Washington Water Supply Availability Committee
Hosted by Jeff Marti

https://watech.webex.com/watech/j.php?MTID=m35f37cc2f338fb71534395a866a79c2b
Friday, Dec 3, 2021 10:00 am | 2 hours | (UTC-08:00) Pacific Time (US & Canada)
Meeting number: 2453 974 2248
Password: thinkSnow2022
Agenda: The Washington Water Supply Availability Committee meets periodically to monitor water supply conditions and forecasts.

Join by video system
Dial 24539742248@webex.com
You can also dial 173.243.2.68 and enter your meeting number.
<table>
<thead>
<tr>
<th>Start Time</th>
<th>End Time</th>
<th>Duration, min</th>
<th>Description</th>
<th>Presenter</th>
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</thead>
<tbody>
<tr>
<td>10:00</td>
<td>10:15</td>
<td>15</td>
<td>Welcome &amp; Introductions</td>
<td>Jeff Marti</td>
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<tr>
<td>10:15</td>
<td>10:30</td>
<td>15</td>
<td>Mountain Report</td>
<td>Scott Pattee, NRC</td>
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<td>10:30</td>
<td>10:45</td>
<td>15</td>
<td>Regional Climate Perspective</td>
<td>Karin Bumbaco/Nick Bond, OWSC</td>
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<tr>
<td>10:45</td>
<td>10:55</td>
<td>10</td>
<td>Streamflow Conditions</td>
<td>Nick Sutfin, USGS</td>
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<tr>
<td>10:55</td>
<td>11:05</td>
<td>10</td>
<td>Streamflow Forecasting</td>
<td>Amy Burke, NWRFC</td>
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<tr>
<td>11:05</td>
<td>11:30</td>
<td>25</td>
<td>Continuing status of Drought Declaration</td>
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<td>Reports from other water managers</td>
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</tbody>
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Total 1.50

NEXT MEETING: FRIDAY JANUARY 14TH
Washington statewide average Snow Water Equivalent on December 03 compared to previous years sorted by year

NRCS data

ranked by SWE
Where has precipitation been less than 75 percent of normal?
Upcoming Event

<table>
<thead>
<tr>
<th>December 13</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pacific Northwest DEWS December Drought &amp; Climate Outlook</strong></td>
</tr>
<tr>
<td>This webinar will feature recent and current conditions, outlooks, as well as presentations on a &quot;Smoke Ready Community&quot; and &quot;An Analysis of the Impact of Drought on Agriculture, Local Economies, Public Health, and Crime Across the Western United States.&quot;</td>
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<tr>
<td>These webinars provide the region's stakeholders and interested parties with timely information on current and developing drought conditions, as well as climatic events like El Niño and La Niña. Speakers will also discuss the impacts of these conditions on things such as wildfires, floods, disruption to water supply and ecosystems, as well as impacts to affected industries like agriculture, tourism, and public health.</td>
</tr>
<tr>
<td><a href="https://www.drought.gov/events/pacific-northwest-dews-december-drought-climate-outlook">https://www.drought.gov/events/pacific-northwest-dews-december-drought-climate-outlook</a></td>
</tr>
</tbody>
</table>
statewide SWE vs accumulated precipitation since Oct 1
day of year December 02

red = drought declared the following spring/summer
Probability of SWE Recovery to Median by April 1
Sasse Ridge Site ID 734 Dec-2 thru Apr-1

- Today's SWE difference (+/-): -4.1
- Normal accumulation to April 1st: 26.9
- Needed accumulation: 31
- Prob recovery = 25%

Median SWE accum

Prob of Reaching Median

needed SWE
PRECIPITATION
BASIN
SOIL MOISTURE
DEPTH AVERAGED SOIL SATURATION IN CONCULLY LAKE

Reset Range

Current as of 12/02/2021

Percent Saturation (%)

Nov 1

Jan 1

Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: 30-Year Hydroclimatic Normals
DEPTH AVERAGED SOIL SATURATION IN COLCKUM

Current as of 12/02/2021

Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: 30-Year Hydroclimatic Normals
DEPTH AVERAGED SOIL SATURATION IN METHOW

Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: 30-Year Hydroclimatic Normals
DEPTH AVERAGED SOIL SATURATION IN COWLITZ

Current as of 12/02/2021

Percent Saturation (%)

Nov 1

Jan 1

Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.

For more information visit: 30-Year Hydroclimatic Normals
DEPTH AVERAGED SOIL SATURATION IN NEWMAN LAKE

Statistical shading breaks at 10th, 30th, 50th, 70th, and 90th Percentiles.
For more information visit: 30-Year Hydroclimatic Normals
1991-2020
Averages/Medians
Skookum Creek (912) Washington SNOTEL Site - 3310 ft
Reporting Frequency: Daily; Date Range: 2021-10-01 to 2022-09-30

Warning: Only positive values can be interpreted on a logarithmic scale.
Salmon Meadows (728) Washington SNOTEL Site - 4460 ft
Reporting Frequency: Daily; Date Range: 2021-10-01 to 2022-09-30

Warning: Only positive values can be interpreted on a logarithmic scale.
UPPER COLUMBIA
Snow Water Equivalent Normals Comparison

Site List - Site Normals

Apr 5
Max: 46.2 in.
Median ('81-'10): 21.1 in.
Median ('91-'20): 20.2 in.
Min: 9.1 in.
Change: -0.9 in. (-4%)

Basin Index (in.)

Nov 1 Jan 1 Mar 1 May 1 Jul 1

Max - Median ('81-'10) - Median ('91-'20) - Min - Change
A shift in normals may occur for several reasons including:

1) change in underlying data due to different 30-year reference periods
2) change in calculation methods
3) change in number of stations with official normals
4) change in monitoring site conditions.
Current Conditions and Seasonal Outlook

Nick Bond & Karin Bumbaco
Office of the Washington State Climatologist
Cooperative Institute for Climate, Ocean, and Ecosystem Studies
University of Washington
3 December 2021
Sept-Oct-Nov 2021

- Averaged statewide, Sept-Oct rank as 15th wettest* (+2.99”)
- SeaTac AP, Bellingham, and Quillayute measured wettest Sept-Nov on record

*Records since 1895
Sept-Oct County Precipitation

County Precipitation Rank (of 127 years) September - October 2021

Washington (Hover over a county) Precip: 8.35" Rank: 15th Wettest Anomaly: 2.74" Mean: 5.61"
Warm temperatures were primarily overnight
Multiple atmospheric river events leading to heavy precipitation and flooding
0.92" deficit
Precipitation Required to End the Drought

Percent of Normal Precip Needed to End Drought Conditions in 5 Months
(by the end of Apr)

(uses 1981-2010 normal)
Percent of Normal Precip Needed to End Drought Conditions in 3 Months

Total Precipitation Anomaly, Dec 2021 to Feb 2022 Average

Multi-model mean from 5 downscaled NMME models - forecast made Nov 8, 2021
**ENSO Predictions**

**Mid-November 2021 IRI/CPC Model-Based Probabilistic ENSO Forecasts**

ENSO state based on NINO3.4 SST Anomaly
Neutral ENSO: -0.5 °C to 0.5 °C

- La Niña Forecast Probability
- Neutral Forecast Probability
- El Niño Forecast Probability
- La Niña Climatology
- Neutral Climatology
- El Niño Climatology

**Observed vs. Model Predictions of ENSO from Nov 2021**

- CPC CONSOL
- DYN AVG
- STAT AVG
- Dynamical Models
- NCEP CFSv2
- CSU-NCAR
- ERSST
- ECMWF
- ECMWF
- ACCESS
- JMA
- IFS
- MLB
- CSIRO
- BCC_CSM11m
- IOCAS ICM

Statistical Models
- CPC MKOV
- CPC CA
- CSU CLIPR
- IAP-NIN
- NTU CODA
- BCC-B20M
- UCLA-TCD

**Seasonal Forecast Probabilities**

<table>
<thead>
<tr>
<th>Season</th>
<th>Probability (%)</th>
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<tbody>
<tr>
<td>NDJ</td>
<td>80</td>
</tr>
<tr>
<td>DJF</td>
<td>85</td>
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<tr>
<td>JFM</td>
<td>70</td>
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<tr>
<td>FMA</td>
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<td>MAM</td>
<td>50</td>
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<td>AMJ</td>
<td>30</td>
</tr>
<tr>
<td>MJJ</td>
<td>20</td>
</tr>
<tr>
<td>JJJ</td>
<td>10</td>
</tr>
<tr>
<td>JAS</td>
<td>0</td>
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</table>

**Model Predictions of ENSO from Nov 2021**

- CPC CONSOL
- DYN AVG
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- NCEP CFSv2
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- IOCAS ICM

Statistical Models
- CPC MKOV
- CPC CA
- CSU CLIPR
- IAP-NIN
- NTU CODA
- BCC-B20M
- UCLA-TCD
Latest Set of Week 3-4 Forecasts from CFSv2
Dec-Feb Precipitation Anomalies

NMMEM

Prob fcst

PAC calib, prob fcst

NCEP_CFSv2

CanCM4i

GEM_NEMO

GFDL_SPEAR

NCAR_CCSM4

NASA_GEOS5v2

IMME
Summary

- The autumn of 2021 has been wet in WA state compared to historical norms and drought conditions have improved, particularly west of the Cascade Mountains.

- The precipitation to completely end the drought is unlikely to materialize in the areas of southeastern WA with the largest deficits.

- A more typical La Niña pattern – with cooler and wetter conditions – is likely to emerge to help produce a decent mountain snowpack in the winter of 2021-22.
Streamflow Conditions in Washington State as of December 2, 2021

Presented to
The Washington State Water Supply Availability Committee
on
Dec. 3rd, 2021

by
Nicholas Sutfin
USGS Washington Water Science Center

http://wa.water.usgs.gov
Duration Hydrograph, Washington State

7-day Average Streamflow (as of Dec. 2, 2021) is near the 90\textsuperscript{th} percentile
Index Gaging Stations
(Stations that measure natural or near-natural streamflow)
Index Gaging Stations, 7-day average streamflow (as of Dec. 3, 2021)

Much Above Normal

Above Normal

Normal

Below Normal

Much Below Normal
Daily streamflow in Washington Rivers compared to historical streamflow, Nov. 1, 2020 – Dec 2, 2021

Percentage of rivers and streams in category

Below normal
At or above normal
Monthly average streamflow for Sept. and Oct. 2021

September 2021

October 2021

Explanations:
- **Low (<10)**: Much below normal
- **10-24**: Below normal
- **25-75**: Normal
- **76-90**: Above normal
- **>90**: Much above normal

High
Monthly Average Streamflow for December 2021
Average Dec. Streamflow 2021

Streamflow for December 1st

Streamflow for all days of the year

Explanation - Percentile classes

<table>
<thead>
<tr>
<th>Low</th>
<th>&lt;10</th>
<th>10-24</th>
<th>25-75</th>
<th>76-90</th>
<th>&gt;90</th>
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<tr>
<td>Much below</td>
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<tr>
<td>normal</td>
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<td>Below normal</td>
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<td>Normal</td>
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<td>Above normal</td>
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<td>Much above</td>
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<td>normal</td>
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USGS science for a changing world
WA Current Groundwater Conditions (Dec. 2nd, 2021)
WA Current Groundwater Conditions (Dec. 2nd, 2021)

Scatter Creek well (465033122570202) in Thurston Co. (16N/02W-29L02P2)
- 82-ft deep
- Sand and gravel
Davenport well in Lincoln County (24N/36E-16A01)
- 117-ft deep
- Wanapum Basalt
WA Current Groundwater Conditions (Dec. 2nd)

Scatter Creek well

Davenport well
Streamflow

7-day average streamflow statewide is above normal (near 90th percentile).
- Much of the state is currently at normal flow conditions whereas the north central part of the state and the northern Cascades are much above normal conditions (>90th percentile)

7-day average streamflow at eight index gaging stations:
- North:
  - Nooksack River: **Much Above Normal**
- Southwest: **Normal**
  - Chehalis River nr. Grand Mound, EF Lewis River, Quinault River at Quinault Lake, Puyallup River nr. Orting
  - American River: **Above Normal**
- East side:
  - Hangman Creek – **Below normal**
  - Walla Walla River – **Much Below Normal**

Groundwater

Index groundwater sites:
- Davenport well (east) – **Below Normal**
- Scatter Creek well (west) – **Much Above Normal**
Index Gaging Stations, 7-day average streamflow (as of Dec. 3, 2021)
Seasonal Precipitation
Oct 1, 2021 – Dec 02, 2021

Seasonal Precipitation (Percent Normal)

- Red: Below 50%
- Orange: 50 – 70%
- Yellow: 70 – 90%
- Green: 90 – 110%
- Light Green: 110 – 130%
- Blue: Above 130%

Creation Time: Friday, Dec 3, 2021
Northwest River Forecast Center
Yakima Airport Weather, Pendleton, National Weather Service

KYKM - Oct 2021 Through Sep 2022

Temperature (Deg F)

Precipitation (Inches)

2.50 (167% average, estimated)
Yakima Basin Precipitation
Oct-Nov: 70.94 in., 121.7% Avg