Drought Update

• Current Hydrologic Conditions
• Watershed-Specific Drought Efforts (March is Water Data Month)
  • Bay-Delta
  • Mill & Deer Creeks
  • Russian River
  • Scott & Shasta Rivers
• Drinking Water
• Other Actions
Hydrologic Conditions Update

• Department of Water Resources & U.S. Bureau of Reclamation

• Division update – hydrologic conditions

• Watershed specific information

• Enforcement update
Bulletin 120 and Water Year Forecast
Updated 3/8/2022

• Sacramento River Index
  • 50% Exceedance Forecast – 4.8 (Critically Dry Year)
  • 90% Exceedance Forecast – 4.0 (Critically Dry Year)

• San Joaquin River Index
  • 50% Exceedance Forecast – 2.0 (Critically Dry Year)
  • 90% Exceedance Forecast – 1.3 (Critically Dry Year)
Other Reservoirs
Updated 3/10/2022

- **Cachuma Reservoir**: 91,030 acre-feet full out of 193,305 acre-foot capacity (47% of capacity and 64% of average)

- **Diamond Valley Lake**: 568,798 acre-feet full out of 810,000 acre-foot capacity (70% of capacity)

- **San Luis Reservoir**: 897,030 acre-feet out of 2,041,000 acre-foot capacity (44% of capacity and 53% of average)
The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

Author:
Brian Fuchs
National Drought Mitigation Center

droughtmonitor.unl.edu
March is Water Data Month!

- Additional slides this meeting on:
  - Updating Water Rights Data for California (UPWARD)
  - The data of drought decisions
  - How drought data is used
  - Drought Water Rights Allocation Tool (DWRAT) in the Russian River
Elements of Water (Un)Availability Analysis

- **How much** water is available?
- **When** is the water available?
- **Where** is the water available?
- **How many** water right diversions are there?
- **Where** are the diversions?
- **How much** are they diverting?
- **When** are they diverting?
- **What is the relative priority** in the event of a shortage?

![Supply vs Demand](image)
Division maintains database of diversions as reported by diverters – key to building drought response actions, permitting, and public trust considerations

- FY 2020-21 State Budget allocated funds to rebuild system
- Process is underway
- [www.waterboards.ca.gov/upward](http://www.waterboards.ca.gov/upward)
Delta Curtailments and Compliance Status

• **Curtailments Status Update** as of March 8\(^{th}\):
  - Current curtailments based on watershed-wide water unavailability
  - Curtailments in place for subset of project rights in Sacramento and San Joaquin River watersheds and Legal Delta
  - Projected to expand as dry conditions persist
  - Updates to continue on a weekly basis

• **Reporting Compliance** as of March 10\(^{th}\):
  - Compliance Certification Forms – compliance largely unchanged: 12,652 (~76%)
  - Enhanced Reporting – significant decreasing trend in compliance
    - Follow-up actions expected in the near future
Data & Delta Watershed Curtailments

Data drives the Water Unavailability Methodology for the Delta Watershed

- Forecasted Supply Data
  - DWR’s Bulletin 120
  - CNRFC Full Natural Flow (FNF)

- Self-Reported Demand Data
  - Annual Reports of Diversion and Use
  - Enhanced Reporting of Demand

Determination of Water Unavailability by Priority of Right and Implementation of Curtailment
Delta Curtailments & Data Transparency

• Water Unavailability Methodology is driven by **publicly available data**

• Division maintains multiple online, interactive tools and visualizations:
  
  • **Interactive Curtailment Status List** – Diverters can monitor the real-time curtailment status for their water right or claim
  
  • **Water Unavailability Visualization** – Diverters can visualize the impact of supply shortages by priority of right at the watershed and subwatershed scale
  
  • **PowerBI Compliance Tracker** – Diverters can monitor compliance with reporting requirements authorized under the emergency regulation
### Delta Interactive Curtailment Status List - Tableau

![Curtailment List](image.png)

**Curtailment status should not be construed as a validation of a water right claim or an authorization to divert.**

<table>
<thead>
<tr>
<th>WR ID</th>
<th>Primary Owner</th>
<th>Claimed Priority Year</th>
<th>Curtailed</th>
</tr>
</thead>
<tbody>
<tr>
<td>A000018</td>
<td>GLENN-COLUSA IRRIGATION DISTRICT</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000023</td>
<td>U.S. BUREAU OF RECLAMATION</td>
<td>Project</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000026</td>
<td>JAMES S PHELPS, TRUSTEE</td>
<td>1918</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000027</td>
<td>RECLAMATION DISTRICT #1004</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000065</td>
<td>FRANK KIMP</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000077A</td>
<td>Northern California Power Agency</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000135</td>
<td>RICHARD L JENNINGS</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000138</td>
<td>CARMICHAEL WATER DISTRICT</td>
<td>1915</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000186</td>
<td>CACHIL DEHE BAND OF WINTUN INDIANS OF</td>
<td>1916</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000290A</td>
<td>W.A. YERKA FAMILY REV TRUST</td>
<td>1916</td>
<td>Not Curtained</td>
</tr>
<tr>
<td>A000290B</td>
<td>CHARLES WISEAVER</td>
<td>1916</td>
<td>Not Curtained</td>
</tr>
</tbody>
</table>

*Instruct: a statement of allocation and use that asserts prior 1914 appropriative claim of right with a year of first use after 1914. For purposes of curtailing, and in the absence of reliable information supporting an earlier priority date, these claims are treated as having priority date of January 1, 1914.*

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**Note:**

- The table above is a snapshot of the Delta Interactive Curtailment Status List. It includes various water right IDs, primary owners, claimed priority years, and whether they are curtained or not.
- The status list is updated as of 3/2/2022 and is effective from that date.
- Curtailment status should not be construed as a validation of a water right claim or an authorization to divert.
Delta Water Unavailability Visualization Tool - Tableau
Delta Compliance & Responses Tracker - PowerBI
Mill & Deer Creeks

• Curtailment drought minimum flow requirements will remain in effect October 15-June 30, pending drought continuance and fish presence

• 50 cfs to the confluence with the Sacramento River has been consistently maintained on both Mill Creek and Deer Creek since October 15

• Pulse flow requests by Department of Fish and Wildlife or National Marine Fisheries Service may be submitted to the Board as early as April 1, 2022

• Voluntary action discussions are ongoing with stakeholders from each creek following meetings in February 2022
Russian River

• **Curtailment Status**: curtailments suspended through April 1, 2022

• **Interactive Compliance Response Tracker**: [Power BI Dashboard](https://www.waterboards.ca.gov/drought/russian_river/)

  accessible on Russian River Drought webpage

[https://www.waterboards.ca.gov/drought/russian_river/](https://www.waterboards.ca.gov/drought/russian_river/)
Lake Mendocino Storage

October 2019 to March 2022

Updates as of 3/9/2022

Calpella Current Flow
56 cfs

Lake Mendocino Outflow
31 cfs

Healdsburg Current Flow
108 cfs

Lake Mendocino Storage
42,891 acre-feet
Elements of Water Availability Analysis

- **How much** water is available?
- **When** is the water available?
- **Where** is the water available?
- **How many** water right diversions are there?
- **Where** are the diversions?
- **How much** are they diverting?
- **When** are they diverting?
- **What is the relative priority** in the event of a shortage?
What is DWRAT?

A **set of mathematical equations** representing constraints and objective functions (rules and goals), optimized using a solver.

**Goals:** Maximize allocation of water for beneficial uses while minimizing shortage

**Rules:** 1) Geography 2) Physics 3) Legal Priority

https://github.com/CAWaterBoardDataCenter/DWRAT

See reference material for full list of constraints and detailed objective functions.
Drought Water Right Allocation Tool (DWRAT)

Water Availability in the Russian River Watershed

Three guys walk into a bar...

- Riparian allocation of shortage:
  - $1\frac{1}{2}$ cups
    - $\frac{1}{2}$ cup
    - $\frac{1}{2}$ cup
    - $\frac{1}{2}$ cup

- Appropriative allocation of shortage:
  - $1\frac{1}{2}$ cups
    - 1 cup
    - $\frac{1}{2}$ cup
    - 0 cups
Example Data Driven Water Availability Analysis

1. Supply Flow Data
Supply Flow Data Sources

- Russian River – uses a Surface Water Runoff Hydrologic Model
- PRMS
- Other options:
  - Direct Gage Data
  - Disaggregated Gage Data
  - Statistical Regression Models
  - Machine Learning Models
  - Remote Sensing Technology (potential future application)

Figure 1. PRMS Hydrologic Processes. Adapted from “Precipitation Runoff Modeling System” by Markstrom and Others, 2020, retrieved from https://www.usgs.gov/software/precipitation-runoff-modeling-system-prms
Example Data Driven Water Availability Analysis

1. Supply Flow Data
Example Data Driven Water Availability Analysis

1. Supply Flow Data
2. Basin Delineation
Rules of Physics and Geography
Example Data Driven Water Availability Analysis

1. Supply Flow Data
2. Basin Delineation
3. Then add in Demand Data

https://www.waterboards.ca.gov/drought/drought_tools_methods/demandanalysis.html
Implementation and Support for Regulatory Action
Scott & Shasta Rivers

• Curtailment Status:
  - **Scott**: All curtailments suspended through March 18th (March flow requirement: 200 cfs flow requirement)
  - **Shasta**: All curtailments suspended through March 31st so long as flows maintained at or above 135 cfs flow requirement and coordination with Watermaster

• Local Cooperative Solutions:
  - New [webpage](#) and guidance posted
  - First proposal received and under review
Scott River

- **Sep 10 Curtailments, 9/10/2021**
- **All Curtailments in effect, 12/1/2021**
- **Curtailments partially or temporarily suspended on this date**
- **Emergency Minimum Flows**
- **1,324 adult Chinook**
  - 829 adult Coho,
  - 01/03/2022
- **340 juvenile Chinook**
  - 146 juvenile Coho,
  - 03/04/2022
### Shasta River Watershed Curtailment Status Dashboard

**Last Date Updated:** February 25, 2022  
(only shows curtailed water rights and water rights with suspended curtailments)

<table>
<thead>
<tr>
<th>Application Number</th>
<th>Primary Owner</th>
<th>Curtailment Status</th>
</tr>
</thead>
<tbody>
<tr>
<td>A000448</td>
<td>GRENADE IRRIGATION DISTRICT</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A003544</td>
<td>MONTAGUE WATER CONSERVATION DISTRICT</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A003555</td>
<td>MONTAGUE WATER CONSERVATION DISTRICT</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A003952</td>
<td>WILLIAM B DUNCAN</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A004831</td>
<td>RAYMOND D EKSTROM</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A004909</td>
<td>MONTAGUE WATER CONSERVATION DISTRICT</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A008809</td>
<td>EMMERSON INVESTMENT, INC</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A010930</td>
<td>FREDERICK SCHNACK</td>
<td>Curtailment Suspended</td>
</tr>
<tr>
<td>A010949A</td>
<td>CALIFORNIA DEPARTMENT</td>
<td>Curtailment Suspended</td>
</tr>
</tbody>
</table>

**Filter Water Rights**  
- Select all  
- Appropriative Groundwater Right  
- Surface Water Right

Note: Appropriative Groundwater Right locations are approximate.
Water Right Enforcement Updates

Scott and Shasta Rivers
• Preparing to Issue Administrative Civil Liability Orders on March 21
• 30 pending complaint investigations

Sacramento and San Joaquin Watersheds
• Investigated and closed 25 complaints this winter while curtailments were suspended
• Term 91 curtailments anticipated to be the first curtailment inspections in 2022

Russian River Watershed
• Issued 60 Final Administrative Civil Liability Orders
• 15 pending complaint investigations

Statewide, year-round presence in investigating water right complaints, regardless of curtailment status
More on Water Data Month

• A new data visualization every day in March

• [www.waterboards.ca.gov/resources/oima/cowi/water_data_month.html](http://www.waterboards.ca.gov/resources/oima/cowi/water_data_month.html)
Additional Information & Updates

• Dry year warning letter to all water right holders or claimants (40,000+) will be mailed this week or early next week.

• Drought Webpage
  • waterboards.ca.gov/drought

• Email Subscription Lists
  • waterboards.ca.gov/resources/email_subscriptions
    • Under “State Water Resources Control Board”, then “Water Rights”
  • Bay-Delta: “Delta Drought”
  • Mill & Deer Creeks: “Mill Deer Drought”
  • Russian River: “Russian River Drought”
  • Scott & Shasta Rivers: “Scott-Shasta Drought”
Lake Shasta Levels: Various Past Water Years and Current Water Year, Ending At Midnight March 9, 2022

Total Reservoir Capacity: 4,552,000 AF

Lake Shasta Conditions
(as of Midnight - March 9, 2022)

Reservoir Capacity (AF)

Current Level: 1,704,821 AF

37% (Total Capacity) 51% (Historical Avg.)
Lake Oroville Levels: Various Past Water Years and Current Water Year, Ending At Midnight March 9, 2022

Total Reservoir Capacity: 3,537,577 AF

Lake Oroville Levels (AF)

Water Year (October 1 - September 30)

Historical Average
Total Reservoir Capacity

Lake Oroville Conditions
(as of Midnight - March 9, 2022)

Current Level: 1,630,633.1 AF
46% (Total Capacity) 71% (Historical Avg.)
New Melones Lake Levels: Various Past Water Years and Current Water Year, Ending At Midnight March 9, 2022

Total Reservoir Capacity: 2,400,000 AF

New Melones Lake Level Conditions
(as of Midnight - March 9, 2022)

Current Level: 967,995 AF

40% (Total Capacity) 87% (Historical Avg.)
## U.S. Drought Monitor

### Colorado Basin RFC

#### March 8, 2022
(Released Thursday, Mar. 10, 2022)
Valid 7 a.m. EST

<table>
<thead>
<tr>
<th>Drought Conditions (Percent Area)</th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Current</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>68.85</td>
<td>60.88</td>
<td>18.36</td>
<td>0.32</td>
</tr>
<tr>
<td><strong>Last Week</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>68.85</td>
<td>60.88</td>
<td>19.36</td>
<td>0.32</td>
</tr>
<tr>
<td><strong>3 Months Ago</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>91.35</td>
<td>68.02</td>
<td>33.67</td>
<td>4.12</td>
</tr>
<tr>
<td><strong>Start of Calendar Year</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>81.98</td>
<td>58.30</td>
<td>16.07</td>
<td>0.32</td>
</tr>
<tr>
<td><strong>Start of Water Year</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>91.13</td>
<td>71.92</td>
<td>46.19</td>
<td>8.34</td>
</tr>
<tr>
<td><strong>One Year Ago</strong></td>
<td>0.00</td>
<td>100.00</td>
<td>99.50</td>
<td>91.49</td>
<td>80.59</td>
<td>51.66</td>
</tr>
</tbody>
</table>

### Intensity:
- None
- D0 Abnormally Dry
- D1 Moderate Drought
- D2 Severe Drought
- D3 Extreme Drought
- D4 Exceptional Drought

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. For more information on the Drought Monitor, go to https://droughtmonitor.unl.edu/About.aspx

### Author:
Brian Fuchs
National Drought Mitigation Center

droughtmonitor.unl.edu

California Water Boards
U.S. Seasonal Drought Outlook
Drought Tendency During the Valid Period

Valid for March 1 - May 31, 2022
Released February 28, 2022

Consistency adjustment based on Monthly Drought Outlook for March 2022

Depicts large-scale trends based on subjectively derived probabilities guided by short- and long-range statistical and dynamical forecasts. Use caution for applications that can be affected by short lived events. "Ongoing" drought areas are based on the U.S. Drought Monitor areas (intensities of D1 to D4).

NOTE: The tan areas imply at least a 1-category improvement in the Drought Monitor intensity levels by the end of the period, although drought will remain. The green areas imply drought removal by the end of the period (D0 or none).

Author:
Yun Fan
NOAA/NWS/NCEP/Climate Prediction Center

http://go.usa.gov/3eZ73
La Niña is likely to continue into the Northern Hemisphere spring (53% chance during June-August 2022).

Afterwards, there is a 40-50% chance of La Nina or ENSO-neutral Conditions