Practical Use of AQPI Products

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Contra Costa County Flood Control &
Water Conservation District

BAWAC Presentation
November 1, 2021

Practical Use of AQPI Products

Since January 2021, the FD District has been using AQPI forecast data on an hourly basis.

The data is put on a cloud server on a scheduled basis and we read it from there.

The data is in agreed upon formats.

Practical Use of AQPI Products

```
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```

Short Range Model
High-**R**esolution **R**apid **R**efresh Forecast - (**HRRR**)
18 x 1 hour periods updated every 1 hour

Long Range Model
Global **F**orecast **S**ystem Forecast - (**GFS**)
28 x 3 hour periods then 26 x 6 hour periods updated every 6 hours

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dateTime:202110260600
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5,54,3hx28:6hx26,mm
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Point3,37.869,-122.09,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,2.3125,2.5,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,2.5625,6.125
Point4,37.791,-121.869,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1.375,1.5,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,1.5625,4.5625
Point5,37.922,-121.758,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,1.625,1.875,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,1.9375,4.375
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Practical Use of AQPI Products   Raw Grid Data

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...
(436 lines)
```

Short Range Model(HRRR)
24x33 grid over Contra Costa County

Also: static metadata

Long Range Model GFS)
5x7 grid over Contra Costa County

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...
(274 lines)
```

Practical Use of AQPI Products

Polygon Data

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Point2,37.974,-122.002,0,0,0,0,0,0,0.001,0,0,0,0,0,0,0,0,0,0,0
Point3,37.869,-122.09,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
Point4,37.791,-121.869,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
Point5,37.922,-121.758,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0
```

Short and Long Range Model
Not used yet. Should look like point data

This should provide the average precipitation over an area (ex. Watershed).

AQPI
Advanced Quantitative
Precipitation Information

Contra Costa County
Flood Control
& Water Conservation District

Practical Use of AQPI Products   Point Data

- The data is for 5 specific points we have been using in our 7532 Flood! protocols.
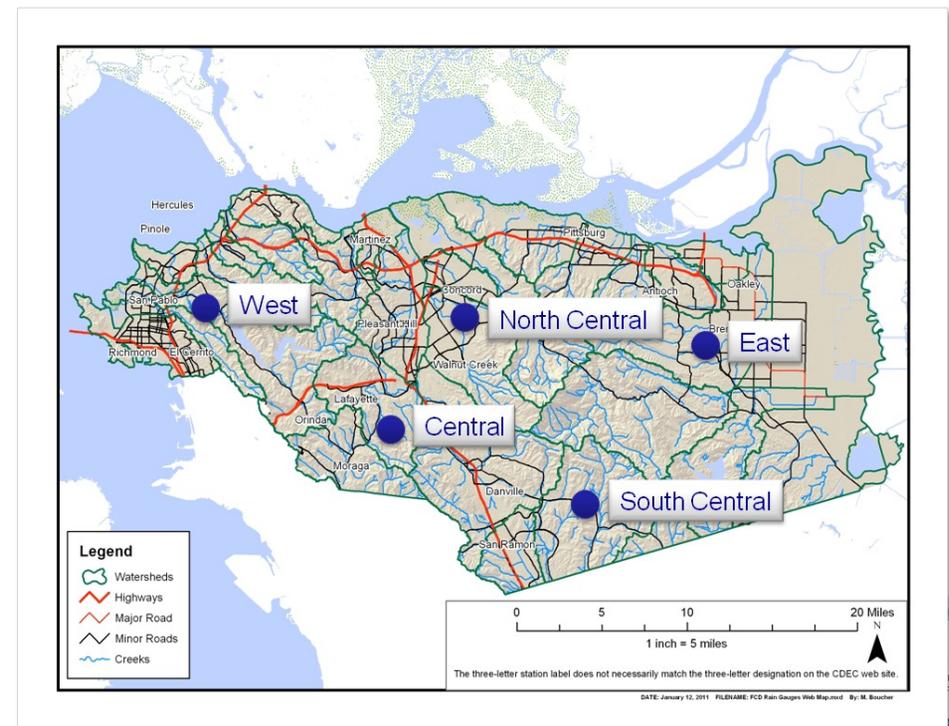
Practical Use of AQPI Products   Grid Data

AQPI "gridded" format forecast. Points that can be interpolated between

~1.8 miles square   ~12.3 miles square
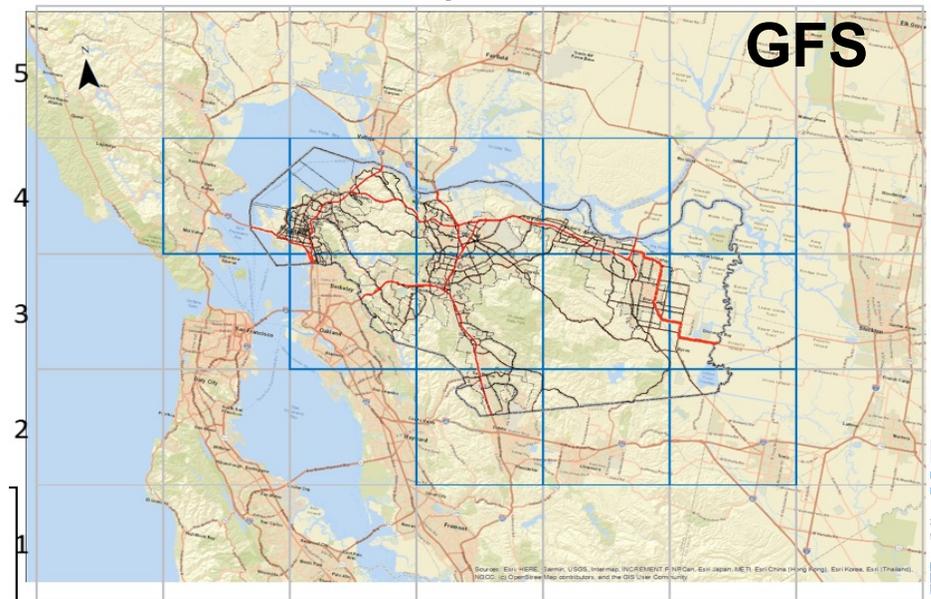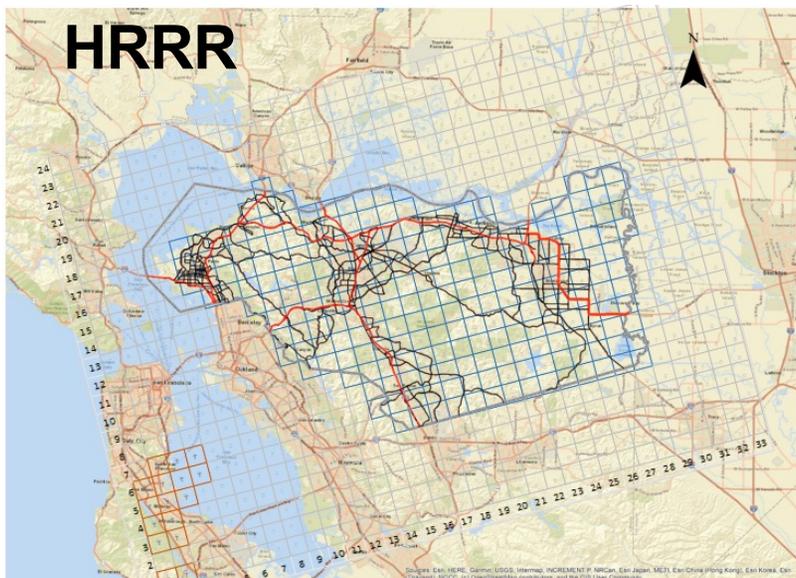
Practical Use of AQPI Products

High-**R**esolution **R**apid **R**efresh Forecast - (**HRRR**)

- 18 x 1 hour quantitative forecast updated every 1 hour.
- Updated <u>every hour</u>.

HRRR

Practical Use of AQPI Products

Global **F**orecast **S**ystem Forecast - (**GFS**)

- 28 x 3 hours for (3.5 days) then 26 x 6 hours for (6.5 days):

  Total of **10 days**.

- Updated <u>every 6 hours</u> at 4 and 10 AM/PM (PST)

GFS

Practical Use of AQPI Products

www.ccflood.us/rainmap.html
or
www.contracosta.ca.gov/rainmap

Practical Use of AQPI Products

Point Data Forecast Table

Practical Use of AQPI Products   Forecast Table

- The data is downloaded and the table updated on an hourly basis.

- We are still testing and tweaking this "experimental" table and hope to get confident it what it is telling us.

Practical Use of AQPI Products

AQPI data used on 10/23/2021 for the 10/24-10/25 storm.

- Formatted to color cells **red** when the values looking 24 hour in the future sum to ≥ 2"

- Cells are colored **orange** if the intensity during that time step are ≥ 2"/24 hours or 0.083 "/hr.

Practical Use of AQPI Products

AQPI data used on 10/24/2021 for the 10/24-10/25 storm.

- For the October 24-25 storm, we used a table we were developing to present the **HRRR** and **GFS** data with conditional formatting.

- This showed us that the 2" forecast would be met before the rain began.

Model Results Updated Periodically

v21.10.19

Contra Costa County Flood Control & Water Conservation District

1 of 16

Published: 10/24/21 11:43 AM

<- Time ...racy is ...ied.
<- Time results ...data.
<- Next scheduled model start time.
<- Next time results will be available.

Forecast source: NOAA experimental AQPI forecasts.

= Time step Change **Trace**: < 0.0075 " = timestep rate ≥ 2"/24 hr. or 0.083 "/hr.

= Rain depth relative to 0.01" or MaxRain*1.2 = rainfall ≥ 2" forecast over the next 24 hours.

Shaded Values = Past | **Incremental Rain Forecast (inches)** Faded Values < 0.005

HRRR or GFS Time	West	North Central	Central	South Central	East
Sun 10/24/21 9:00 AM		0.0240	0.0976	0.0260	0.0181
Sun 10/24/21 10:00 AM	0.0582	0.0191	0.0593	0.0123	Trace
Sun 10/24/21 11:00 AM	0.1000	0.0374	0.0783	0.0146	0.0165
Sun 10/24/21 12:00 PM	0.7047	0.3528	0.4220	0.0122	Trace
Sun 10/24/21 1:00 PM	0.4953	0.5260	0.5374	0.3626	0.2528
Sun 10/24/21 2:00 PM	0.4614	0.5669	0.4575	0.4701	0.2642
Sun 10/24/21 3:00 PM	0.5291	0.4441	0.4106	0.7461	0.2768
Sun 10/24/21 4:00 PM	0.2804	0.4965	0.4753	0.5676	0.2206
Sun 10/24/21 5:00 PM	0.2689	0.3496	0.4858	0.3902	0.2386
Sun 10/24/21 6:00 PM	0.2551	0.1902	0.2488	0.6154	0.2933
Sun 10/24/21 7:00 PM	0.2622	0.2425	0.3780	0.5303	0.1874
Sun 10/24/21 8:00 PM	0.2807	0.2228	0.1819	0.3303	0.1882
Sun 10/24/21 9:00 PM	0.1823	0.1402	0.1799	0.2272	0.1028
Sun 10/24/21 10:00 PM	0.1496	0.1835	0.2642	0.1654	0.1358
Sun 10/24/21 11:00 PM	0.1744	0.1094	0.1665	0.1894	0.1106
Mon 10/25/21 12:00 AM	0.1622	0.1039	0.1642	0.1752	0.1709
Mon 10/25/21 1:00 AM	0.0614	0.0843	0.1047	0.1177	0.1004
Mon 10/25/21 2:00 AM	0.0854	0.0705	0.0752	0.1457	0.0563

AQPI — Advanced Quantitative Precipitation Information

Contra Costa County Flood Control & Water Conservation District

Practical Use of AQPI Products   7532 Plots

- We put the data in some graphics that display the status of the **7532 Flood! Protocols.**

- In this image the "Flood Forecast Meter" shows there is no threat of flooding.

7-5-3-2 Forecst Analysis Summary Plots

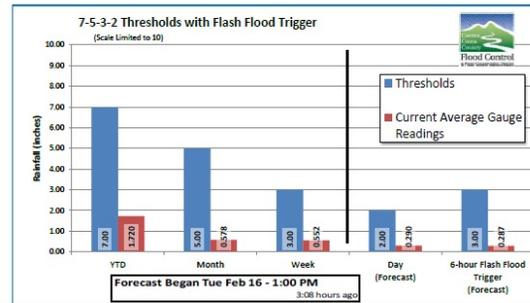These plots summarize the past rainfall measurements and 24-hour forecast for the "7-5-3-2 Flood!" protocols.
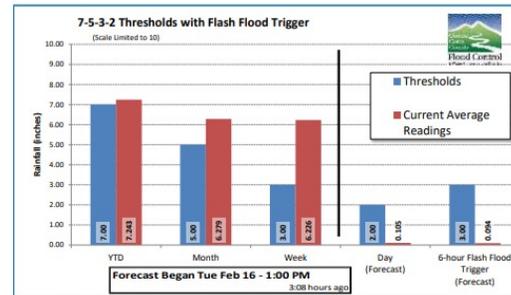
Based on Average Gauge Readings

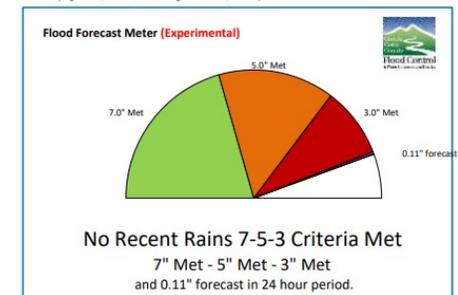| Information for the "Thresholds" plot	Year to Date+ (inches)	Avg 30 Days+ (inches)	Avg 7 Days+ (inches)	Avg. or Max 24-hr Rainfall Forecast++ (inches)	6-hour Flash Flood Trigger (Forecast)
Thresholds	7.00	5.00	3.00	2.00	3.00
Current Average Gauge Readings	1.72	0.58	0.55	0.29	0.29

Based on Average Gauge Readings Plus Forecasts

Projected Average by Fri Oct. 22 - 5:00 PM Forecast Began Thu Oct 21 - 3:00 PM	Year to Date+ (inches)	Avg 30 Days+ (inches)	Avg 7 Days+ (inches)	Avg. or Max 24-hr Rainfall Forecast++ (inches)
Compare to Protocol:	7.00	5.00	3.00	2.00
Highlighted if current Average Data + Average Cum. Forecast meets Protocols	2.01	0.87	0.84	0.29

+Values based on Average Gauge plus Average forecast Values in Total Cumulative Table.
++Max(Avg 24-hr QPF from above or Avg Max 24-hr QPF sheet)

Published:
Thursday 10/21/2021 5:43 PM

These tables and charts are Experimental

Published:
Thursday 10/21/2021 5:43 PM

Practical Use of AQPI Products   7532 Plots

- As of October 26, 2021 our watershed were primed and wet. The forecast was relatively clear.

7-5-3-2 Forecst Analysis Summary Plots

These plots summarize the past rainfall measurements and 24-hour forecast for the "7-5-3-2 Flood!" protocols.
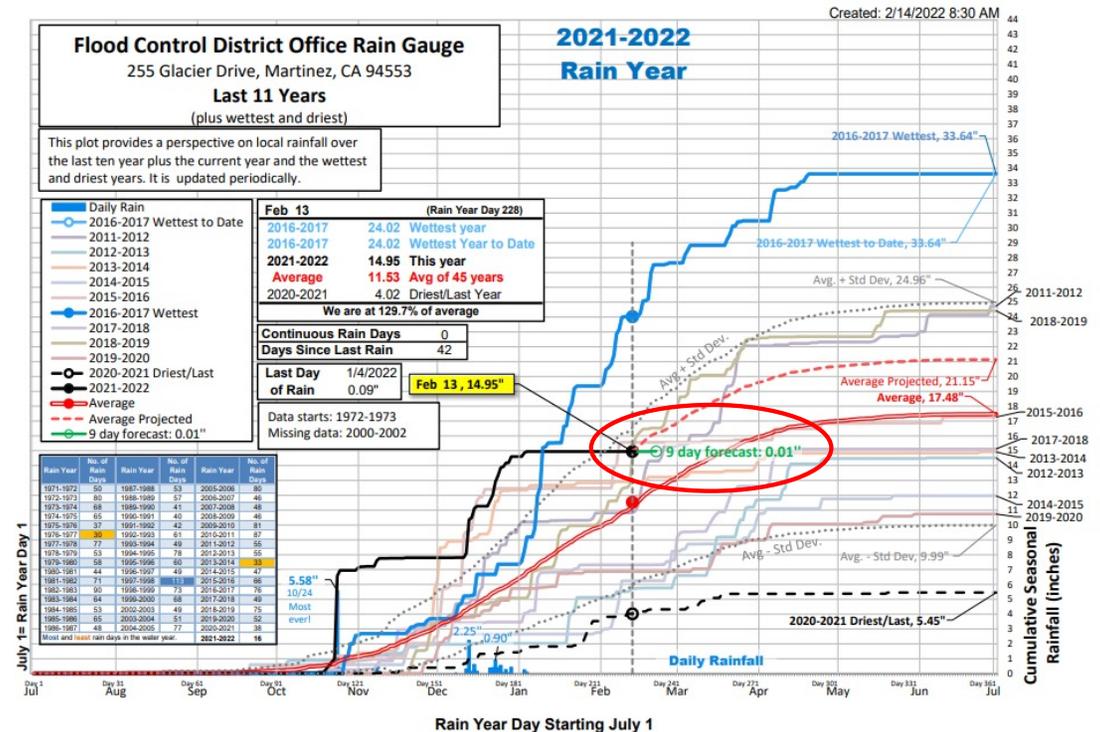
Timing   **Severity**

Practical Use of AQPI Products   11 Year Plot

- I figured out a way to put the forecast in our "11 year plot".

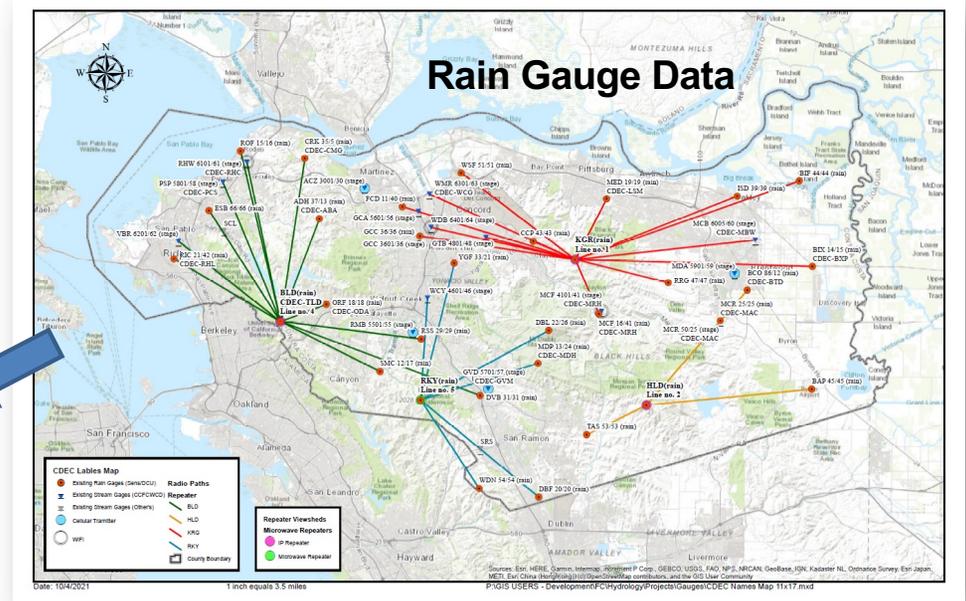- See green projection from the black line of this years rainfall.

Practical Use of AQPI Products

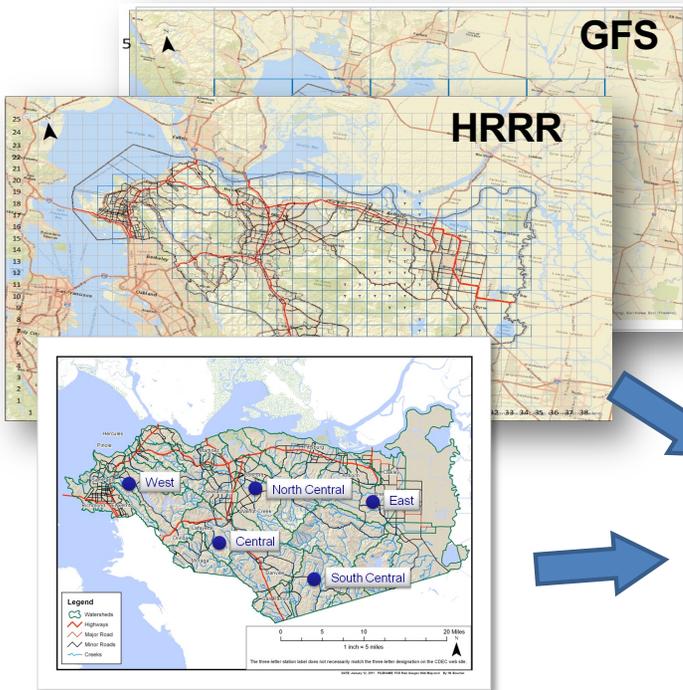

GFS

HRRR

Rain Gauge Data

? 7 5 3 2 FLOOD!

AQPI
Advanced Quantitative
Precipitation Information

Contra Costa County
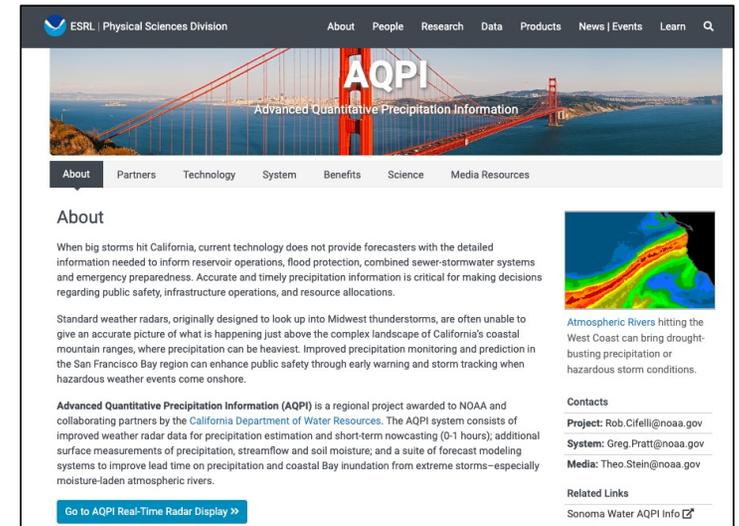Flood Control
& Water Conservation District

Practical Use of AQPI Products

- The AQPI radar system, once fully implemented, will feed the radar data into the models making them much more accurate in time and space.

AQPI and other Web Sites

- Sonoma Water
  https://www.sonomawater.org/aqpi/

- Contra Costa County Flood Control's RainMap
  https://ccflood.us/rainmap.html

- National Water Model Map
  https://water.noaa.gov/map

Q&A

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www.contracosta.ca.us/RainMap