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

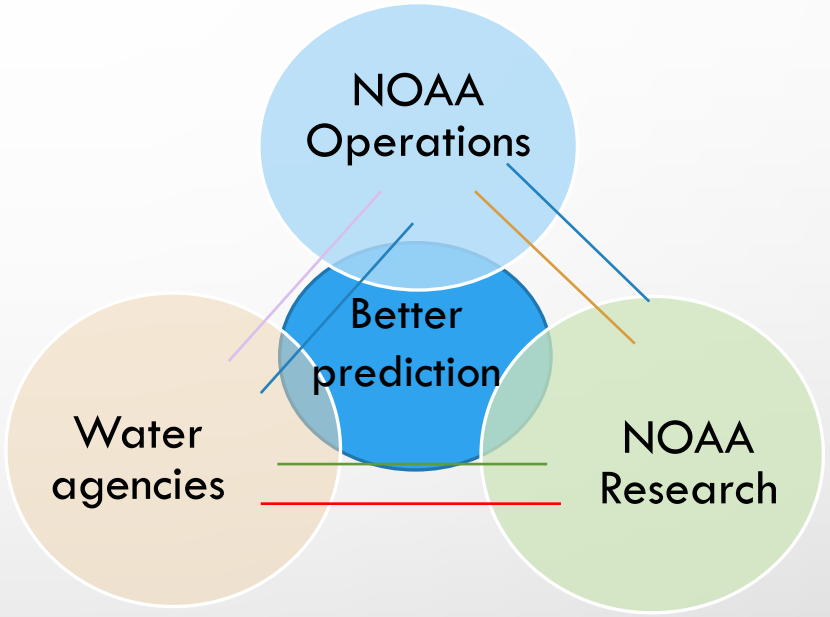
Time	Topic	Lead
2:00 PCT	Background, Purpose	Hilary
	ConOps: Machine to Machine Data Spectrum	Jack Xu, Mark Boucher
	Available data available now	Greg
	Discussion: Why? (Vision/Goals) How? (platform/logistics)	Hilary, Rebecca Pluche
	Potential future meeting topics	Hilary
~4:00	Adjourn	

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

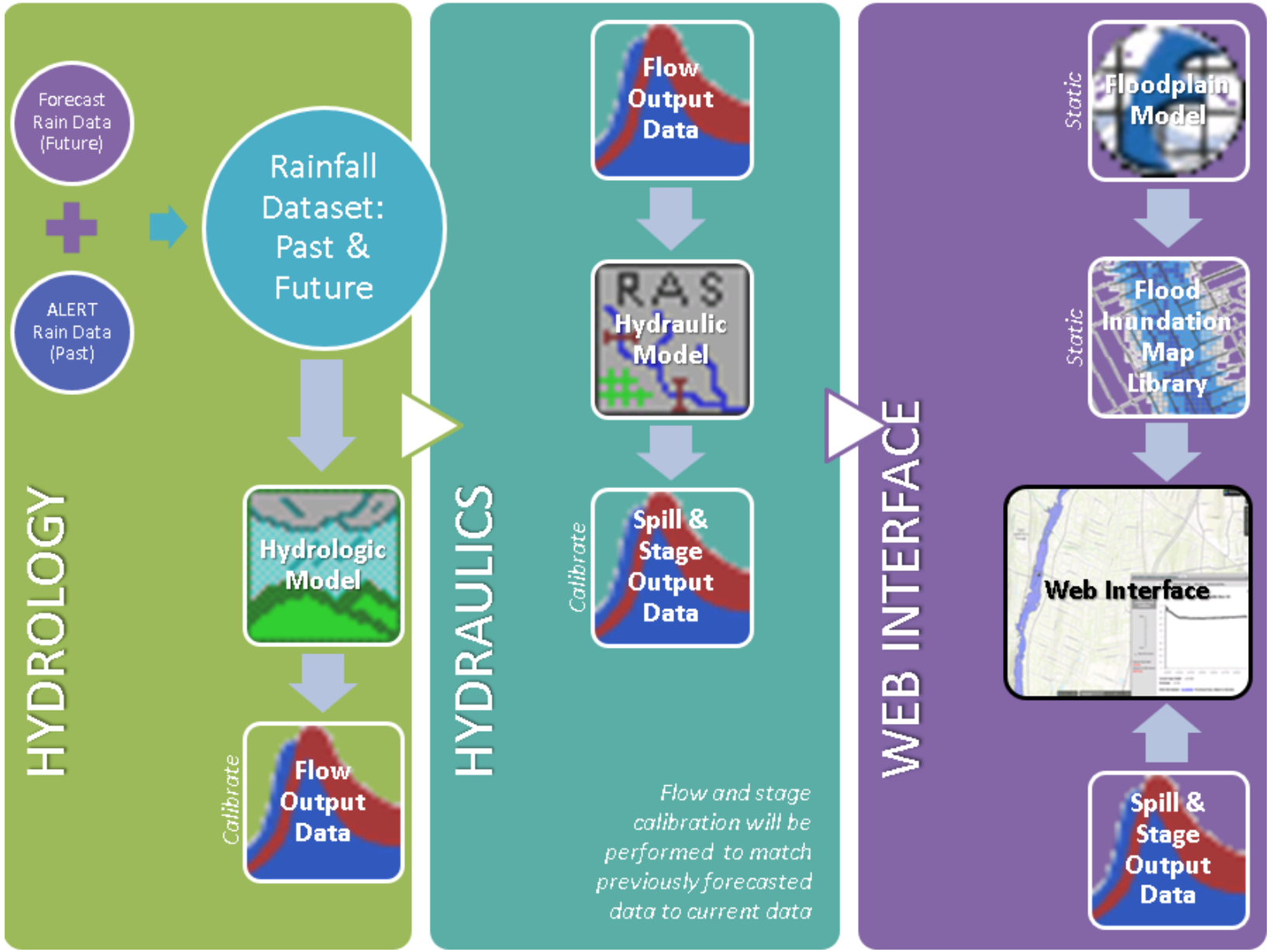
Clean Water • Healthy Environment • Flood Protection

May 2020
AQPI Users Group

Automated Hydro Modeling

Presented by: **Jack Xu, PE, CFM**

Valley Water



Old System

Rainfall Input
- Gridded QPF
- Point Gauge

Averaged to WS

HEC-DSS for data storage

Flood inundation map library

Valley Water

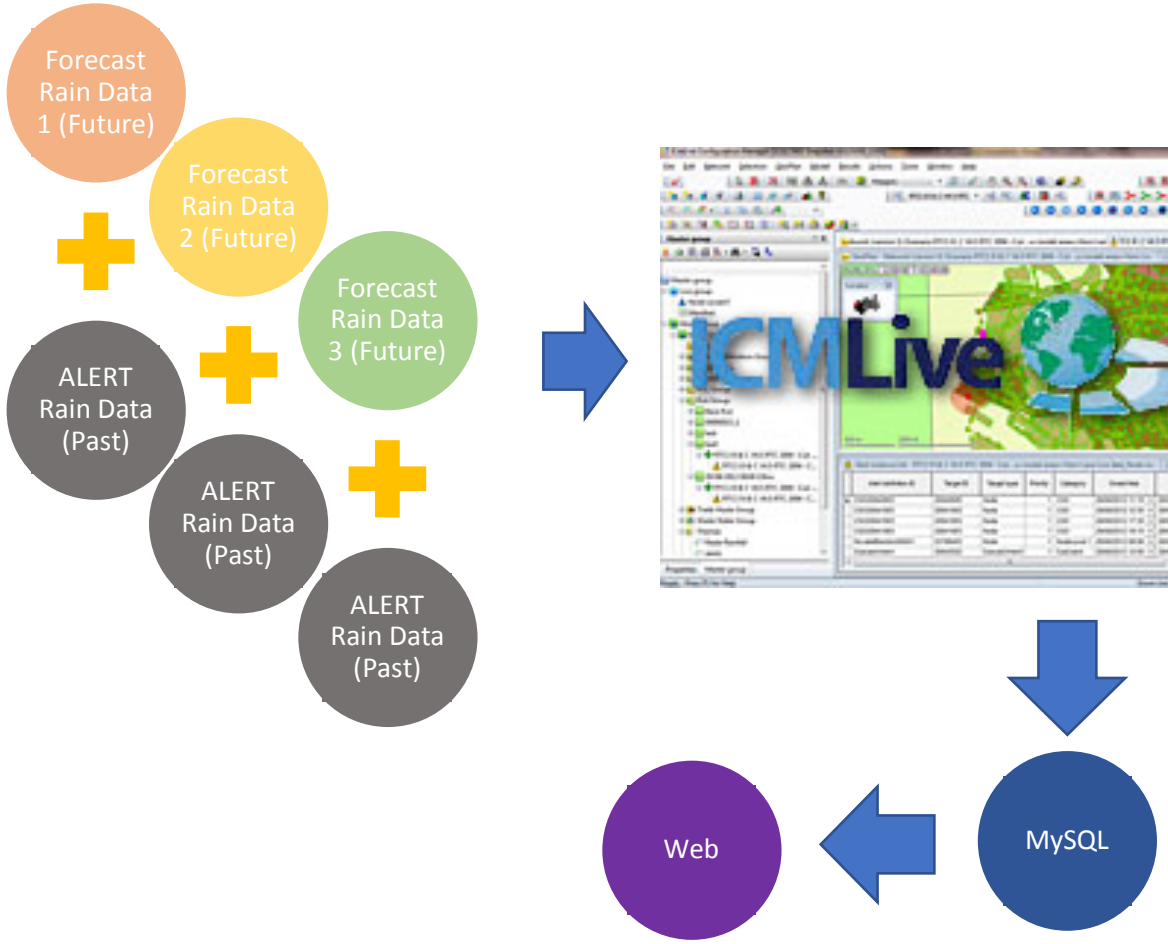
Old System

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

Valley Water

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

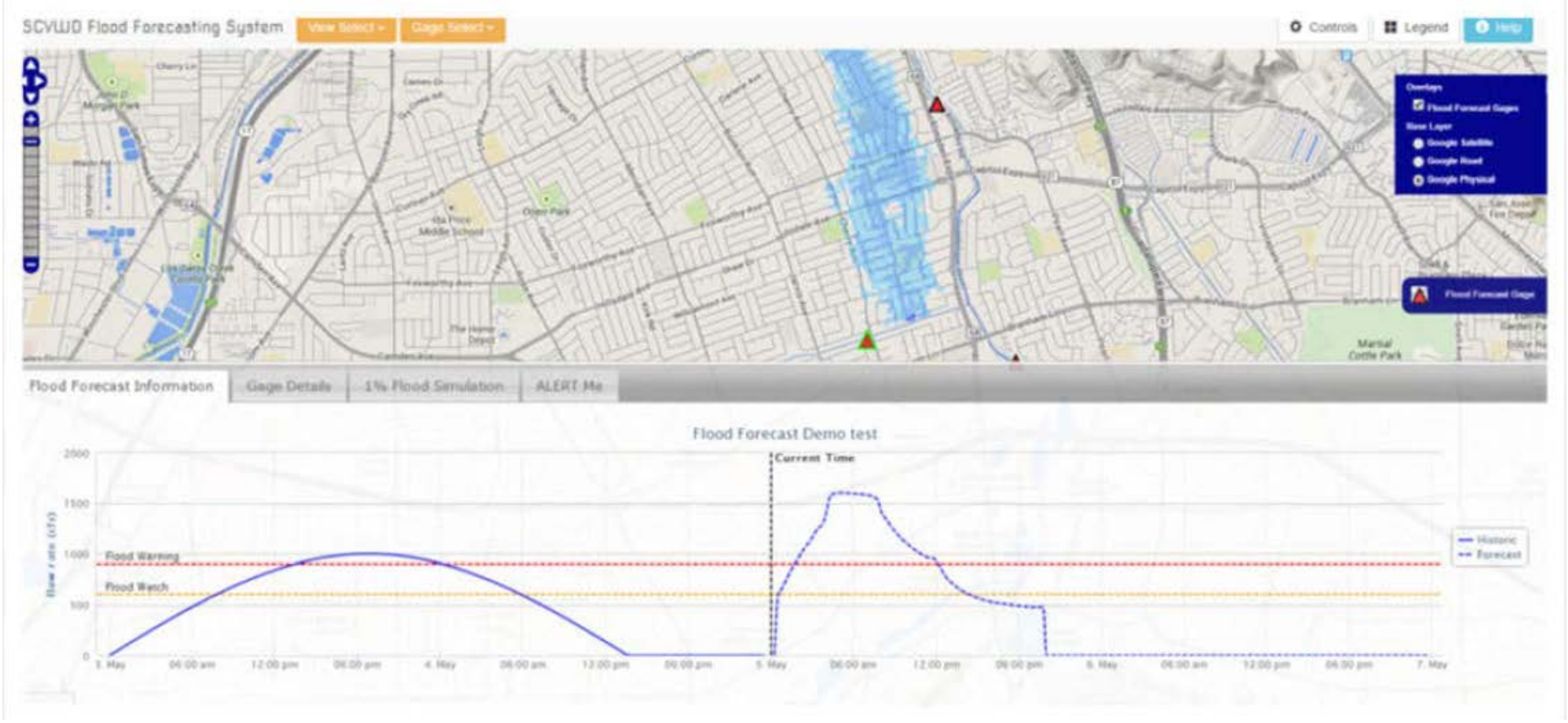
- Grid: ASCII (text file, larger size)
- Grid: NETCDF, GRIB (binary, smaller size)
- Point Data: CSV/Text (would need to be processed from the grids by QPF folks)

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

Valley Water

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

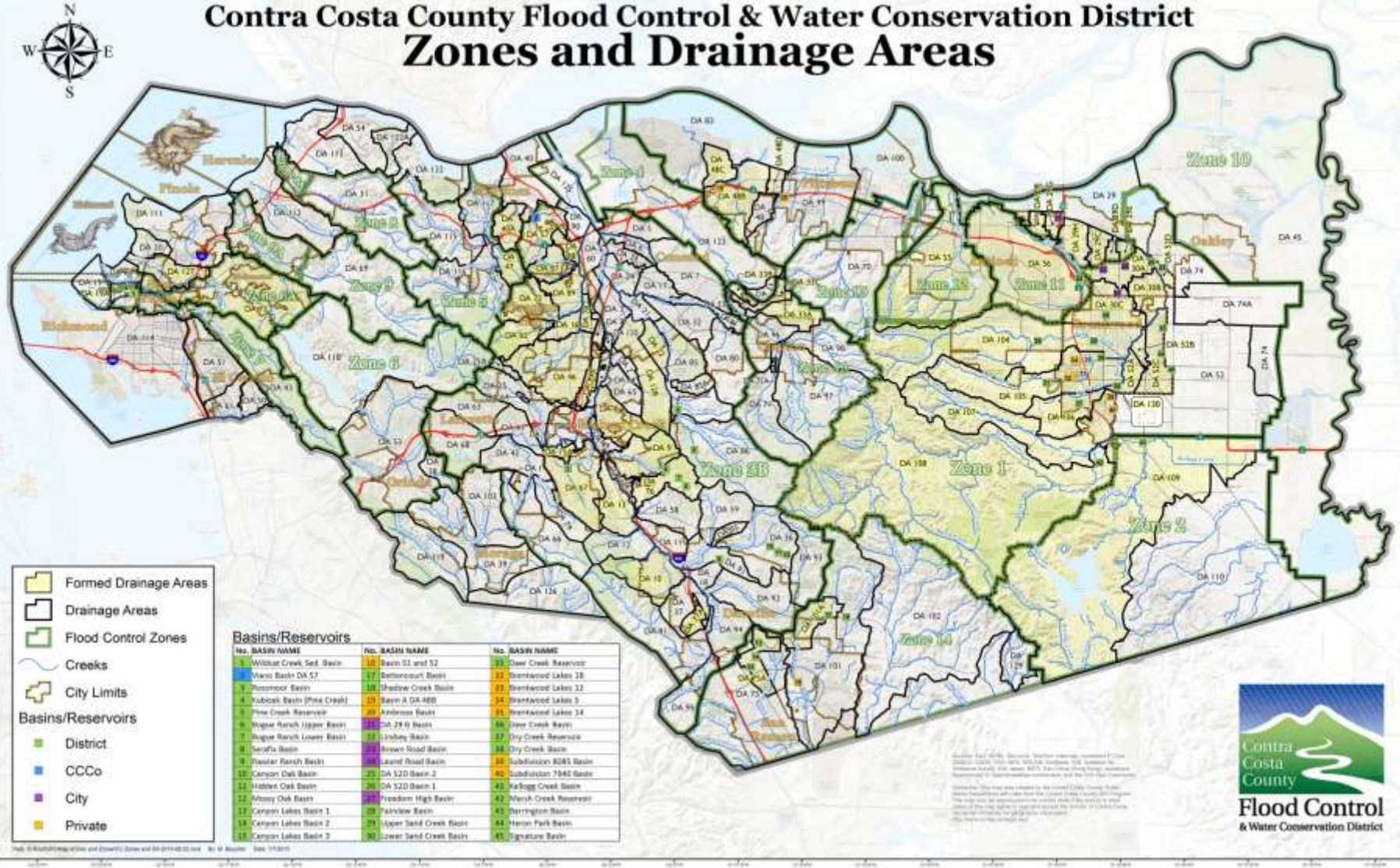
May 20, 2020

Mark Boucher, PE
Sr. Hydrologist

Contra Costa County
Flood Control
& Water Conservation District

Contra Costa County Flood Control & Water Conservation District

Zones and Drainage Areas



Basins/Reservoirs

No.	BASIN NAME	No.	BASIN NAME	No.	BASIN NAME
1	Wildcat Creek Sed. Basin	16	Basin 51 and 52	31	Deer Creek Reservoir
2	Marsh Basin DA 57	17	Bettencourt Basin	32	Brentwood Lakes 1B
3	Rossmoor Basin	18	Shadow Creek Basin	33	Brentwood Lakes 12
4	Kubiak Basin (Pine Creek)	19	Basin A DA 48B	34	Brentwood Lakes 3
5	Pine Creek Reservoir	20	Ambrose Basin	35	Brentwood Lakes 14
6	Rogue Ranch Upper Basin	21	DA 29 G Basin	36	Deer Creek Basin
7	Rogue Ranch Lower Basin	22	Lindsey Basin	37	Dry Creek Reservoir
8	Serafix Basin	23	Brown Road Basin	38	Dry Creek Basin
9	Hassler Ranch Basin	24	Laurel Road Basin	39	Subdivision 8285 Basin
10	Canyon Oak Basin	25	DA 52D Basin 2	40	Subdivision 7940 Basin
11	Hidden Oak Basin	26	DA 52D Basin 1	41	Kellogg Creek Basin
12	Mossy Oak Basin	27	Freedom High Basin	42	Marsh Creek Reservoir
13	Canyon Lakes Basin 1	28	Fairview Basin	43	Darrington Basin
14	Canyon Lakes Basin 2	29	Upper Sand Creek Basin	44	Heron Park Basin
15	Canyon Lakes Basin 3	30	Lower Sand Creek Basin	45	Signature Basin

Contra Costa County Flood Control & Water Conservation District

Contra Costa

Flood Risk Assessment

- Flooding is more likely when the ground is wet.

Flood Risk Assessment

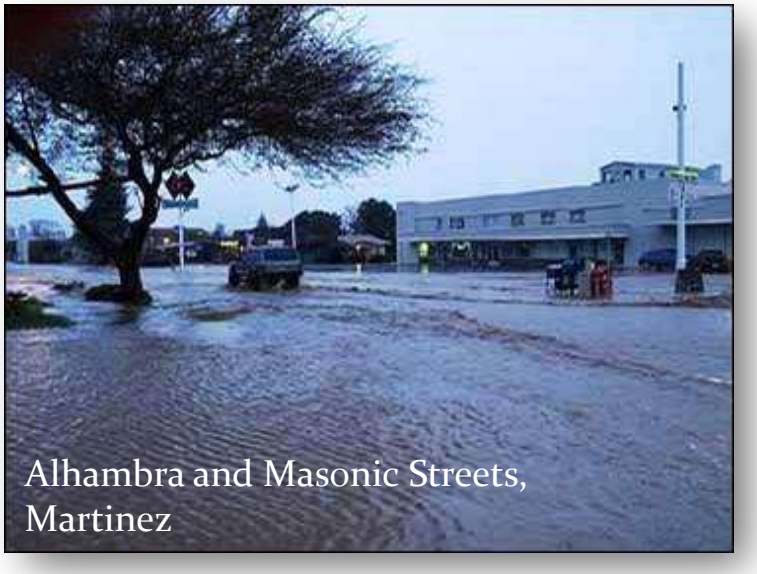
7-5-3-2 Flood Protocols

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



Alhambra and Masonic Streets, Martinez

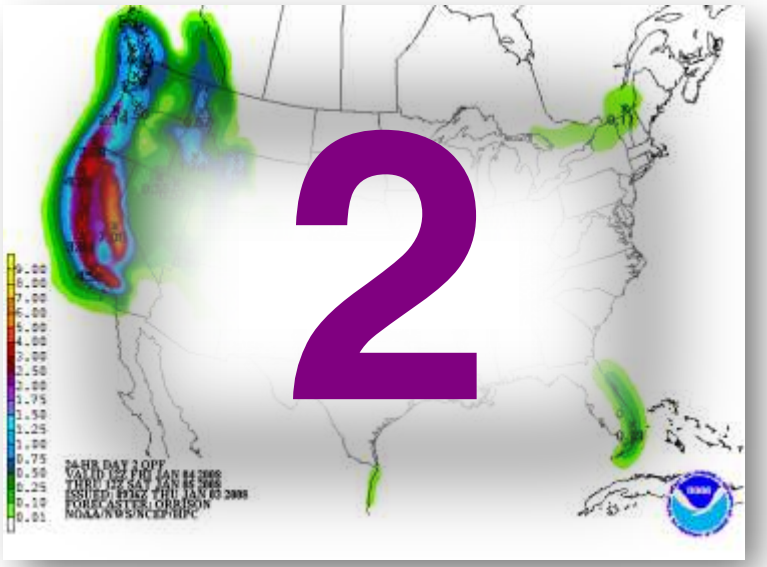
7 5 3

Historical pre-flood forecast

National Weather Service

forecast of two inches (2”)

in the next day or 24 hours…

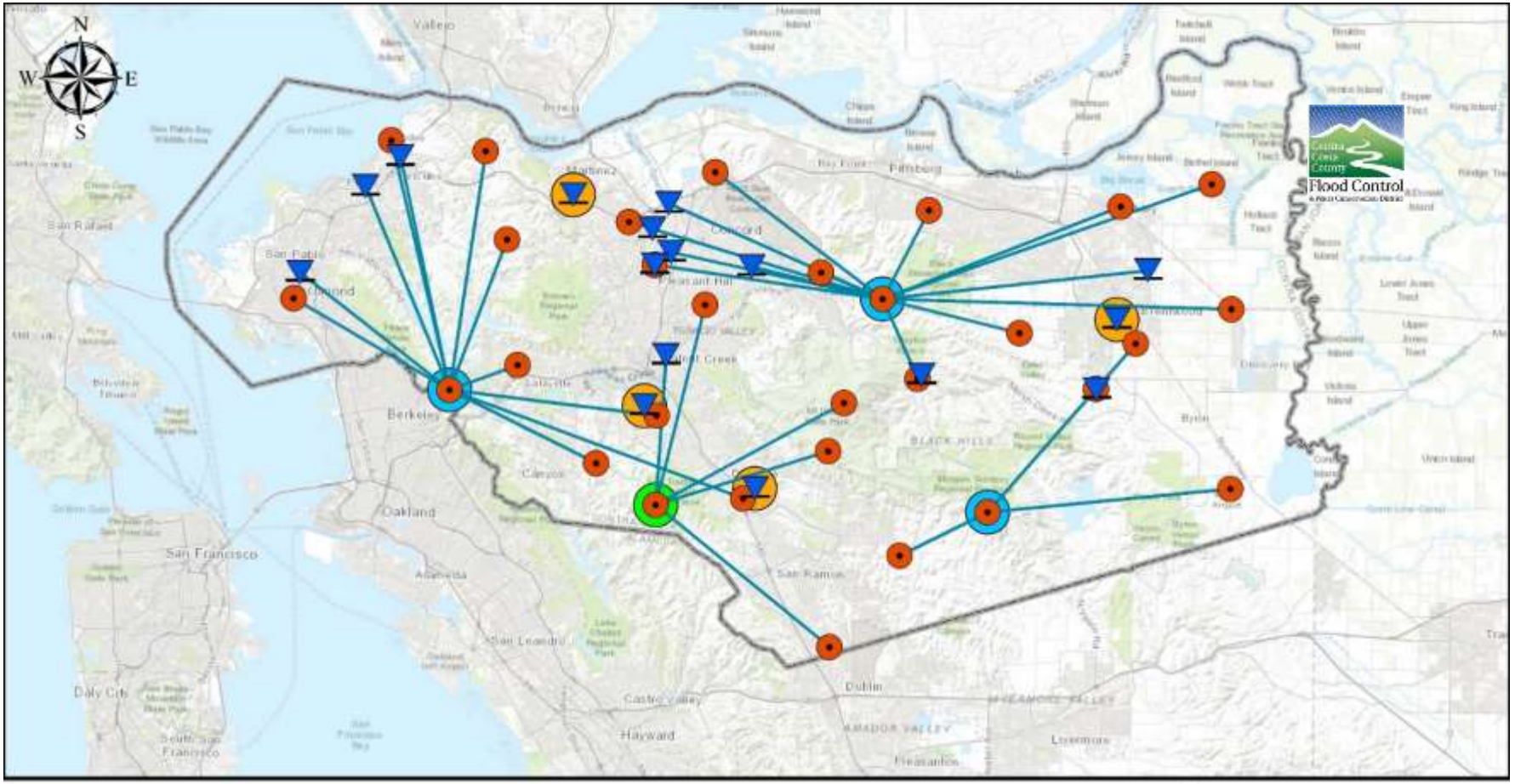


Contra Costa County Flood Control & Water Conservation District

(inches)

Contra Costa County
Flood Control

7 5 3
2
FLOOD!



Contra Costa Hydrology Data Collection System

- Existing Stream Gauges (16)
- Existing Rain Gauges (30)
- Modem Repeaters (1)
- IP Repeaters (3)
- Radio Paths (35)
- Cell Tramitter (4)

43 stations

NovaStar 5

10.180.1.220:8180/NovaStar5/index.do?mapId=6

Apps | DLink | History | Google Shop | Tools | JMT | Mark | NovaStar 5 | CCCo Gmap | Mark Work | GIS | IRWMP | Other bookmarks

- Active Alarm
- System up
- Home
- Stations
- Points
- Alarms
- Data
- System
- Users
- Tabular Data
- Report Data
- Plot Data
- Map Data
- About NovaStar 5
- Contact HydroLynx
- Change Profile
- Log out

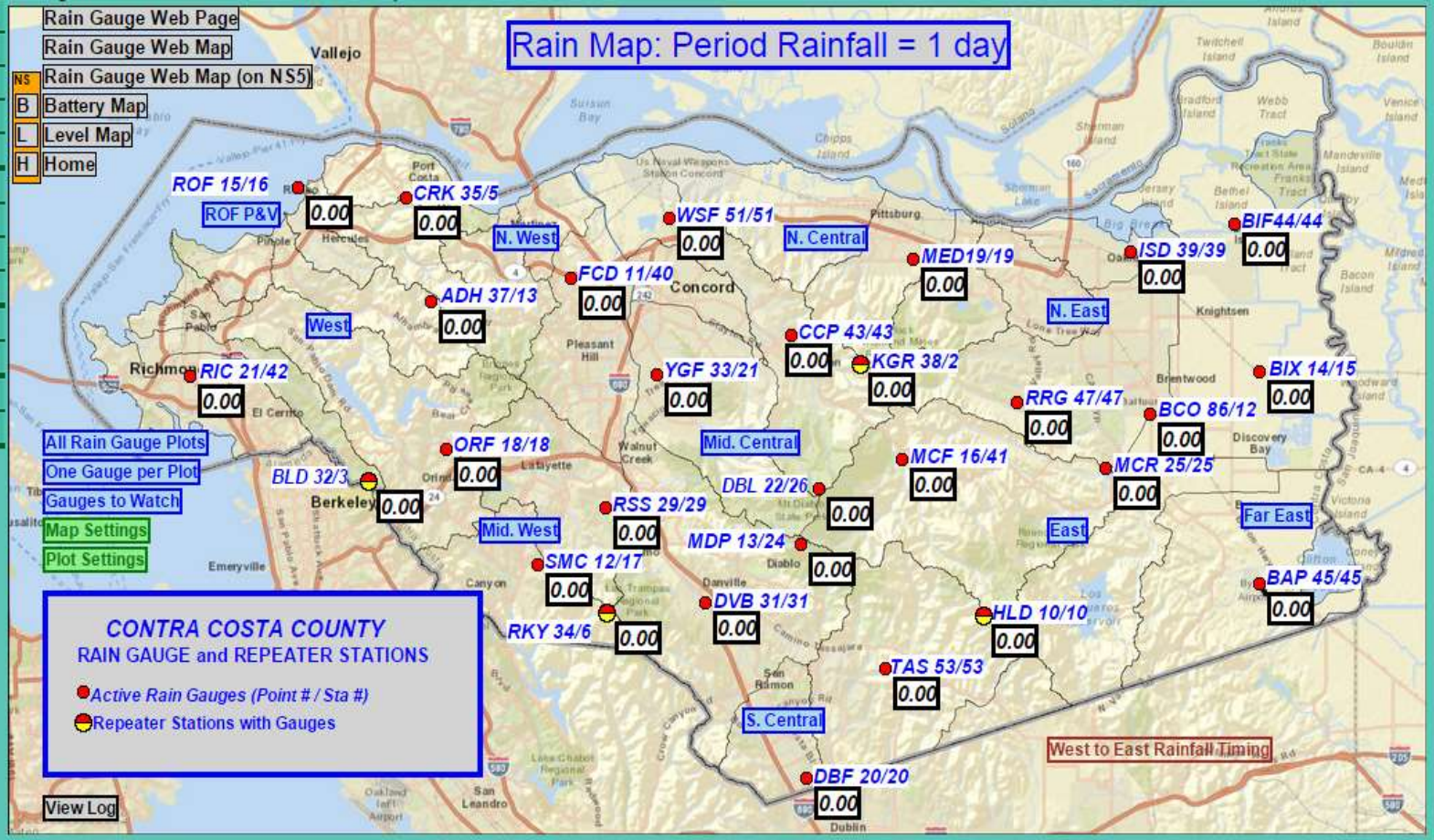
Map Data Display

Back | Print | Refresh | 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

Back | Print | Refresh | Top

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RainMap NovaStar 5 Quip Mark Work Mark Toastmasters IRWMP Travel G-Shop

Rain Gauges Maintained by Contra Costa County Flood Control and Water Conservation District

Martinez, California

Rainfall Durations Ending May 20, 2020 at 08:00

Information on using this data is provided on the main County website.

Local weather links: Satellite Loop, Storm Total Loop.

Check above for the current page update time. The gauges are polled every 30 minutes.

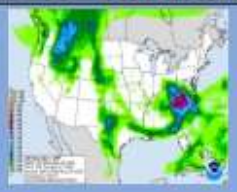
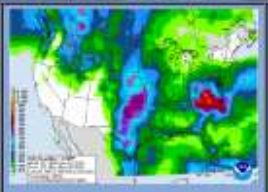
Gauge Location Map ---Radio Path and Viewshed Map (8MB)

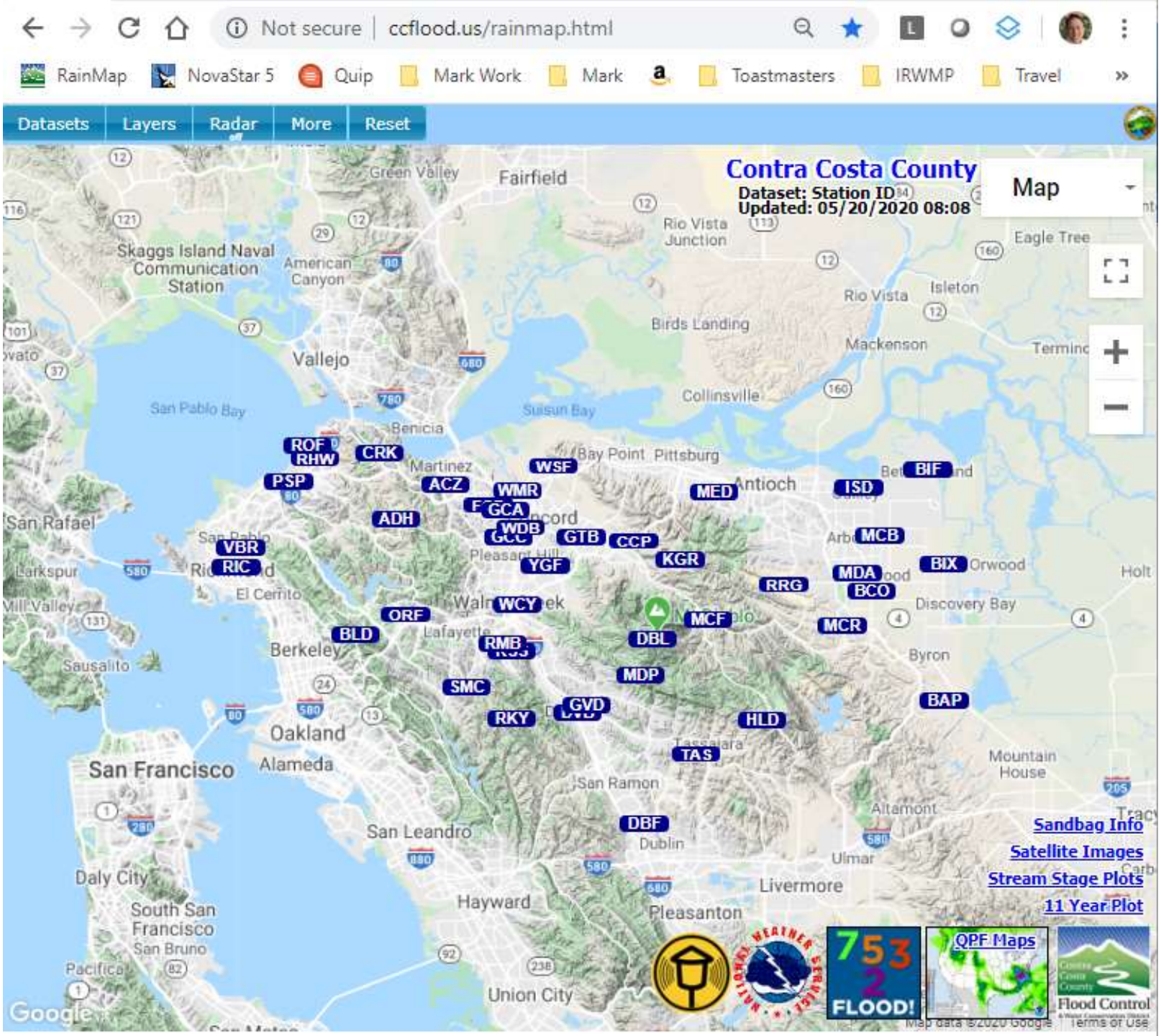
Contra Costa County - Public Works - Flood Control - Hydrology - Forecasting - Gauges

NWS SF Area Weather - Weather Links - Water Elevation Gauges - Interactive RainMap **NEW!!**

QPF Tool

All numbers represent depth of rainfall in inches.

Critical Antecedent Conditions [3]		7"	5"	3"	-	-	See Note 3	 NWS 24-hour QPF Map			 NWS 5-day QPF Map			Bay Area QPF Map
West County Stations	**MSP**[1]	**Year to date**[2]	**Last 30 days**	**Last 7 days**	**Last 5 days**	**Last 2 days**	**Last 24 hours**	**Last 12 hours**	**Last 9 hours**	**Last 6 hours**	**Last 3 hours**	**Last 2 hours**	**Last 1 hour**	**Last 30 min.**	**Established**
Station 15 Rodeo Fire Department	18.30	9.14	0.48	0.34	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	EST. 1972
Station 21 Richmond City Hall	21.81	13.30	0.61	0.39	0.32	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	EST. 1974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RainMap
NovaStar 5
Quip
Mark Work
Mark
Toastmasters
IRWMP
Travel
Datasets
Layers
Radar
More
Reset
Contra Costa County
Dataset: Station ID
Updated: 05/20/2020 08:08
Map
Fairfield
Green Valley
Rio Vista Junction
Eagle Tree
Skaggs Island Naval Communication Station
American Canyon
Rio Vista
Isleton
Birds Landing
Mackenson
Vallejo
Collinsville
San Pablo Bay
Suisun Bay
Benicia
Bay Point
Pittsburg
Martinez
Antioch
San Rafael
Larkspur
Mill Valley
El Cerrito
Pleasant Hill
Orwood
Holt
Discovery Bay
Lafayette
Berkeley
Sausalito
Byron
Oakland
Alameda
San Francisco
San Ramon
Mountain House
Altamont
San Leandro
Dublin
Ulmar
Livermore
Daly City
South San Francisco
San Bruno
Pacifica
Hayward
Pleasanton
Union City
ROF
RHW
CRK
PSP
ACZ
WSF
WMR
GCA
ADH
WDB
GTB
CCP
MED
ISD
BIF
MCB
VBR
RIC
YGF
KGR
MDA
BIX
RRG
BCO
WCY
ORF
MCF
MCR
BLD
RMB
DBL
MDP
SMC
GVD
RKY
HLD
BAP
TAS
DBF
Sandbag Info
Satellite Images
Stream Stage Plots
11 Year Plot
QPF Maps
FLOOD!
Flood Control
Google
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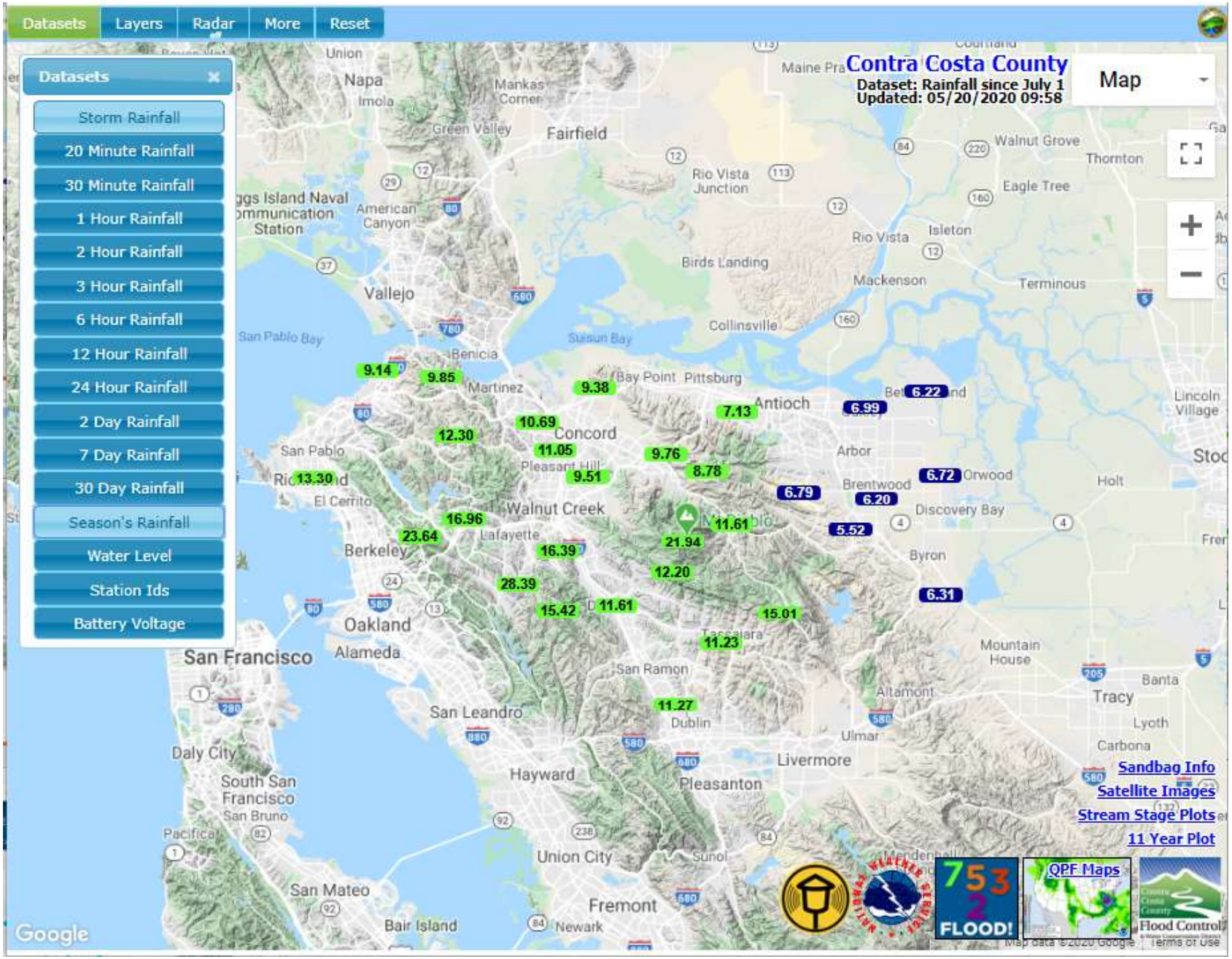
Datasets
Layers
Radar
More
Reset
Datasets
Storm Rainfall
20 Minute Rainfall
30 Minute Rainfall
1 Hour Rainfall
2 Hour Rainfall
3 Hour Rainfall
6 Hour Rainfall
12 Hour Rainfall
24 Hour Rainfall
2 Day Rainfall
7 Day Rainfall
30 Day Rainfall
Season's Rainfall
Water Level
Station Ids
Battery Voltage
Contra Costa County
Dataset: Rainfall since July 1
Updated: 05/20/2020 09:58
Map
Sandbag Info
Satellite Images
Stream Stage Plots
11 Year Plot
QPF Maps
FLOOD!
Flood Control
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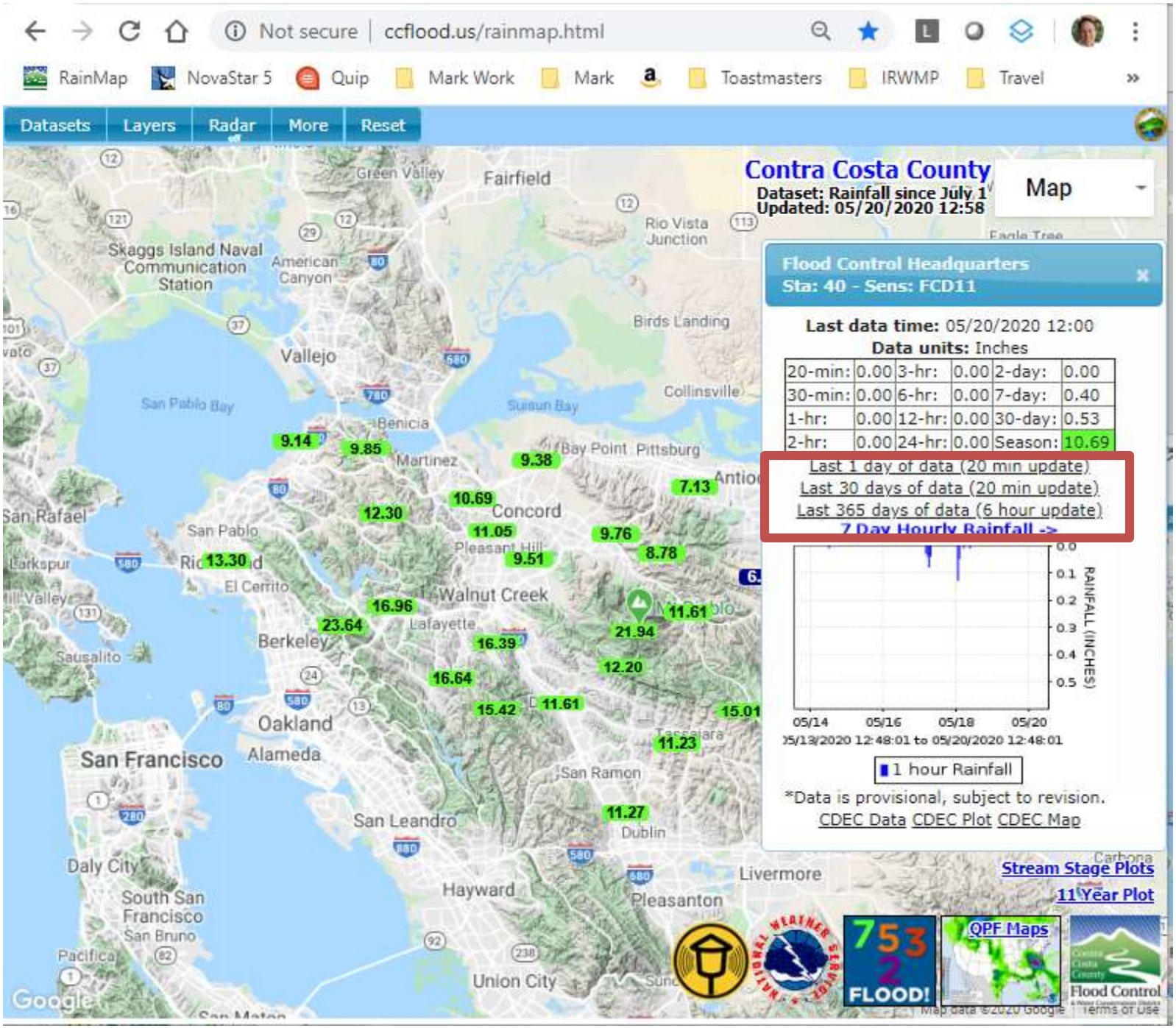
Not secure | ccflood.us/rainmap.html
RainMap
NovaStar 5
Quip
Mark Work
Mark
Toastmasters
IRWMP
Travel
Datasets
Layers
Radar
More
Reset
Contra Costa County
Dataset: Rainfall since July 1
Updated: 05/20/2020 12:58
Map
Flood Control Headquarters
Sta: 40 - Sens: FCD11
Last data time: 05/20/2020 12:00
Data 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 ->
RAINFALL (INCHES)
05/14
05/16
05/18
05/20
05/13/2020 12:48:01 to 05/20/2020 12:48:01
1 hour Rainfall
*Data is provisional, subject to revision.
CDEC Data CDEC Plot CDEC Map
Stream Stage Plots
11 Year Plot
QPF Maps
Flood Control
9.14
9.85
9.38
7.13
10.69
12.30
11.05
9.76
8.78
13.30
9.51
16.96
11.61
23.64
21.94
16.39
12.20
16.64
15.42
11.61
15.01
11.23
11.27
Fairfield
Green Valley
Rio Vista Junction
Skaggs Island Naval Communication Station
American Canyon
Birds Landing
Vallejo
Collinsville
San Pablo Bay
Suisun Bay
Benicia
Martinez
Bay Point
Pittsburg
Concord
San Rafael
San Pablo
Pleasant Hill
Larkspur
El Cerrito
Walnut Creek
Lafayette
Berkeley
Sausalito
Oakland
Alameda
San Francisco
San Ramon
San Leandro
Dublin
Daly City
South San Francisco
San Bruno
Pacifica
Hayward
Livermore
Pleasanton
Union City
Google

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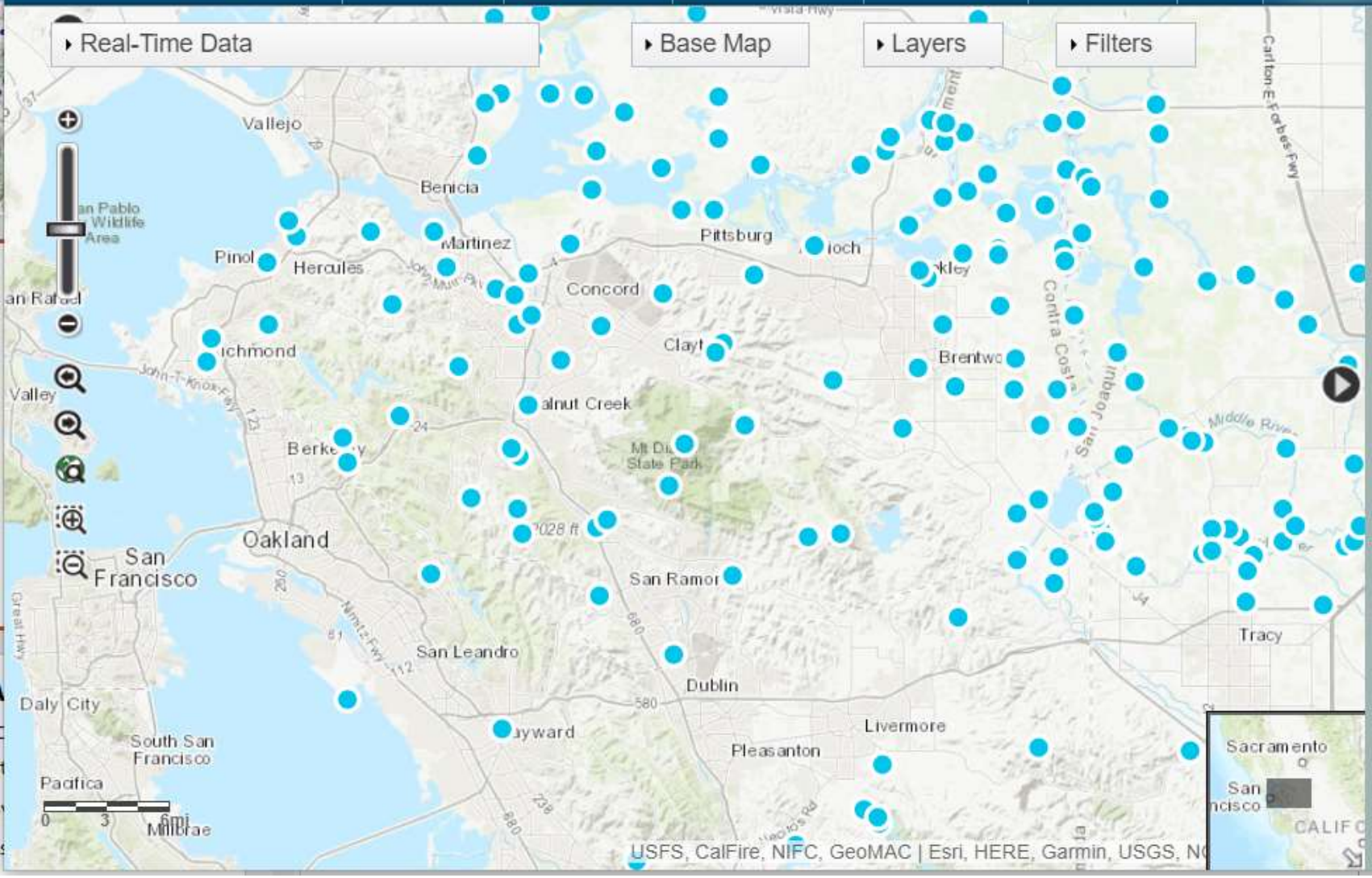


Station Locat

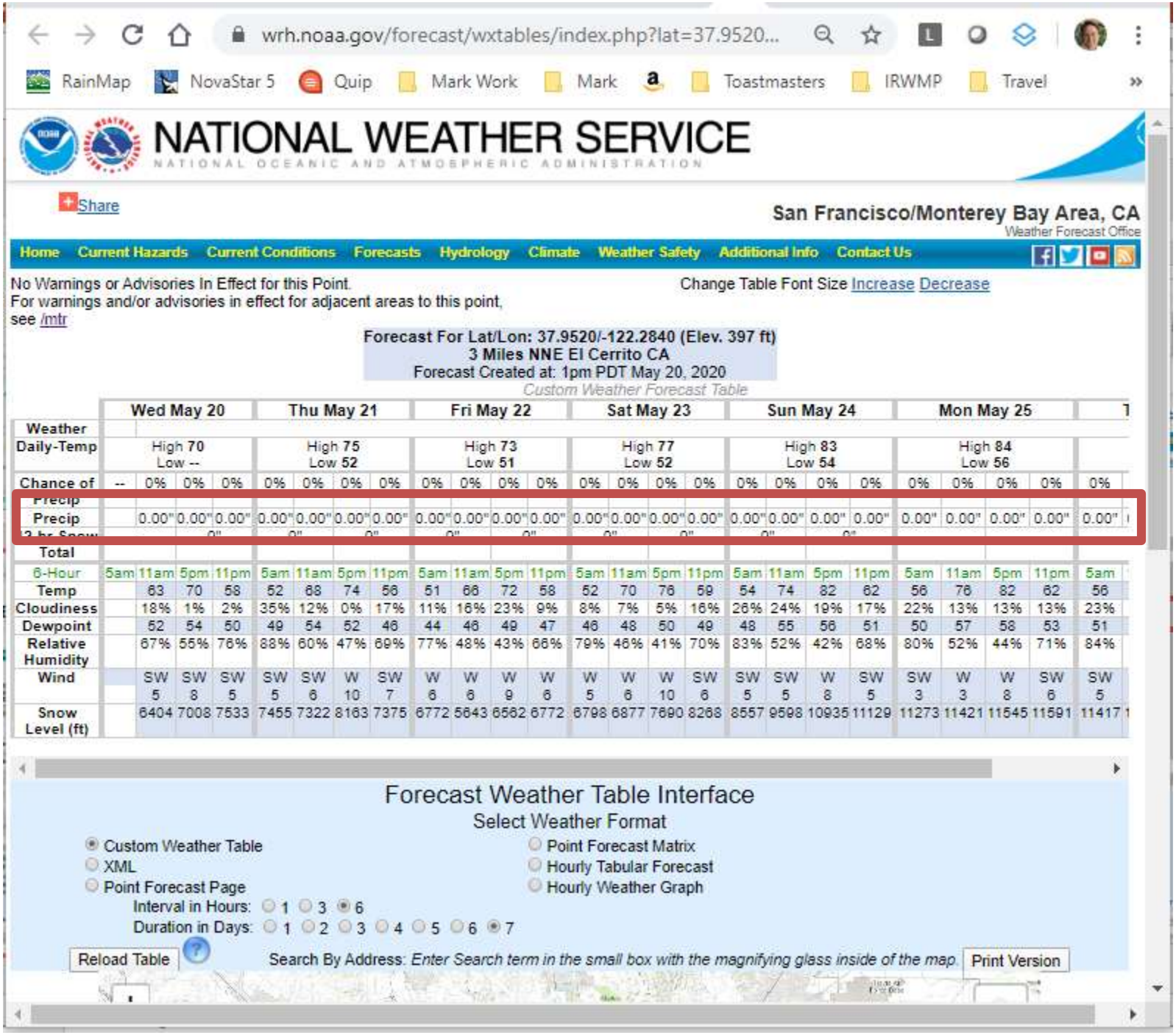
Search by station

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 (

Select All

Download Statio
All | Current Pa



wrh.noaa.gov/forecast/wxtables/index.php?lat=37.9520...

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NATIONAL WEATHER SERVICE

NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION

Share

San Francisco/Monterey Bay Area, CA
Weather Forecast Office

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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

	Wed May 20				Thu May 21				Fri May 22				Sat May 23				Sun May 24				Mon May 25				
Weather																									
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	--	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																									
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"
12-hr Snow			0"			0"				0"				0"				0"							
Total																									
6-Hour	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	52	68	74	56	51	66	72	58	52	70	76	59	54	74	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%	19%	17%	22%	13%	13%	13%	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
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%
Wind		SW 5	SW 8	SW 5	SW 5	SW 6	W 10	SW 7	W 6	W 6	W 9	W 6	W 5	W 6	W 10	SW 6	SW 5	SW 5	W 8	SW 5	SW 3	W 3	W 8	SW 6	SW 5
Snow Level (ft)		6404	7008	7533	7455	7322	8163	7375	6772	5643	6562	6772	6798	6877	7690	8268	8557	9598	10935	11129	11273	11421	11545	11591	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

Reload Table

Search By Address: *Enter Search term in the small box with the magnifying glass inside of the map.*

Print Version