NOAA West Watch

Reporting Regional Environmental Conditions & Impacts in the West

March 20, 2018
Call Agenda

- **Project Recap & Updates (Polly Hicks)**
- **El Niño and Regional Climate brief (Dan McEvoy)**
- **Guest Speaker: Debris-Flow Hazards Following Wildfire (Dennis M. Staley, USGS)**
- **IOOS Nearshore Conditions brief (Julie Thomas, Marine Lebrec, Alex Harper)**
- **Environmental conditions and impacts reporting and discussion (Polly Hicks)**
- **Discussion**
Project Recap and Updates

• NOAA West Watch bi-monthly webinars are a project of the NOAA West Regional Coordination Team

• Goals of the project:
  – **Document and share** environmental conditions information and impacts on human systems and NOAA mission at the regional scale
  – **Improve awareness** of environmental observations and human system impacts across NOAA mission lines
  – **Improve regional communication and coordination**
  – **Improve external communication** of regional impacts

• Next webinar: May 22\textsuperscript{nd}, 1-2PM PDT/ 2-3PM MDT
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Precipitation and Temperature

Water Year To Date
% of Average Precipitation

Water Year To Date
Mean Temperature Departure From Average

https://wrcc.dri.edu/anom/
Snow drought continues, with some improvements

Snow Water Equivalent

Westwide SNOTEL Current Snow Water Equivalent (SWE) % of Normal
Mar 19, 2018

Notice: We anticipate this map will not be available next year due to staffing constraints. Alternate maps: https://go.usa.gov/xnzk5

Current Snow Water Equivalent (SWE) Basin-wide Percent of 1981-2010 Median
unavailable *
-50%
50 - 69%
60 - 89%
70 - 99%
90 - 129%
130 - 149%
150%

* Data unavailable at this time of posting or unavailable at this site or year

Precipitation

Westwide SNOTEL Water Year (Oct 1) to Date Precipitation % of Normal
Mar 19, 2018

Notice: We anticipate this map will not be available next year due to staffing constraints. Alternate maps: https://go.usa.gov/xnzk5

Water Year (Oct 1) to Date Precipitation Basin-wide Percent of 1981-2010 Average
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-50%
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Prev. local data subject to revision

Prepared by:
USDA/NRCS National Water and Climate Center
Portland, Oregon
http://www.wcc.nrcs.usda.gov

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Portland, Oregon
http://www.wcc.nrcs.usda.gov
Snow Drought: California

Statewide Average: 48% of Average

**NORTH**
Data as of March 19, 2018
Number of Stations Reporting | 30
Average snow water equivalent (Inches) | 11.2
Percent of April 1 Average (%) | 40
Percent of normal for this date (%) | 40

**CENTRAL**
Data as of March 19, 2018
Number of Stations Reporting | 39
Average snow water equivalent (Inches) | 16.0
Percent of April 1 Average (%) | 54
Percent of normal for this date (%) | 55

**SOUTH**
Data as of March 19, 2018
Number of Stations Reporting | 28
Average snow water equivalent (Inches) | 10.9
Percent of April 1 Average (%) | 42
Percent of normal for this date (%) | 43

**STATE**
Data as of March 19, 2018
Number of Stations Reporting | 97
Average snow water equivalent (Inches) | 13.1
Percent of April 1 Average (%) | 47
Percent of normal for this date (%) | 48

[https://cdec.water.ca.gov/](https://cdec.water.ca.gov/)
Sierra Nevada Snow Bot

Sierra Nevada SWE as of 2018-3-19: 8 km^3. This is 50.1% of normal for this date. Model by @gcortes @UCLACivil #Snow #California #Water #Drought

- “Miracle March”: 1991
- Sierra Nevada was on pace with 2015, lowest snowpack on record
- March has been wet and snowy helping to mitigate the drought conditions

Data: UCLA, https://margulis-group.github.io/data/
Seasonal Streamflow Forecasts, March 1

- Issued March 1, 2018
- % of average forecast runoff volume

https://www.wcc.nrcs.usda.gov/wsf/westwide.html
Seasonal Streamflow Forecasts, March 19

https://www.cnrfc.noaa.gov/

Colorado River Basin

https://www.cbrfc.noaa.gov/
**ENSO Status**

- **ENSO Alert System Status:** **La Niña Advisory**

- La Niña conditions are present. *

- Equatorial sea surface temperatures (SSTs) are below average across the central and eastern Pacific Ocean.

- A transition from La Niña to ENSO-neutral is most likely (~55% chance) during the March-May season, with neutral conditions likely to continue into the second half of the year.

Credit: CPC

* Note: These statements are updated once a month (2nd Thursday) in association with the ENSO Diagnostics Discussion, which can be found here: http://www.cpc.ncep.noaa.gov/products/analysis_monitoring/enso_advisory/.
The latest weekly SST departures are:

- Niño 4: -0.1°C
- Niño 3.4: -0.7°C
- Niño 3: -0.7°C
- Niño 1+2: -0.7°C
Current Sea Surface Temperatures
ENSO Forecasts

Source: NOAA/CPC
ENSO Forecasts

CPC/IRI El Nino forecast:

NMME models + other dynamical models + statistical models

Source: CPC/IRI
April U.S. Forecasts

Source: NOAA/CPC
U.S. Seasonal Temperature Forecasts

Source: NOAA/CPC
U.S. Seasonal Precipitation Forecasts

Source: NOAA/CPC
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Debris-Flow Hazards Following Wildfire

Dennis M. Staley, Jason W. Kean, and Francis K. Rengers

U.S. Geological Survey Landslide Hazards Program, Golden, CO, USA
Fire-induced Changes That Contribute to Increased Hydrologic Hazard

Combustion of Canopy
+ Physical and Chemical Changes in Soils
Enhanced runoff and Erosion
Fire-induced Changes That Contribute to Increased Hydrologic Hazard

Combustion of Canopy
+ Physical and Chemical Changes in Soils
   Enhanced runoff and Erosion
Debris flow initiated by a **landslide**

Debris flow initiated by **water runoff**

**Elliot State Forest, Oregon**

**Coal Seam Fire, Colorado**
Debris Flow: Fish burn area [2016], Duarte, CA: January 20, 2017
Debris Flow: Fish burn area [2016], Duarte, CA, January 20, 2017
Flooding and Debris Flows Happen Quickly, and Do Not Require Lots of Rain

Manitou Springs, Colorado
July 1, 2013
Storm Duration = ~15 minutes
Max 15 minute Intensity = ~50 mm/h
Flow Duration = < 10 minutes
Flooding: Waldo Canyon burn area [2012], Colorado Springs, CO: July 1, 2013
Intensity Matters!
Montecito, California, January 9, 2018

Storm Duration = Several Hours of low intensity rainfall, with 15 minute burst
Max 15 minute Intensity = ~120 mm/h
Flow Duration = 15 - 30 minutes*

21 Fatalities, 2 missing, 100+ Homes Completely Destroyed, 100s more damaged
Debris Flow Hazard Assessment

https://landslides.usgs.gov/hazards/postfire_debrisflow/

- Likelihood of debris flow
- Estimated magnitude of debris flow.
- Combined hazard.
- Estimated rainfall-intensity duration threshold.
Post-fire floods and debris flows do not require any antecedent moisture.
Post-fire floods and debris flows can be triggered within minutes of intense rainfall.
Hazards may persist 2 – 5+ years following wildfire.
Avoidance is the best form of risk reduction.
USGS provides debris-flow hazard assessments
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Waves runup covered geotube sand cover during high tide.

Westport, Grays Harbor, WA

November 6, 2009, 23ft waves @18 sec
(Photograph by David Michalsen & Scott Brown, USACE Seattle)

Max Significant Wave Heights
1981 - present
Regional Sediment Management (RSM):
“... it is really GOOD to have CDIP wave-riders OPERATIONAL on the WEST Coast... these are huge assets to have while we are being subjected to El Nino and big wave events.”
Rod Moritz USACE

Waves measured 11m significant height
Water depth = 25m
“CDIP’s timely and accurate wave data update every 30 minutes and are highly utilized by the maritime community, where they are critical to safe and efficient navigation by dredging project managers as well as by military, commercial, and recreational mariners.” — Captain Dan Jordan, Columbia River Bar Pilots
San Francisco Corps District

Humboldt Channel Entrance

Wave-driven Surfzone Currents & Sediment Transport

- Balance between year-round NW seas and W storm waves
- Summer months dominated by NW seas and southward transport
- Winter months dominated by W sea & swells and northward transport

Local NW Seas

Southward Surfzone Currents

Northward Surfzone Currents

Strom Waves
Humboldt North Spit

- Buoy data are reviewed prior to annual on-site jetty inspections
- Data are used in the North Jetty site design (when repairs are needed)

Anne Sturm, James Zoulas, and John Dingler, South Pacific Division

3-5 people die per year in nearshore boating accidents (Troy Nicolini – NWS, Eureka).

20ft Hs waves – Jan 26, 2017
https://www.youtube.com/watch?v=46A7eYkCRI8
San Francisco District

1) Assess conditions for dredge material placement sites near the San Francisco Bar and Ocean Beach

2) Assess real-time conditions for hopper dredge captains during annual O&M dredging activities.

Anne Sturm, James Zoulas, and John Dingler, South Pacific Division

Thanks to Michael Dillabough and Capt Kixon
Contributions from NANOOS re PNW coastal conditions
NANOOS Update

www.nanoos.org

Climatology App

Chlorophyll Anomaly

January 2018

February 2018
NANOOS Update

Sea Surface Temperature Anomaly

February 2017

February 2018

November 2017

www.nanoos.org

Climatology App
Air & Water Temperature Anomalies

www.nanoos.org

NANOOS Update

Climatology App

Air T

Water T

Water T
CeNCOOS Climatology Regional Assessment

NANOOS: www.nanoos.org Climatology app
Seasonal Cooling Trend in Monterey Bay

M1 Buoy

Spray Glider
Simultaneous occurrence of three marine algal toxins and one freshwater algal toxin in San Francisco Bay

Two new OA buoys deployed in SF Bay by EOS SFSU

Bay Ocean Buoy (BOB)
Marine Acidification Research Inquiry (MARI)

Long-term water quality monitoring + carbon chemistry + atmospheric CO₂

Peacock et al 2018
Harmful Algae

Photo Credit: Steve Babuljak
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Regional Impacts Summary

Reporting Status:
• 35 entries since January 20, 2018

Environmental Conditions
• Drought
• Snowpack/snow drought
• Wildfires and smoke
• Mudslides
• Water temperatures
• Algal bloom
• Tsunami watch
• Changing ocean conditions
• Global temperature

Human & Environmental Impacts
• Economic impacts
  • Recreational & tourism
  • Agriculture
• Reservoir levels/water restrictions
• Evacuations
• Species impacts
  • Disease susceptibility
  • Average size of individuals
• Harvest restrictions
• Increased human health risks
Impacts in Pictures

Low snowpack in much of the region is impacting recreational use and local economies. By early January, Colorado had lowest snow-pack in 30 years. By February the Sierra Nevada only had 23% of their average snowpack. The lack of snow caused many low-elevation downhill and cross country ski areas to close early or fail to open resulting in potential millions of dollars in economic losses.
Impacts in Pictures

Drought and reduced snowpack is impacting reservoir levels and causing concerns for water users. Lake Powell is expected to get only 47% of its average inflow due to low snowpack.

OR Governor Brown declared a Drought Emergency for Klamath Co, which is at 45% snowpack. Officials predict $557M in economic losses impacting 4,500 jobs in agriculture, natural resources and recreation.

Lack of snow may also impact water temperatures. For the Sacramento River, the BOR is delaying the allocation of water to some agriculture users incase releases are needed to keep temperatures low for endangered chinook salmon.
Impacts in Pictures

Wind-driven fire in rural central California forced evacuations in February.

30,000 individuals were forced to evacuated due to a potential mudslide threat along the Santa Barbara Coast. The evacuations were in the same area that experienced severe mudslides in January.

Mike Eliason/Santa Barbara County Fire/Handout via REUTERS

Matt Udkow/Santa Barbara County Fire Department/Associated Press
Impacts in Pictures

The northern Pacific sardine population (from Mexico to British Columbia) has plummeted 97 percent since 2006. An assessment by NOAA Fisheries and the Pacific Fishery Management Council projects that only 52,065 metric tons of sardines will be along the West Coast on July 1; below the 150,000 metric-ton threshold required for commercial fishing. It is anticipated that the fishery will be closed for a fourth year in a row. The source of the declines is related to both natural fluctuations as well as changing ocean conditions.

Photo: CHUCK KIRMAN, AP
Impacts in Pictures

WA Governor Inslee announced an initiative that directs state agencies to take immediate and long-term steps to protect the Southern Resident Killer Whales. The endangered orcas are at a 30-year low with only 76 individuals down from 98 in 1995.
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• Discussion (all)
  – Additional impacts to report?
  – Observations on recent environmental anomalies?

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