

AQPI Watershed Modeling Working Group
 May 20th, 2020, 2:00 PCT
 By GoToMeeting

Time	Topic	Lead
2:00 PCT	Background, Purpose	Hilary
	ConOps: Machine to Machine Data Spectrum	Jack Xu, Mark Boucher
	Available data available now	Greg
	Discussion: Why? (Vision/Goals) How? (platform/logistics)	Hilary, Rebecca Pluche
	Potential future meeting topics	Hilary
~4:00	Adjourn	

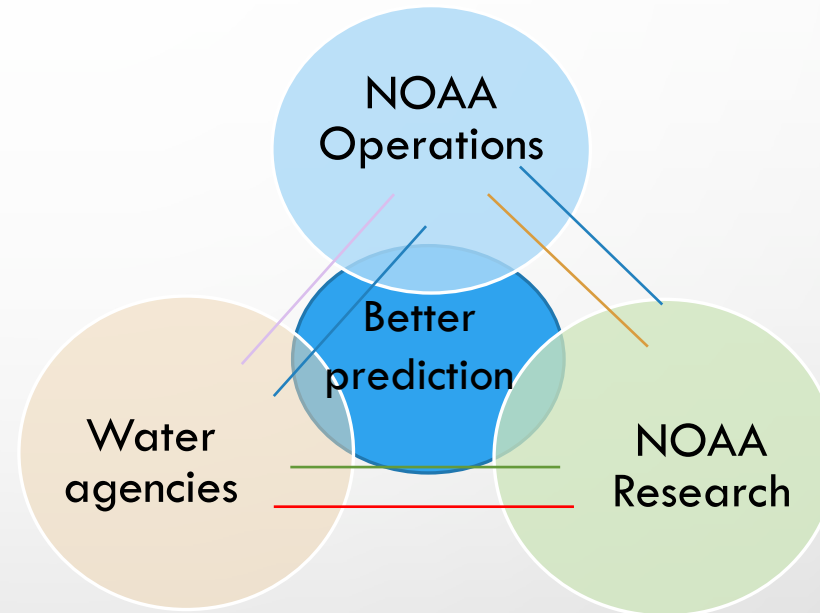
The background of the slide is a light gray gradient with several realistic water droplets of various sizes scattered across it. The droplets have highlights and shadows, giving them a three-dimensional appearance. The main title is centered in a large, bold, black, sans-serif font.

WATERSHED MODELING WORKING GROUP

Bay Area water agencies, NOAA research (AQPI team)
NOAA operations (NWS)
May 20, 2020

BACKGROUND

- TAC – TECHNICAL ADVISORY COMMITTEE
- USERS GROUP MEETING OAKLAND
 - CONCEPT OF OPERATIONS
 - INTER-AGENCY PROBLEM SOLVING
- INCREASING EFFICACY OF FORECASTING BY ADDING CHANNELS



PURPOSE/GOALS

- GET AGENCIES TALKING TO EACH OTHER
- PROBLEM SOLVING
- HELPING EACH OTHER INCREASE CAPACITY OF AQPI USE
- CONCEPT OF OPERATIONS EXAMPLES
- ITERATIVE FEEDBACK/IMPROVEMENT OF AQPI SYSTEM
- CASE STUDIES
- WHAT'S NEXT -- HOW WILL AQPI TRANSITION?
- NEXT PHASE OWNERSHIP

- EDUCATION
- PREEMINENCE/EXPERTISE
- STANDARDS AND BEST PRACTICES
- SHARING KNOWLEDGE
- NETWORKING



WHY? VISION DISCUSSION

WHAT WOULD YOU MOST LIKE TO GET OUT OF THIS GROUP?



HOW?

GROUP COLLABORATION LOGISTICS

✓ MONTHLY MEETING?

- 15 MIN PRESENTATION (NWS, NOAA RESEARCH OR INTERAGENCY KNOWLEDGE SHARE)
- DISCUSSIONS/PROBLEM SOLVING/KNOWLEDGE SHARING

✓ CO-FACILITATORS (HILARY, REBECCA) → SELF-DIRECTED

AND

✓ PLATFORM TO FACILITATE ONGOING DISCUSSIONS OUTSIDE OF EMAIL & MEETINGS?

POSSIBLE FUTURE MEETING TOPICS

- NATIONAL WATER MODEL – UNPACKING THE “BLACK BOX”
- EXPECTED CLIMATE CHANGE IMPACT TO REGION (IN AS MUCH DETAIL AS POSSIBLE)
- HISTORICAL ATMOSPHERIC RIVER DATA
- MOVING FROM POINT TO GRID OR DISTRIBUTED MODELING
- FLASH FLOOD PREDICTION WITH AQPI
- PROBABILISTIC FORECASTS



Valley Water

Clean Water • Healthy Environment • Flood Protection

May 2020
AQPI Users Group

Automated Hydro Modeling

Presented by: Jack Xu, PE, CFM

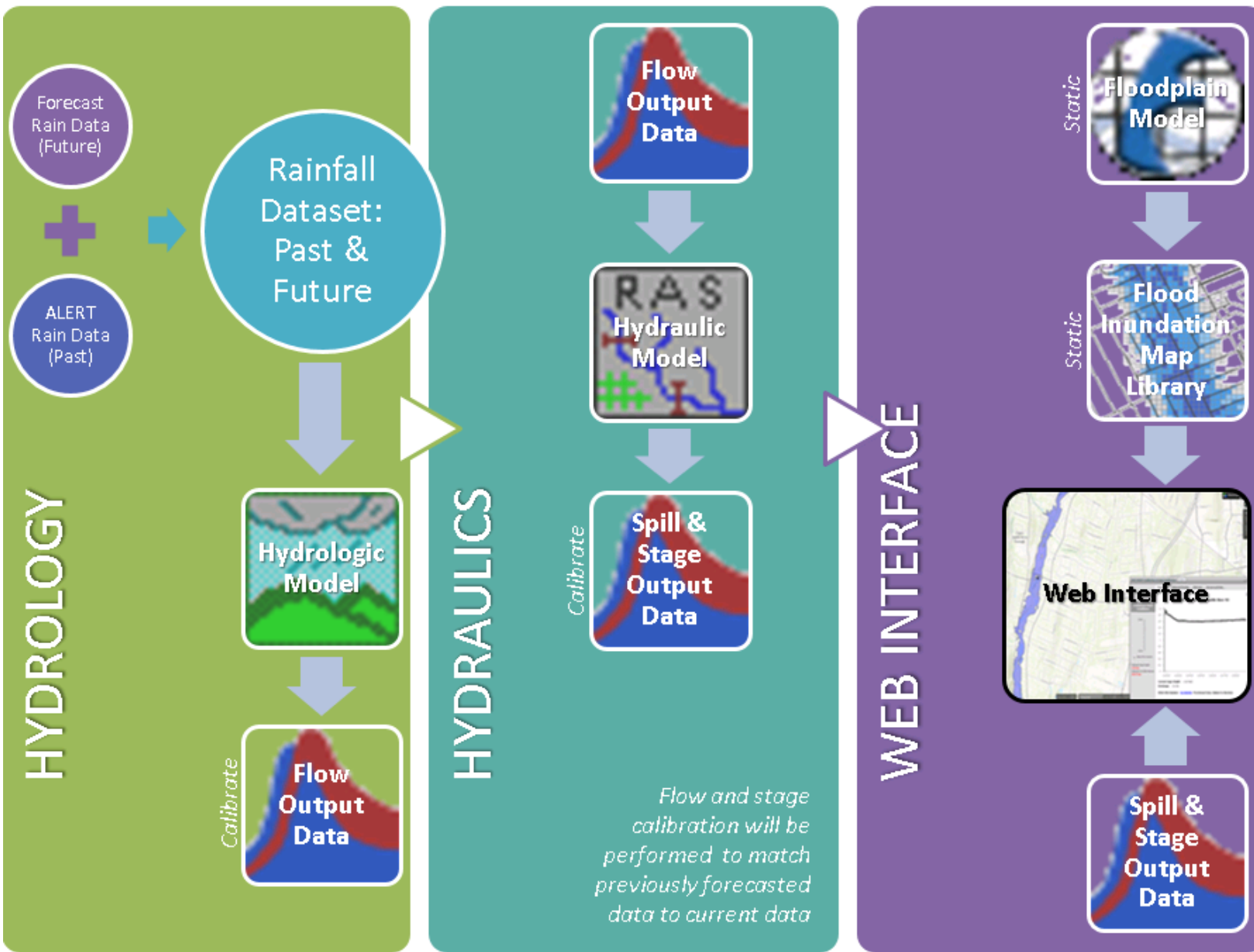
Old System

Rainfall Input

- Gridded QPF
- Point Gauge Averaged to WS

HEC-DSS for data storage

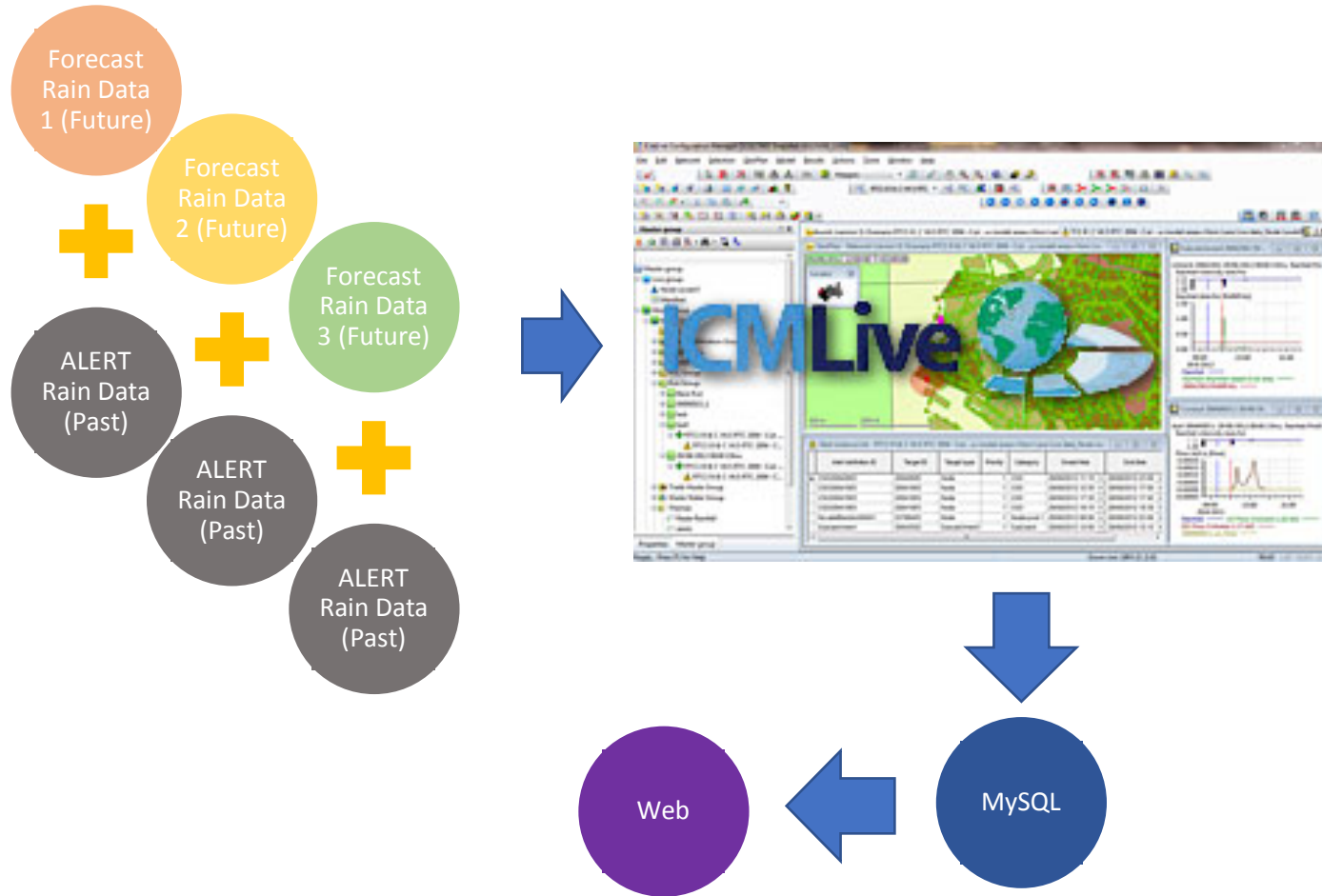
Flood inundation map library



Old System

Pros and Cons

- Familiar model environment
- Relatively simple
 - *Rainfall Grid*
- Provides a flood map
- **Probably better success using HEC-1 or HEC-2**
- Automation is questionable
- Limitations in parameter initialization
 - DSS only
- Lack of flexibility
 - VBScript libraries are small
- Flood maps static



Current System

- Rainfall directly Ingested to model
- Output into MySQL
- Currently hydrologic w/ simplified hydraulics
- ICM / DHI

Current System

Pros and Cons

- Automation is reliable
- Directly ingest rain grids
- Lots of features:
 - Storm Drains
 - 2D Mapping
 - Reservoir initialization
- Good software support and new updates/ features yearly
- Complex software
- Expensive
 - \$50k initial
 - \$20k/yr

QPF Rainfall Formats

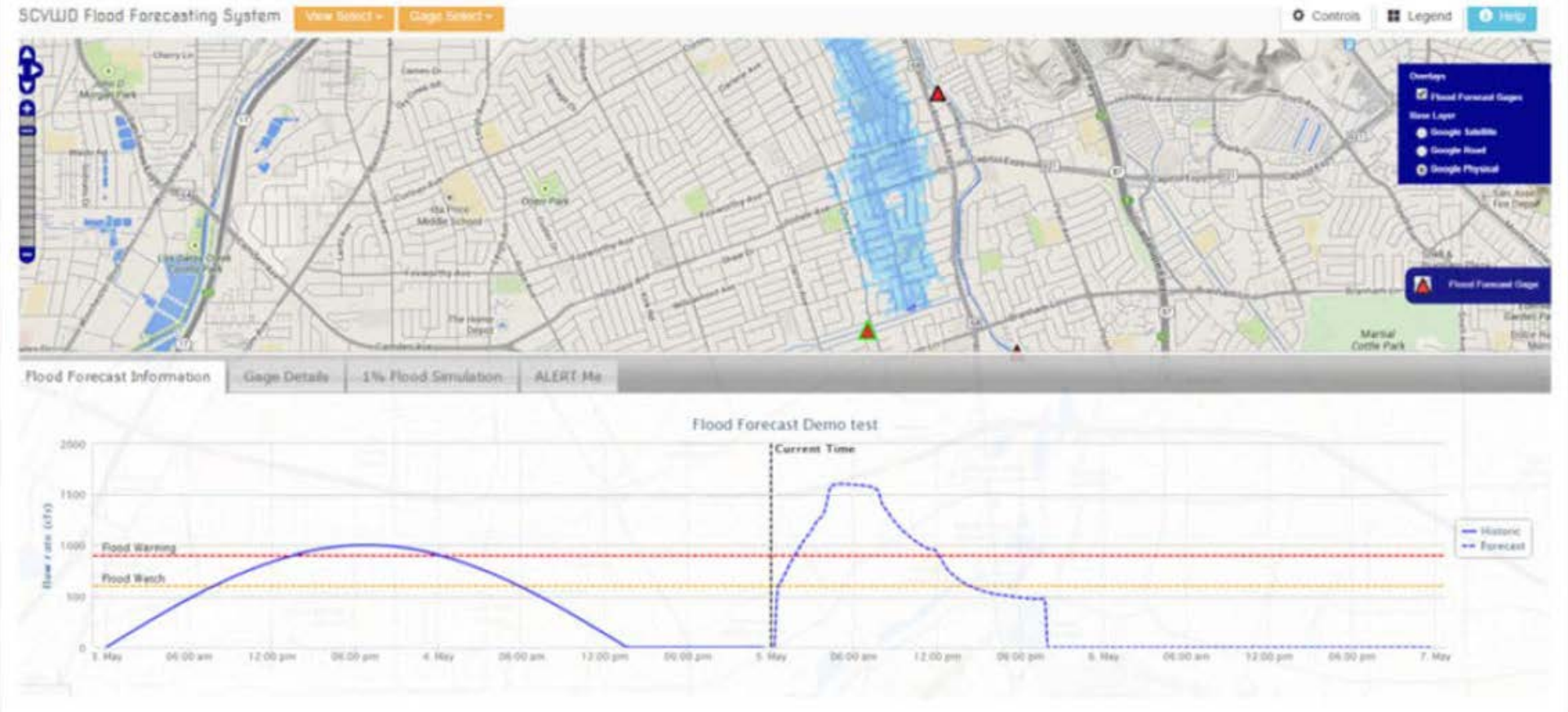
- Grid: ASCII (text file, larger size)
- Grid: NETCDF, GRIB (binary, smaller size)
- Point Data: CSV/Text (would need to be processed from the grids by QPF folks)

Rainfall Pre-Processing

1. Take gridded data, turn it into point data, and treat like a rain gauge
 - The challenge lies in how to turn the data into model input data.
2. Take gridded data, average over the watershed
 - A better version of #1.
3. Input gridded data directly into model (sub-basin average or rain on grid methods)
 - Requires better software

Output Interfacing

1. Read model results directly
 - For your eyes only
2. DSS > Excel File > JSON for web display
 - Share results with others
3. Model Output > MySQL > web display
 - Share results with others, better long-term data storage, but requires more modern model software.



Website Layout

Lessons Learned

- Legacy freeware lack built in tools for modern data input/output (I/O)
 - However, they are familiar and otherwise simple to run
 - Need to hack together I/O processes
- New software require a large initial investment in cost and staff time; need to commit
 - Good support and features with continual improvement in the software

QUESTIONS



DATA FROM WEB

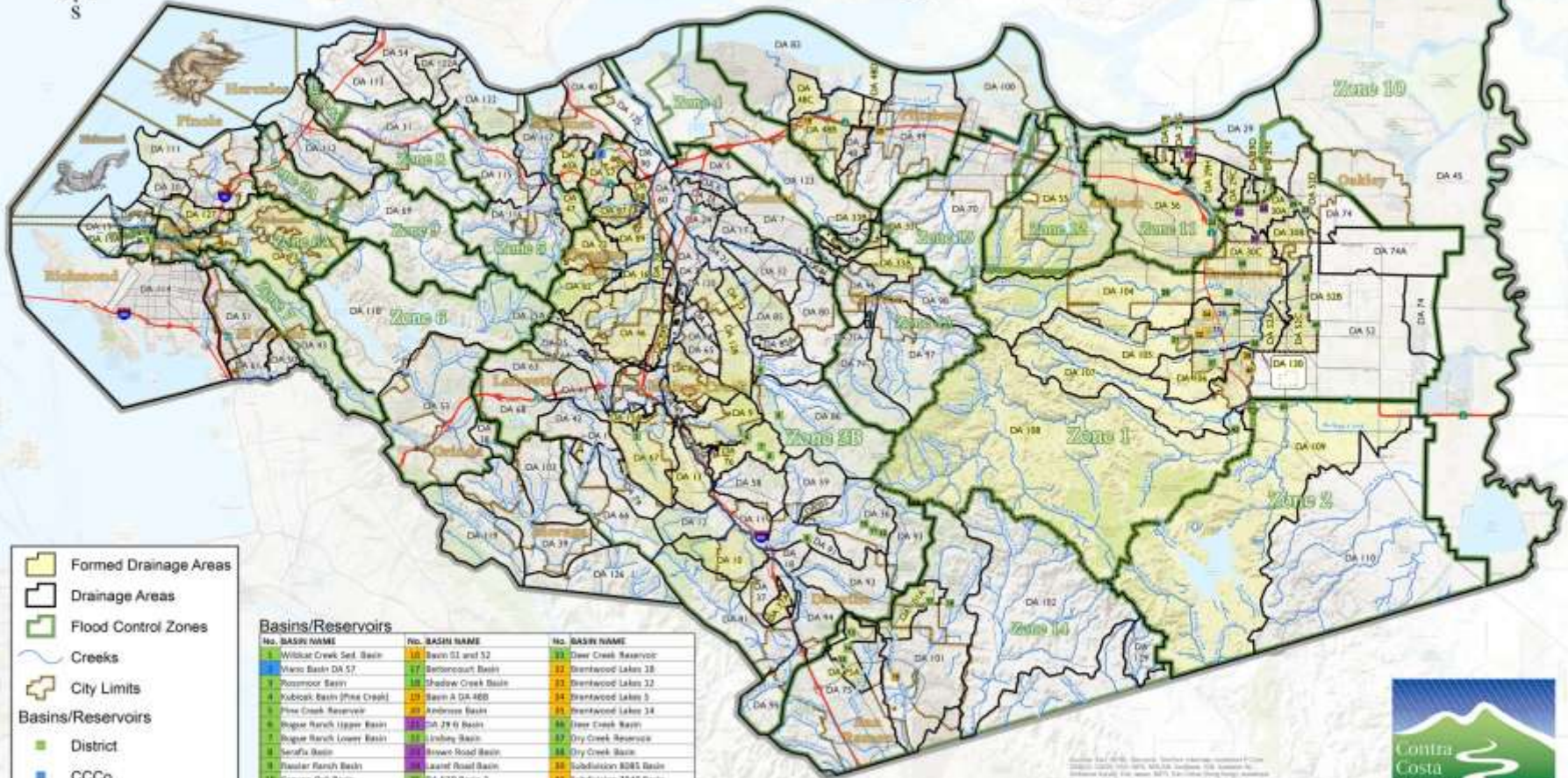
AQPI Watershed Modeling Working Group

May 20, 2020

Mark Boucher, PE
Sr. Hydrologist



Contra Costa County Flood Control & Water Conservation District Zones and Drainage Areas



- Formed Drainage Areas
- Drainage Areas
- Flood Control Zones
- Creeks
- City Limits

Basins/Reservoirs

- District
- CCCo
- City
- Private

No.	Basin/Reservoir Name	No.	Basin/Reservoir Name	No.	Basin/Reservoir Name
1	Wilbur Creek Sed. Basin	16	Basin 01 and 52	33	Deer Creek Reservoir
2	Mingo Basin DA 57	17	Bettencourt Basin	34	Bentwood Lakes 18
3	Blommoor Basin	18	Shadow Creek Basin	35	Bentwood Lakes 32
4	Pudisco Basin (Pine Creek)	19	Basin A DA 480	36	Bentwood Lakes 5
5	Pine Creek Reservoir	20	Andrews Basin	37	Bentwood Lakes 14
6	Wagler Ranch Upper Basin	21	DA 29 0 Basin	38	Jess Creek Basin
7	Wagler Ranch Lower Basin	22	Lindley Basin	39	Dry Creek Reservoir
8	Serafini Basin	23	Bowers Road Basin	40	Dry Creek Basin
9	Plaster Ranch Basin	24	Laurel Road Basin	41	Sobolofson 8085 Basin
10	Canyon Oaks Basin	25	DA 520 Basin 2	42	Sobolofson 7540 Basin
11	Holsten Oak Basin	26	DA 520 Basin 1	43	McSigg Creek Basin
12	Whisper Oak Basin	27	Freedom High Basin	44	Marsh Creek Reservoir
13	Canyon Lakes Basin 1	28	Fairview Basin	45	Barrington Basin
14	Canyon Lakes Basin 2	29	Upper Sand Creek Basin	46	Heron Park Basin
15	Canyon Lakes Basin 3	30	Lower Sand Creek Basin	47	Signature Basin

Map Date: 04/2010. Source: District information, unincorporated City of Contra Costa, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2015, 2016, 2017, 2018, 2019, 2020, 2021, 2022, 2023, 2024, 2025, 2026, 2027, 2028, 2029, 2030, 2031, 2032, 2033, 2034, 2035, 2036, 2037, 2038, 2039, 2040, 2041, 2042, 2043, 2044, 2045, 2046, 2047, 2048, 2049, 2050, 2051, 2052, 2053, 2054, 2055, 2056, 2057, 2058, 2059, 2060, 2061, 2062, 2063, 2064, 2065, 2066, 2067, 2068, 2069, 2070, 2071, 2072, 2073, 2074, 2075, 2076, 2077, 2078, 2079, 2080, 2081, 2082, 2083, 2084, 2085, 2086, 2087, 2088, 2089, 2090, 2091, 2092, 2093, 2094, 2095, 2096, 2097, 2098, 2099, 2100, 2101, 2102, 2103, 2104, 2105, 2106, 2107, 2108, 2109, 2110, 2111, 2112, 2113, 2114, 2115, 2116, 2117, 2118, 2119, 2120, 2121, 2122, 2123, 2124, 2125, 2126, 2127, 2128, 2129, 2130, 2131, 2132, 2133, 2134, 2135, 2136, 2137, 2138, 2139, 2140, 2141, 2142, 2143, 2144, 2145, 2146, 2147, 2148, 2149, 2150, 2151, 2152, 2153, 2154, 2155, 2156, 2157, 2158, 2159, 2160, 2161, 2162, 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Contra Costa



Flood Risk Assessment



- Flooding is more likely when the ground is wet.

Flood Risk Assessment

7-5-3-2 Flood Protocols

7" of rain for the season starting on July 1

5" of rain in the last 30 days.

3" of rain in the last 7 days.

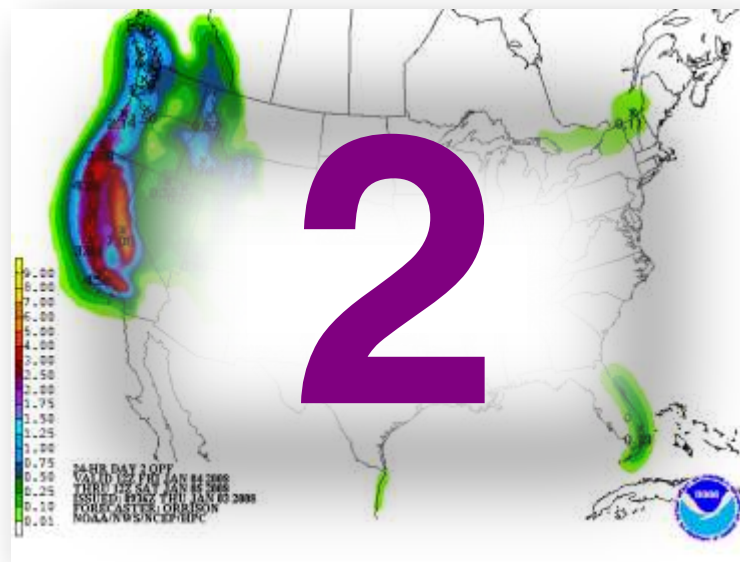
Primed for flooding



**7
5
3**

Historical pre-flood forecast

National Weather Service
forecast of two inches (2")
in the next day or 24 hours...

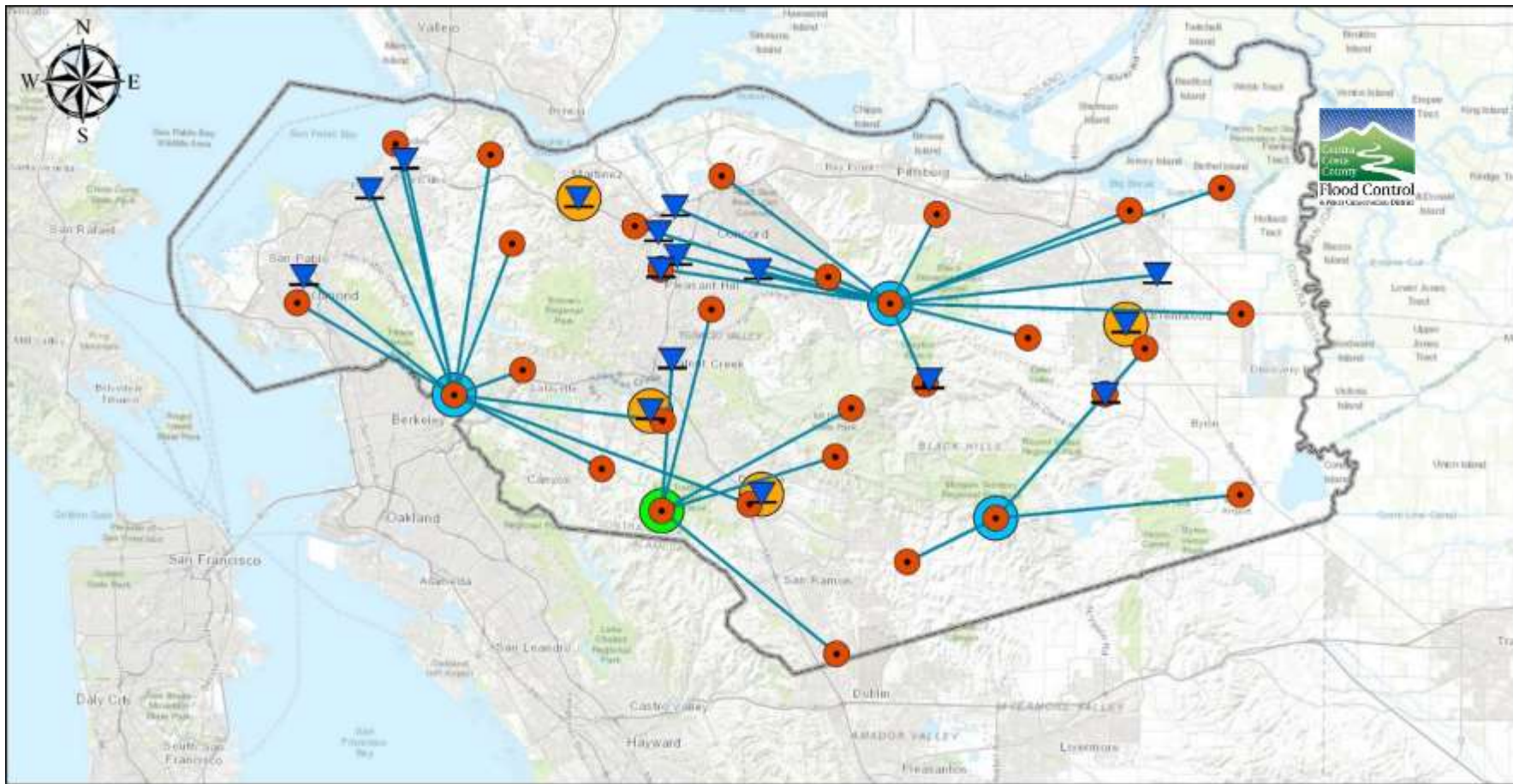


7 Year
5 Month
3 Week
2 Day

(inches)

753
2

FLOOD!



Contra Costa Hydrology Data Collection System

- ▼ Existing Stream Gauges (16)
- Existing Rain Gauges (30)
- Modem Repeater (1)
- IP Repeater (3)
- Radio Paths (35)
- Cell Transmitter (4)

43
stations

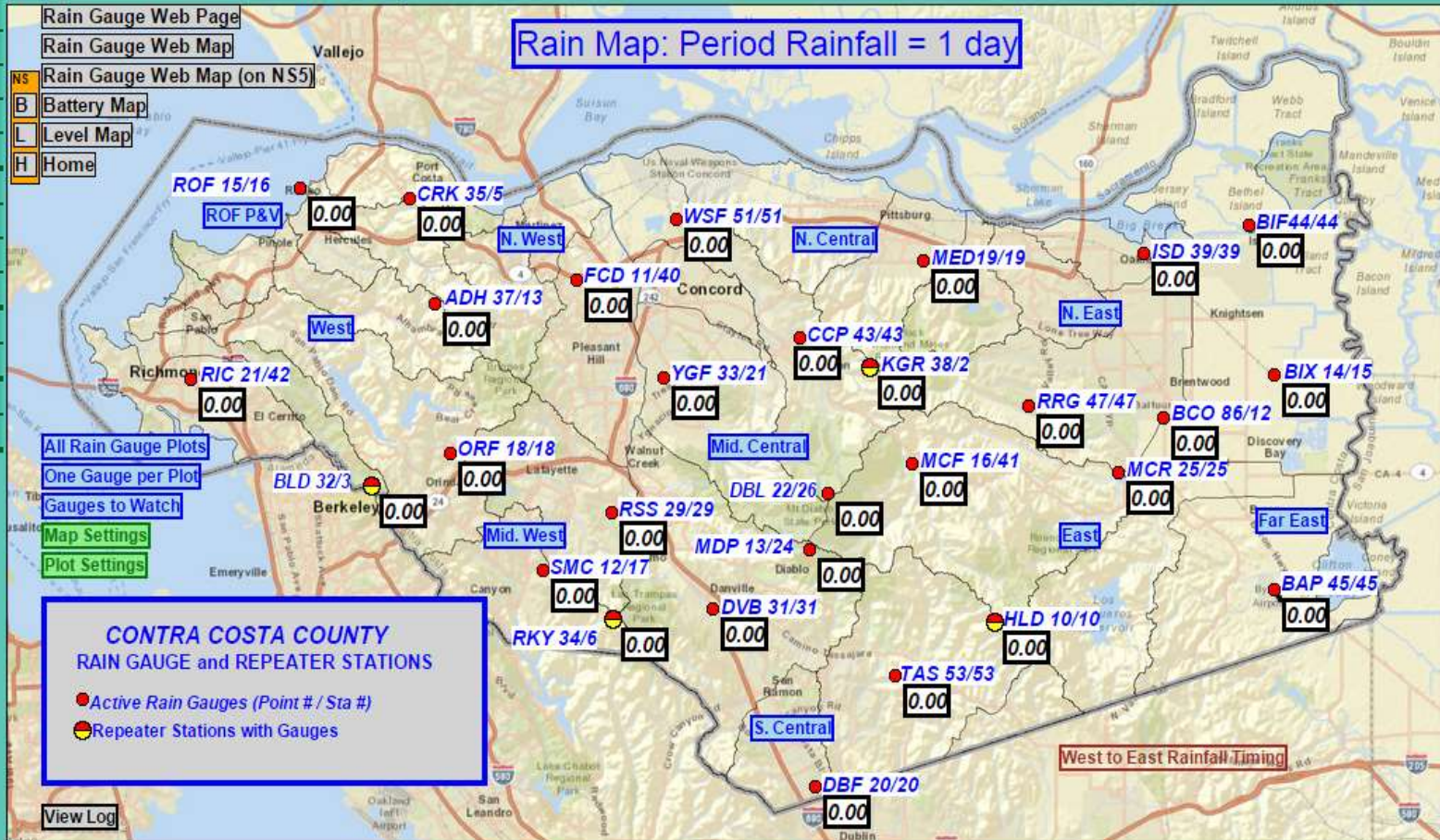
- Active Alarm
- System up
- Home
- Stations
- Points
- Alarms
- Data
- System
- Users
- Tabular Data
- Report Data
- Plot Data
- Map Data
- About NovaStar 5
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Map Data Display Bottom

Map: Rain Map [Save as home page](#) Edit

Data analysis: Period Rainfall

Ending time: 06/17/2015 15:39:24 Interval: 1 day



Data list [Show data](#) [No data on home page](#)

Map Data Display Top

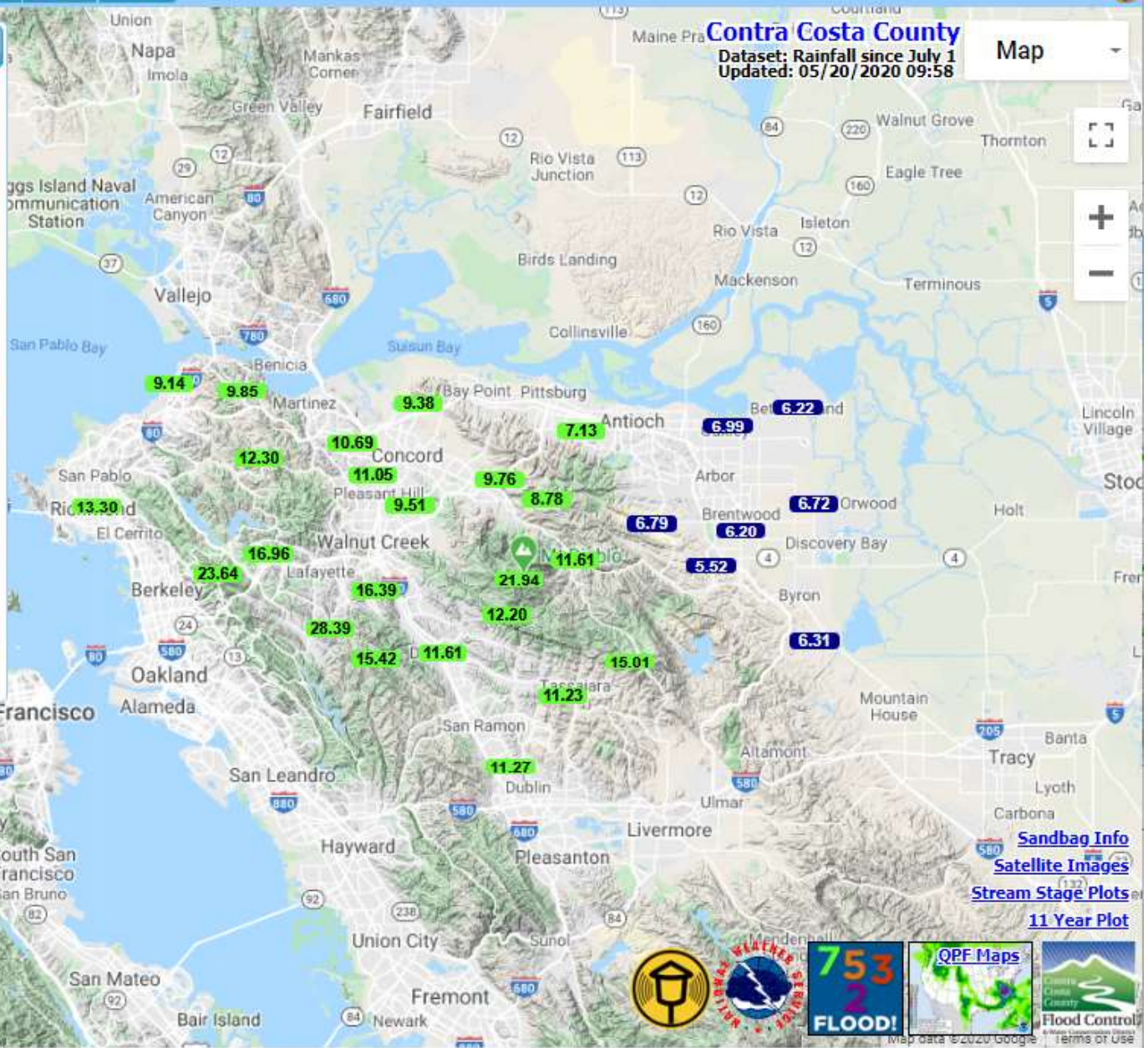


Contra Costa County

Dataset: Rainfall since July 1
Updated: 05/20/2020 09:58

Map

- Storm Rainfall
- 20 Minute Rainfall
- 30 Minute Rainfall
- 1 Hour Rainfall
- 2 Hour Rainfall
- 3 Hour Rainfall
- 6 Hour Rainfall
- 12 Hour Rainfall
- 24 Hour Rainfall
- 2 Day Rainfall
- 7 Day Rainfall
- 30 Day Rainfall
- Season's Rainfall
- Water Level
- Station Ids
- Battery Voltage

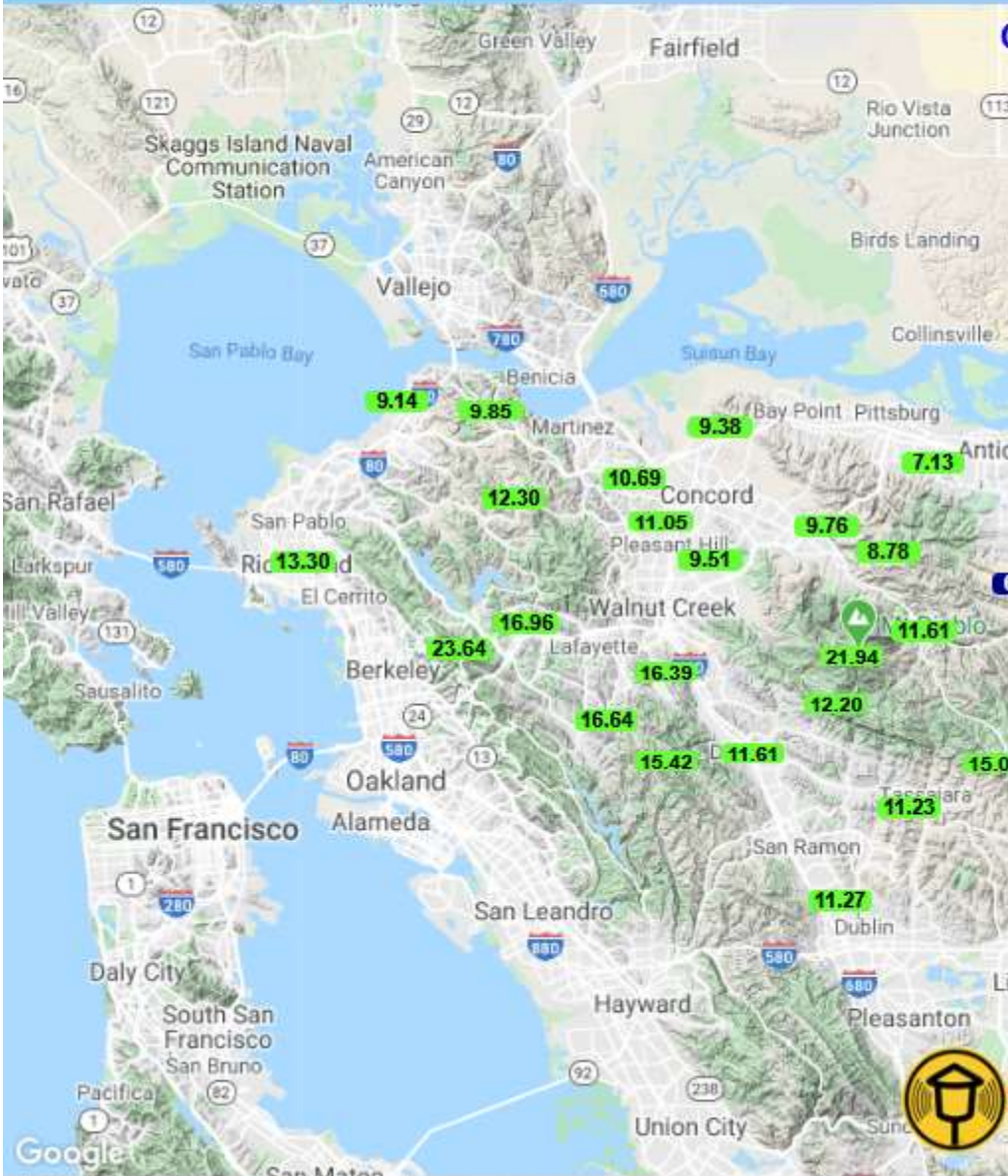


- [Sandbag Info](#)
- [Satellite Images](#)
- [Stream Stage Plots](#)
- [11 Year Plot](#)

753 FLOOD!

QPF Maps

Flood Control



Contra Costa County
 Dataset: Rainfall since July 1
 Updated: 05/20/2020 12:58

Map

Flood Control Headquarters
 Sta: 40 - Sens: FCD11

Last data time: 05/20/2020 12:00

Data units: Inches

20-min:	0.00	3-hr:	0.00	2-day:	0.00
30-min:	0.00	6-hr:	0.00	7-day:	0.40
1-hr:	0.00	12-hr:	0.00	30-day:	0.53
2-hr:	0.00	24-hr:	0.00	Season:	10.69

- [Last 1 day of data \(20 min update\)](#)
- [Last 30 days of data \(20 min update\)](#)
- [Last 365 days of data \(6 hour update\)](#)
- [7 Day Hourly Rainfall ->](#)



75/13/2020 12:48:01 to 05/20/2020 12:48:01

*Data is provisional, subject to revision.

[CDEC Data](#) [CDEC Plot](#) [CDEC Map](#)

[Stream Stage Plots](#)

[11 Year Plot](#)



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DWR Sites | Help Link

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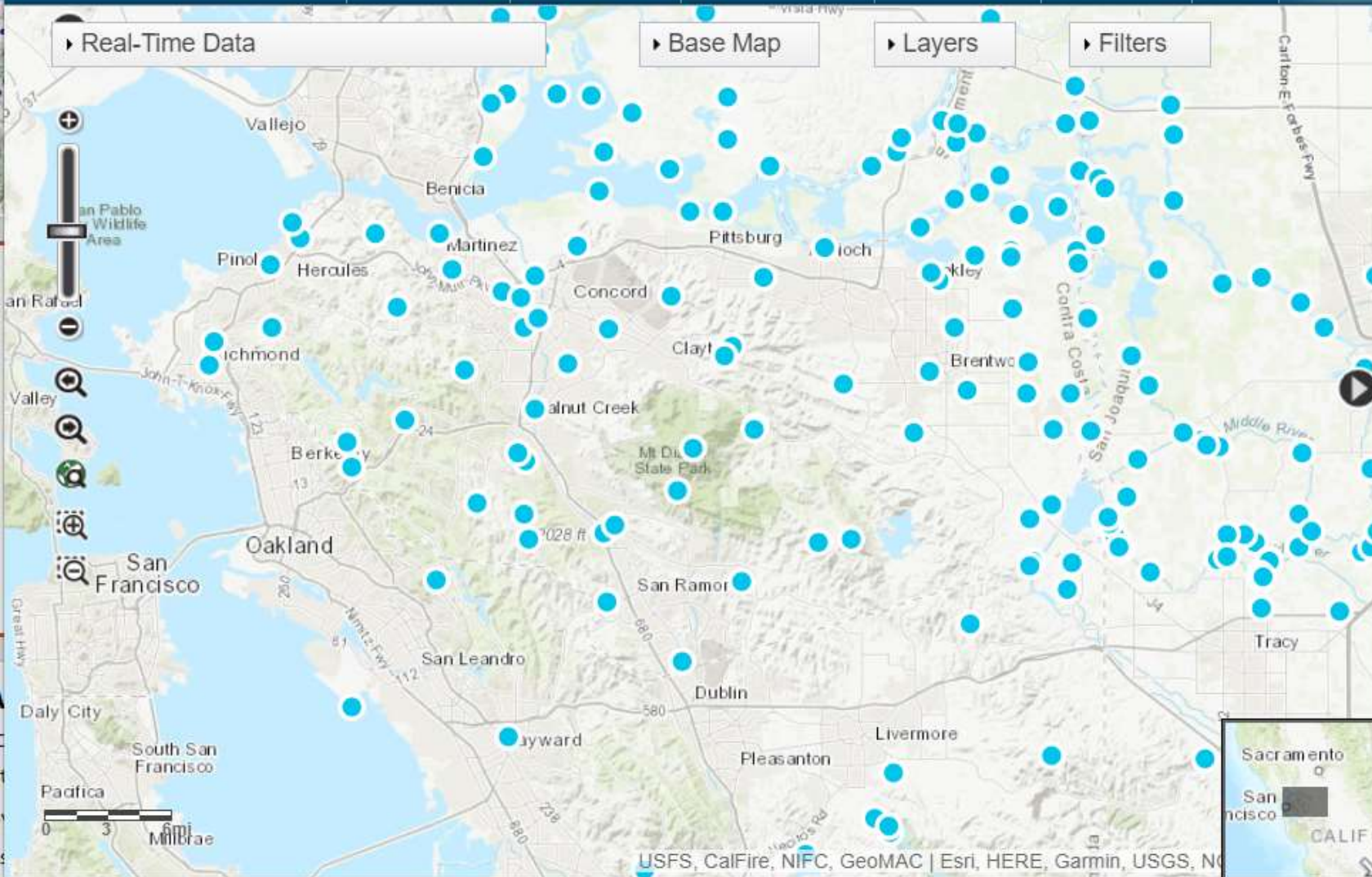
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- QUERY TOOLS
- PRECIPITATION
- RIVER FORECAST
- RIVER STAGES
- RESERVOIRS
- SNOW
- STATIONS
- WEATHER

Real-Time Data

Base Map

Layers

Filters



Station Location

Search by station

183 stations

- ALN ALAMEDA CK
- ACZ ALHAMBRA CR
- ABA ARROYO DEL
- AVL ARROYO VALL
- BAC BACON ISLAN
- BET BETHEL ISLAN
- BIF BETHEL ISLAN
- BXP BIXLER PUMP
- BKD BLACK DIAMO
- BLL BLACKLOCK (

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NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

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No Warnings or Advisories In Effect for this Point.
For warnings and/or advisories in effect for adjacent areas to this point, see [mtr](#)

Change Table Font Size [Increase](#) [Decrease](#)

Forecast For Lat/Lon: 37.9520/-122.2840 (Elev. 397 ft)
3 Miles NNE El Cerrito CA
Forecast Created at: 1pm PDT May 20, 2020

Custom Weather Forecast Table

Weather	Wed May 20				Thu May 21				Fri May 22				Sat May 23				Sun May 24				Mon May 25				1				
Daily-Temp	High 70 Low --				High 75 Low 52				High 73 Low 51				High 77 Low 52				High 83 Low 54				High 84 Low 56								
Chance of Precip	--	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%
Precip	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"	0.00"
2 hr Snow	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"	0"
Total																													
6-Hour Temp	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am	11am	5pm	11pm	5am
Temp	63	70	58	58	52	88	74	58	51	66	72	58	52	70	76	59	54	74	82	62	56	76	82	62	56	76	82	62	56
Cloudiness	18%	1%	2%	35%	12%	0%	17%	11%	16%	23%	9%	8%	7%	5%	16%	26%	24%	10%	17%	22%	13%	13%	13%	23%	23%	23%	23%	23%	23%
Dewpoint	52	54	50	49	54	52	46	44	46	49	47	46	48	50	49	48	55	56	51	50	57	58	53	51	58	53	51	51	51
Relative Humidity	67%	55%	76%	88%	60%	47%	69%	77%	48%	43%	66%	79%	46%	41%	70%	83%	52%	42%	68%	80%	52%	44%	71%	84%	84%	84%	84%	84%	84%
Wind	SW	SW	SW	SW	SW	W	SW	W	W	W	W	W	W	W	W	SW	SW	SW	W	SW	SW	W	W	SW	SW	SW	SW	SW	
	5	8	5	5	5	6	10	7	6	8	9	6	5	6	10	6	5	5	8	5	3	3	8	6	5	5	5	5	5
Snow Level (ft)	6404	7008	7533	7455	7322	8163	7375	6772	5643	6582	6772	6798	6877	7690	8268	8557	9508	10935	11129	11273	11421	11545	11591	11417	11417	11417	11417	11417	

Forecast Weather Table Interface

Select Weather Format

- Custom Weather Table
 - XML
 - Point Forecast Page
 - Point Forecast Matrix
 - Hourly Tabular Forecast
 - Hourly Weather Graph
- Interval in Hours: 1 3 6
- Duration in Days: 1 2 3 4 5 6 7

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