NOAA West Watch

Reporting Regional Environmental Conditions & Impacts in the West

March 21, 2017
Call Agenda

• **Project Recap & Updates (Ruth Howell)**

• El Niño and Regional Climate brief (Dan McEvoy)

• IOOS Nearshore Conditions brief (Jan Newton, Aric Bickel, Clarissa Anderson)

• Environmental conditions and impacts reporting and discussion:
  - Media (Ruth Howell)
  - Others

• Discussion
Regional Coordination Goals

1. **Document and share** environmental conditions information and impacts on human systems and NOAA mission at the regional scale.

2. **Improve awareness** of environmental observations and human system impacts across NOAA mission lines.

3. **Improve regional communication and coordination** across NOAA mission lines and between NOAA and NOAA-funded regional partners involved in monitoring and communicating changing climate conditions and impacts.

4. **Improve external communication** of regional impacts from changing environmental conditions, including but not limited to El Niño. Target audience is regionally connected elected officials and representative groups (e.g., WGA).
Regional Coordination Action Plan

Bi-Monthly webinars
- Brief on regional climate conditions/forecast and discuss deviations from “normal”.
  - NWS, NESDIS and OAR report on terrestrial observations;
  - NMFS and NOS report on coastal and marine observations; and
  - Partner network observations (WRCC, IOOS, RISA, Sea Grant, etc)

- Exchange information on terrestrial and coastal-marine impacts

Bi-Monthly communication
- Information will enrich existing products such as the State of the Climate monthly summaries
- Communication to in-region elected officials (in coordination with NOAA OLIA and NOAA West Congressional Roundtables).

Documentation
- Regionally specific updates and observed changes in the terrestrial and coastal and marine environments (as informally reported) will be summarized at the end of the water year.
  - The summary will informally characterize changing environmental conditions and impacts.
  - The summary will not include attribution of impacts, but could serve to inform a retrospective analysis of the human system impacts of environmental phenomena – including ENSO.
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Climate Brief – Temperature

Temperature Anomaly Last 60 Days
01/18/2017 – 03/18/2017

Temperature Anomaly WY
10/01/2016 – 03/18/2017

Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers
Precipitation

Precipitation % of Normal Last 60 Days
01/18/2017 – 03/18/2017

Precipitation % of Normal WY
10/01/2016 – 03/18/2017

Percent of Average Precipitation (%)
1/18/2017 – 3/18/2017

Generated 3/19/2017 at WRCC using provisional data.
NOAA Regional Climate Centers

wrcc.dri.edu
Precipitation

DJF Precipitation Percentile Rankings

Western United States - Precipitation
December-February 2017 Percentile

Rankings (1895-2010)

WRCC DRI EDU

WestWide Drought Tracker, U Idaho/WRCC Data Source: PRISM (Prelim), created 11 MAR 2017
Snow Water Equivalent

Source: NRCS
Snow Water Equivalent

% of April 1 Average / % of Normal for This Date

<table>
<thead>
<tr>
<th>NORTH</th>
<th>Data as of March 20, 2017</th>
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<tbody>
<tr>
<td>Number of Stations Reporting</td>
<td>29</td>
</tr>
<tr>
<td>Average snow water equivalent (inches)</td>
<td>38.8</td>
</tr>
<tr>
<td>Percent of April 1 Average (%)</td>
<td>140</td>
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<tr>
<td>Percent of normal for this date (%)</td>
<td>140</td>
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<th>CENTRAL</th>
<th>Data as of March 20, 2017</th>
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<td>42</td>
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<tr>
<td>Average snow water equivalent (inches)</td>
<td>48.5</td>
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<tr>
<td>Percent of April 1 Average (%)</td>
<td>166</td>
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<tr>
<td>Percent of normal for this date (%)</td>
<td>169</td>
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<td>26</td>
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<tr>
<td>Average snow water equivalent (inches)</td>
<td>43.2</td>
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<tr>
<td>Percent of April 1 Average (%)</td>
<td>162</td>
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<td>Percent of normal for this date (%)</td>
<td>165</td>
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<table>
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<th>Data as of March 20, 2017</th>
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<tbody>
<tr>
<td>Number of Stations Reporting</td>
<td>97</td>
</tr>
<tr>
<td>Average snow water equivalent (inches)</td>
<td>44.2</td>
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<tr>
<td>Percent of April 1 Average (%)</td>
<td>157</td>
</tr>
<tr>
<td>Percent of normal for this date (%)</td>
<td>159</td>
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</table>

Statewide Average: 157% / 159%

Source: CDEC/CA DWR
Snow Water Equivalent

- Donner Summit SNOTEL
- Currently at record value for **SNOTEL PERIOD OF RECORD**
- Good data begins water year 1983/1984, so missing 1982/1983 values

Source: NRCS
Snow Water Equivalent

• Donner Summit March 1 Snow Course, **1918-2017**
• Several manual measurements taken over large area and averaged

- 13th greatest March 1 value on record
- Substantial differences found between SNOTEL and Snow Course readings
- Manual/spatial measurements vs. point/automated

Data: NRCS, Graphic: Dan McEvoy WRCC
Snow Water Equivalent

- California statewide March 1 SWE based on 58 snow courses, 1950-2017
- 2017 ranks 6th
El Nino Status

- ENSO Alert System Status: Not Active

- ENSO-neutral conditions are present

- Equatorial sea surface temperatures (SSTs) are near-average across the central and east-central Pacific. They are above-average in the eastern Pacific Ocean.

- ENSO-neutral conditions are favored to continue through at least the Northern Hemisphere spring 2017, with increasing chances for El Niño development into the fall.*

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/.
Current Sea Surface Temperatures
Niño Region SST Departures (°C) Recent Evolution

The latest weekly SST departures are:

- Niño 4: 0.0°C
- Niño 3.4: 0.3°C
- Niño 3: 0.8°C
- Niño 1+2: 2.6°C
ENSO Forecasts

NMME Forecast for Niño 3.4 (scaling) IC= 201703

Source: NOAA/CPC
ENS0 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. Temperature Forecasts

Source: NOAA/CPC
U.S. Precipitation Forecasts

Source: NOAA/CPC
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Sea Surface Temperature: February 2017

NANOOS: www.nanoos.org Climatology app

Remote Sensing
- In-Situ
  - NODC Ocean Aides
  - Surface Salinity (Climate)
- Satellite
  - NCDC OI SST
  - Water Temp. (Climate)
  - Water Temp. (Anomaly)
  - OSU AMSO Climate
  - Sea Level (Climate)
  - Sea Level (Anomaly)
  - OSU MODIS Climate
  - Chlorophyll (Climate)
  - Chlorophyll (Anomaly)
  - Water Temp. (Climate)
  - Water Temp. (Anomaly)
NANOOS: [www.nanoos.org](http://www.nanoos.org) Climatology app

**NDBC 46002, Oregon, Or**

**Offshore SST**

**NDBC 46041, Cape Elizabeth, Wa**

**Near shore SST**

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**Twanoh Water temperature Anomaly, 2017 - Climatology**

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**Carr Inlet Water temperature Anomaly, 2017 - Climatology**
Mean shoreline change for different contour elevations
Surface Temperature
Salinity

[Graphs showing salinity levels over time for different locations such as Harbor Bay, MBAR ML, and Horns Bay, each with red and blue lines representing different data sets.]

[Graphs highlighting variations and trends in salinity levels with specific focus areas marked for analysis.]
Chlorophyll, Nitrates, and Upwelling

HS2 Chlorophyll mg m-3 at the M1 Mooring (36.7N, -122W), Monterey Bay CA

Climatology Minimum on 08-Feb-2011, 0.4555 mg m-3; Maximum on 28-Jun-2016, 14.46 mg m-3
2017 YTD Minimum on Feb-10, 1.155 mg m-3; Maximum on Mar-15, 14.36 mg m-3

Monterey Bay Aquarium Research Institute: http://www.mbari.org
Contact: mbari@alumast.org

Surface ISUS NO3 at the M1 Mooring (36.7N, -122W), Monterey Bay CA

Climatology Minimum on 08-Mar-2010, 0.01uM; Maximum on 25-May-2013, 27.5uM
2017 YTD Minimum on Mar-11, 1.209uM; Maximum on Jan-27, 8.391uM

Monterey Bay Aquarium Research Institute: http://www.mbari.org
Contact: mbari@alumast.org

Updated: Mar 17, 2017 06:

Upwelling Basin index

Taken Index Values from NOAA/DMSP/FOSS for 36.7N-122W Values are daily average of wind-driven upwelling transports computed from

PMMOC 3-hourly surface pressure analysis. Values are in units of cubic meters per second along each 100 meters of coastline. -9999 indicates no value. Positive numbers indicate offshore transport. Data is based on PST. Last data point is on Feb 28, 2017

Updated: Mar 04, 2017 Monterey Bay Aquarium Research Institute: http://www.mbari.org

Updated: Mar 04, 2017 Monterey Bay Aquarium Research Institute: http://www.mbari.org
SCCOOS REGION: Anomalous Winter Storms & Nearshore Effects

January 19-24

What looks like an increase in phytoplankton growth in response to the storm may not actually be the case

Evidence: Weekly sampling at shore stations revealed very low living biomass at Scripps Pier and Stearns Wharf (Santa Barbara)

Explanation: The higher Chl retrievals from VIIRS are most likely false positives due to run-off and turbidity that is not properly deconvolved by the standard algorithm
Burke-o-Later® at Carlsbad Aquafarm measures Ocean Acidification

- Large rains Jan 19-24 led to a significant dip in pH, alkalinity, and aragonite saturation state (omega)
- Omega typically 2-3 at Carlsbad Aquafarm
SCCOOS REGION: Anomalous Winter Storms & Nearshore Effects

February 26-28

**No glider data quite yet to examine nearshore upwelling!**

*This time the enhanced Chl concentrations after the storm period are likely associated with runoff and spring upwelling bloom conditions*

Evidence: Weekly sampling at shore stations revealed increasing biomass and diversity, including an increase in *Pseudo-nitzschia* (HAB) cells at Scripps Pier and Santa Monica Pier.

Explanation: The higher Chl retrievals from VIIRS are most likely capturing some false positives in the San Diego area where the storm track was focused but much of this Chl could still be attributed to regional changes in Spring Bloom biomass.
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Regional Impacts Summary

Reporting Status:
• 40 entries since last reporting period (Jan 24, 2017)
• 87 entries total NOAA West Watch 2016-2017
• Thanks to Shawn Roj, intern with Western Regional Climate Center

Environmental Conditions
• Floods
• Drought Relief
• Atmospheric river storms
• Widespread dead trees
• Sewage Spills
• Wind Storm
• Ice Jam
• Poor Air Quality

Human & Environmental Impacts
• Property damage/Loss of property
• Loss of life
• Impacts to recreational access
• School & business closures
• Evacuations
• Increased human health risks
• Increased risk of wildfire
Impacts in Pictures – Oroville Dam Emergency

A giant crack in the concrete spillway of Lake Oroville caused massive amounts of erosion, the temporary evacuation of 200,000 people, and major failures of riverbanks along the Feather River due to dramatically reduced stream flows.

Oroville explainer: http://projects.sfchronicle.com/2017/oroville-explainer/
Muddy river water from the Oroville Dam catastrophe caused the Feather River Hatchery to relocate 8 million juvenile fish that are too young to be released into the river. Fish were also saved from pools of water no longer connected to the river.
Impacts in Pictures – Puget Sound Sewage Spill

More than 100 million gallons of raw sewage and stormwater have flowed into Puget Sound after a failure at the King County wastewater treatment plant in Seattle caused at least $25M in damage.
Impacts in Pictures – Colorado Dead Trees

834 million dead trees in Colorado could cause a worsening threat of wildfire.
The Colorado River basin has seen a sharp decline in drought conditions this winter due to a healthy snowpack. Lake Mead could rise by 20 feet or more.
Impacts in Pictures – Snow Event in Seattle

A storm in Washington brought about 2" of snow to portions of Seattle with up to 15" on the higher hills of the eastern suburbs. Schools were closed and close to 100,000 customers were without power. More than 80 flights were canceled at Seattle-Tacoma Int. airport affecting 10,000 passengers.
Impacts in Pictures – Wind Storm in Wyoming

Jackson, Wyoming saw strong, 40-60 mph damaging winds, that toppled steel power poles cutting off power for many, including Teton Village and the Jackson Hole Ski Resort.
Southern Idaho saw major flooding due to warm weather, rain, snowmelt and ice jams on rivers. Flooded basements, mudslides, and ice-jam flooding are causing major impacts around the state. One man was rescued from his flooded house.
Impacts in Pictures – S. California Atmospheric Rivers

Atmospheric rivers set in on Southern California this winter.

In Los Angeles:

- surrounding mountains received upwards of 8 and 9 inches of rain, with up to 2 feet of snow in the higher elevations.
- 300 flights canceled.
- 3 people lost their lives.
- 100 homes evacuated due to threat of mudslides.
- 150,000 customers were left without power.

In San Diego:

- 3rd highest recorded flood levels for the San Diego River since 1900.
Impacts in Pictures – S. California Atmospheric Rivers

In San Diego:

- Three high rain and wind events in Jan-Feb
- Feb 27 - 3rd highest recorded flood levels for the San Diego River since 1900.
- 65 emergency swift water rescues. All successful; no loss of life.
- Hotel evacuation
- Significant flooding on highways and interstates
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  – Additional impacts to report?
  – Observations on recent environmental anomalies?

Next NOAA West Watch: May 23, 1-2pm PDT