday 2/19

3:00 p.m.	<p>Op Area call</p> <ul style="list-style-type: none">• NWS update:<ul style="list-style-type: none">• Heavy rain forecast of 2-4 inches in the valley all day Monday• Strong winds of 40-50 mph in the valleys• Weather models differ on timing• District update: Anderson peak spillway forecast 8,000 cfs Monday at or after midnight
4:00 p.m.	District and countywide EOC PIOs have joint conference call

Storm Approaching – Sunday 2/19

Evacuations and closures

- County Boys Ranch
- County Sheriff's Training Facility
- Happy Hollow Zoo

7:30 p.m.

District issued high-flow notifications to agencies/residents immediately downstream of Anderson Dam

11:00 p.m.

External to EOC, District and City staff began exchanging information to develop community message

Storm arrives – Monday 2/20

3:53 a.m.	NWS issues Flood Warning for Coyote Creek near Edenvale for Monday evening until further notice.
8:00 a.m.	EOC moves from monitoring to activation

Storm arrives - Monday 2/20

District continues to deliver sandbags countywide

District staff provides assistance to San Jose at Metcalf Road Bridge in the afternoon, completed on Tuesday morning

District responds to city-owned hillside storm drain failure crossing over Coyote-Alamitos Canal (afternoon-evening)

Work continues on Coyote Canal

Storm arrives – Monday 2/20

8:30 a.m.

Op Area call:

- NWS:
 - Storm starting, high winds and downed trees expected
 - Flood Warning for Coyote Creek. Edenvale projected to hit 12.4 feet
 - San Francisquito Creek may exceed flood stage
- County EOC requests District liaison
- Cities monitoring streams and reservoirs

Storm arrives – Monday 2/20

8:30 a.m.

Op Area call (continued):

- District:
 - San Francisquito and West Little Llagas likely to flood
 - Anderson spillway projected to reach 5,000-8,000 cfs, peaking at 10 a.m. Tuesday.

Storm arrives – Monday 2/20

9:15 a.m.	At PIO call, San Jose confirming shelters and evacuation centers
10:40 a.m.	Board update—reduced risk to Golden Wheel Mobile Home Park; preparing NextDoor messages
12:32 p.m.	District shares EOC Action Plan. Peak of 7,000-9,000 cfs Tuesday morning

Storm arrives – Monday 2/20

12:37 p.m.	7,300 cfs inundation maps submitted to Op Area
12:46 p.m.	PIOs share concern on Ross Creek over topping
1:00 p.m.	District deploys 3 FITs countywide
District hydrographers calibrating gauges	

Storm arrives – Monday 2/20

3:00 p.m.

Op Area call

- NWS: Storm moved rapidly, high precipitation
- District:
 - Long duration of high flows
 - Anderson to peak at 7,000-9,000 cfs 6-10 a.m. Tuesday
- San Jose: Evacuation centers opening, 2 shelters to open at 7 p.m.; reported flooding at South Bay Mobile Home Park

Storm arrives – Monday 2/20

4:00 p.m.	District emails San Jose that Ross Creek close to flooding
5:00 p.m.	San Jose EOC liaison joins District EOC
5:20 p.m.	San Jose PIO indicates sending messages to community regarding evacuation center, and “high-stream flows in Coyote Creek could cause low-lying areas near Coyote Creek to flood”

Storm – Monday 2/20

6:40 p.m.	District EOC coordinates community messaging with City staff outside of City EOC
8:00 p.m.	Op Area call: <ul style="list-style-type: none">• NWS: Rains tailing off, strong winds to continue till midnight• County: Reiterates NWS info--widespread flooding likely• District: Anderson to peak at 5,000-7,000 cfs Tuesday morning to noon

City liaison expressed concern about implications of high flows.

Midnight

- Op Area Call:
 - NWS: Showers across the region into the morning, repeats Coyote Creek flood warning
 - District: Ross, San Francisquito receding, West Little Llagas had peaked, and Coyote peak of 7,000-8,000 cfs expected between 6-8 a.m.

Tuesday 2/21

1:30 a.m.

District retweeted and reposted on Facebook the NWS areal flood warning

Areal Flood Warning

Through 1130 AM PST Tuesday

- At 1100 PM PST Monday the Coyote Creek stream gage at Madrone below the Anderson Dam was reporting a level of 9.9 feet. Flood stage at this location is 9.0 feet. Heavy flows from Anderson Reservoir are expected to persist overnight and flooding will likely continue along the portion of the Coyote Creek below Anderson Dam into Tuesday morning.
- Some locations that will experience flooding include... Areas along the Coyote Creek between San Jose and Morgan Hill.

weather.gov/sanfrancisco

YouTube Instagram Facebook Twitter /NWSBayArea

Tuesday 2/21

Madrone gauge reaches 6,000 cfs

2:47 a.m.

PIO informs San Jose PIO that flood levels expected earlier; Asked what communications were planned.

5:40 a.m.

District EOC emails SJ EOC identifying vulnerable populations and structures

Tuesday 2/21

6:30 a.m.	Coyote Canal fails, flooding northbound Hwy 101
7:48 a.m.	Communication to Board: <ul style="list-style-type: none"><li data-bbox="498 505 1561 636">• Flows rose faster than previously forecast<li data-bbox="498 658 1754 789">• Peak should occur at 8 a.m., San Jose will experience sustained high flows

Coyote Creek Flooding – Tuesday 2/21

9:00 a.m.

Op Area call:

- NWS: Coyote Creek flood warning, flows to recede below flood stage by 1:00 a.m. at Edenvale
- CHP: Water from Coyote Canal flooding northbound Hwy 101
- City: Rock Springs flooded; Metcalf may need additional clearing
- District:
 - 7 reservoirs spilling
 - Anderson peaked 6,830 cfs, highest ever recorded
 - Coyote Canal spilling and moving toward Hwy 101
- VTA: On standby to assist with transportation for evacuations

Coyote Creek Flooding – Tuesday 2/21

9:30 a.m.	3 Flood Information Teams deployed to Coyote Creek
District hydrographers out calibrating gauges	
9:20 a.m.	In response to City, District staff provides information and maps outside of EOC
11:34 a.m.	Board notified of breach on Coyote Canal and flooding Hwy 101, flooding in Rock Springs, and Anderson peaking

Coyote Creek Flooding – Tuesday 2/21

12:00 p.m.

Op Area call

- District: Northbound lane Hwy 101 closed and District makes request for capability to stop the flooding at Hwy 101
- San Jose:
 - Proclaimed local emergency
 - Rock Springs flooding
 - Alert SCC messaging along Coyote Creek
 - Evacuations for Rock Springs, Needles and Nordale
- County Fire: Mutual aid to assist with water rescue

Coyote Creek Flooding – Tuesday 2/21

3:00 p.m.

District dispatched 3 inspection parties to monitor the Coyote levee behind mobile home parks (Oakland Road) Montague to Charcot and Army Corps reaches. District field staff informed SJPD officers that water levels were still rising and overtop floodwall and levee. SJPD then began announcing mandatory evacuation.

Coyote Creek Flooding – Tuesday 2/21

3:00 p.m.

Op Area call:

- NWS: Coyote Creek crested at 7120 cfs, not projected to drop below flood stage until Wednesday afternoon.
- District:
 - Crews in the field fixing Coyote Canal
 - Coyote Creek likely to flood at Charcot in the next 4-5 hours
 - Phelan at Senter sandbag site flooded
- County: County and Red Cross ready to assist with San Jose sheltering needs
- San Jose:
 - Unified command post at Golden Wheel Mobile Home Park
 - 3 areas of concern – Mobile Home Parks, Rock Springs and William Street
- Caltrans: Hwy 101 closed until Wednesday night, and had no hard time for reopening

Coyote Creek Flooding – Tuesday 2/21

5:00 p.m.	District cancelled capability request to the County having identified a local solution
7:00 p.m.	<p>Op Area call</p> <ul style="list-style-type: none">• NWS:<ul style="list-style-type: none">• Coyote Creek peaked and is receding• 3 days of dry period forecast• District:<ul style="list-style-type: none">• Creeks receding countywide, except Coyote• E. William expected to peak in next hour or two• San Jose:<ul style="list-style-type: none">• Reports on shelters and evacuation sites

Coyote Creek Flooding – Tuesday 2/21

8:41 p.m.

Report to the Board

- Staff began repairs on Coyote Canal adjacent to Hwy 101
- Preventing levee erosion near South Bay Mobile Home Park

Coyote Canal response – Hwy 101



Coyote Creek Flooding – Tuesday 2/21

11 p.m.

Op Area call

- District:
 - Anderson spills are dropping off
 - E. William peaked at 8:30 p.m.
 - Crews are working on repairs to Coyote Canal near Hwy 101
- San Jose:
 - Characterizes the event as in excess of 100-year storm for San Jose
 - City working with partners to evacuate and meet sheltering needs

Coyote Creek Flooding – Wednesday 2/22

4:00 a.m.

Op Area call:

- NWS: Streams receding
- District: Repairs to Coyote Canal repairs completed , Hwy 101 expected to open for the morning commute
- San Jose: Mandatory evacuation notification for 14,000 people

Coyote Creek Flooding – Wednesday 2/22

7:48 a.m.

Email to the Board

- Flows at Anderson are 3,839 cfs, down from peak ~7,100 cfs
- Hwy 101 closed on both directions between Hwy280/680 and Hwy 880
- While not a 100-year event, San Jose is treating it as a 100-year event for evacuation
- Streams receding; there were other calls that were scheduled

District crews in the field conducting a number of storm-related repairs

7:00 p.m.

District EOC closed

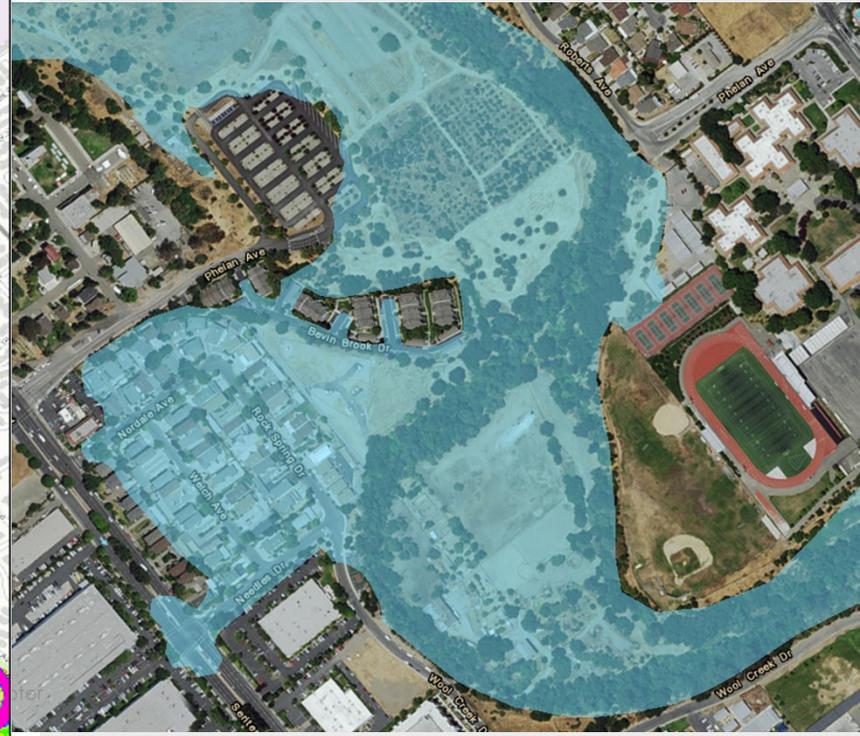
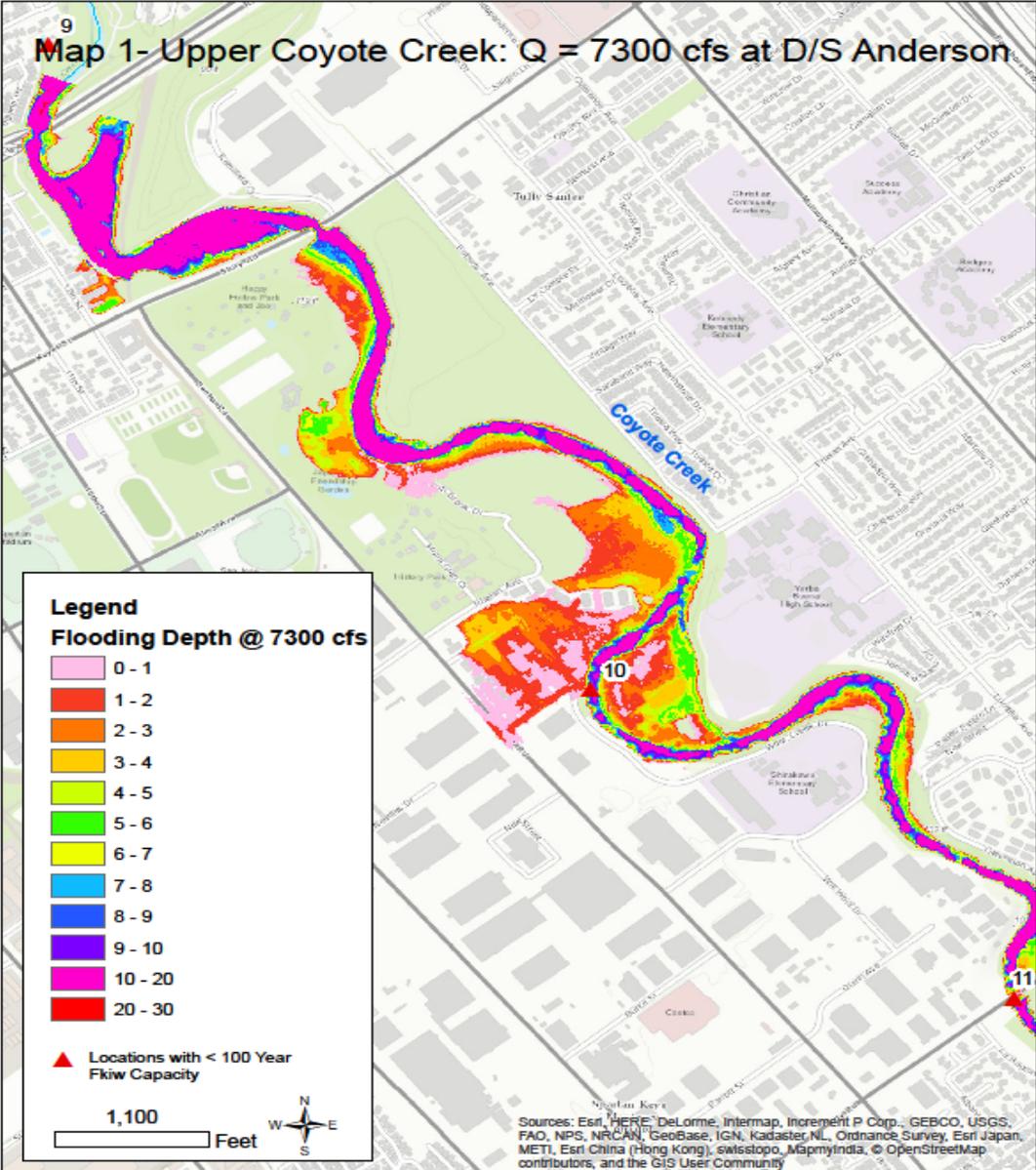
Summary

- ▶ The winter of 2016-2017 was extraordinary.
- ▶ The Santa Clara Valley Water District's primary role is to reduce the risk and impacts of flooding.
- ▶ The District and the National Weather Service provided useful and valid information, data and forecasts leading up to the flood.
- ▶ Numerous indicators showed the potential for flooding on Coyote Creek.

Lessons learned

- ▶ Technical data misunderstood and/or discounted by others
- ▶ District and city need to be better partners on reducing flood risks
- ▶ Joint emergency action plans with cities with high risk of flooding must be improved
- ▶ The District's EOC procedures and training, including communications, must improve

Observed flooding vs model-7300 cfs



Next Steps

- ▶ Immediate: Neighborhood meetings (6 – 8:30 p.m.)
 - ▶ April 6: County Service Building 2, Auditorium, 1555 Berger Drive
 - ▶ April 12: Franklin McKinley School District, Boardroom, 645 Wool Creek Road
 - ▶ April 17: Roosevelt Community Center, 901 E. Santa Clara Street

Next Steps

▶ Short Term

- ▶ Coyote Creek Joint Emergency Action Plan
- ▶ Short-term flood protection options – prior to winter 2018

▶ Intermediate/Long Term

- ▶ Develop options
- ▶ Seek state and federal funding