2008-09 Climate Recap and 2009-10 Seasonal Outlook

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Many Thanks to Eric Salathe, CIG, UW
2008 Global Recap

Global Land-Ocean Temperature Anomaly (°C)

Base Period = 1951-1980

http://data.giss.nasa.gov/gistemp/
Warming of 2009

- Jan-Sep 2009, 6\textsuperscript{th} warmest on record globally
- AMSU Satellite Data (CH4) Suggests Jul 18, 2009 was warmest day in satellite era (0.5F warmer than previous day in 2005).
- Since July 10\textsuperscript{th}, global daily maximum temperature records have been set over >30\% of days

http://www.ncdc.noaa.gov/
Western US Winter 2008-09 Recap

Oct-May Precip (% of Normal)

Oct-May Temperature Anomaly

Westmap, WRCC NOAA
Fire Season 2009

Western United States 6 month SPI August 2009

Western United States Precipitation Percent of Normal June-August Departure from 1971-2000 Mean

WestWide Drought Tracker, University of Idaho - WRCC
Fire Season 2007

Western United States 6 month SPI August 2007

Western United States Precipitation Percent of Normal June-August
Departure from 1971-2000 Mean
Idaho Recap
Statewide Cool Season (Oct-May) Precipitation was near 71-00’ normals
Above normal precip in the Bitterroots and Salmon River Basin
Winter 2008-09 Temperature Summary

Statewide Cool Season (Oct-May) Temperatures were slightly above 71-00' normals.
Role of Temperature

- **Snow**
  - When the freezing level is below the hill, it causes snow.

- **Rain**
  - When the freezing level is above the hill, it causes rain.

- **Melt**
  - When the freezing level is at the top of the hill, it causes melt.

- **No Melt**
  - When the freezing level is at the bottom of the hill, there is no melt.
Daily Freezing Level

Elevation of 0°C Surface for 47.80°N, 116.10°W

NOAA RISA, WRCC-UI
Operational 2010
U.S. Drought Monitor: Idaho

Drought Conditions (Percent Area)

<table>
<thead>
<tr>
<th></th>
<th>None</th>
<th>D0-D4</th>
<th>D1-D4</th>
<th>D2-D4</th>
<th>D3-D4</th>
<th>D4</th>
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</thead>
<tbody>
<tr>
<td>Current</td>
<td>66.3</td>
<td>33.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
<tr>
<td>Last Week (19/06/2009 map)</td>
<td>66.3</td>
<td>33.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>3 Months Ago (07/21/2009 map)</td>
<td>95.7</td>
<td>4.3</td>
<td>0.8</td>
<td>0.0</td>
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<tr>
<td>Start of Calendar Year (01/01/2009 map)</td>
<td>22.4</td>
<td>77.6</td>
<td>53.5</td>
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<td>0.0</td>
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<tr>
<td>Start of Water Year (13/06/2008 map)</td>
<td>66.3</td>
<td>33.7</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
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<tr>
<td>One Year Ago (19/14/2008 map)</td>
<td>23.4</td>
<td>76.6</td>
<td>34.5</td>
<td>0.0</td>
<td>0.0</td>
<td>0.0</td>
</tr>
</tbody>
</table>

Intensity:
- D0 Abnormally Dry
- D1 Drought - Moderate
- D2 Drought - Severe
- D3 Drought - Extreme
- D4 Drought - Exceptional

The Drought Monitor focuses on broad-scale conditions. Local conditions may vary. See accompanying text summary for forecast statements.

http://drought.unl.edu/dm

October 13, 2009
Valid 7 a.m. EST

 Released Thursday, October 15, 2009
Author: R. Tinker, CPC/NOAA
Statewide Drought Conditions
Change from one Year Ago

Idaho 10 month SPI September 2008

Idaho 10 month SPI September 2009
2009-2010 Seasonal Outlook

Basis for Outlook

– Long-lived boundary conditions (climate-memory)
  • Long-term trends
  • Soil moisture (summer) / snow cover (winter-spring)
  • Ocean Temperatures

– Statistical Tools
  • Low-frequency Climate Variability (e.g., ENSO)

– Climate Models
  • CFS: Climate Forecast System
Sea surface temperatures (SST) were at least 1.0°C above-average across much of the central and east-central equatorial Pacific.
El Niño is present across the equatorial Pacific Ocean.

Anomalies strongest in central Pacific

“Central Pacific El Niño”

“El Niño Modoki”
1. Observations in the NINO3.4 region indicate weak El Nino conditions.
2. SST anomalies are lacking canonical El-Nino structure.
3. Atmospheric response (SOI) has not been noted thus far.
4. Forecasts call for a strengthening of El Nino conditions into 2009-2010 winter, with a weak to moderate El Nino.
5. Atmospheric manifestation of El Nino typically begin in Nov.
CFS Seasonal Outlook

CFS monthly Prec forecast (mm/month)

CFS monthly T2m forecast (K)

Ensemble average of 40 members from initial conditions of 7Oct2009 to 16Oct2009.
Implications for Idaho
El Nino’s Footprint in Idaho
Oct-Mar Precipitation (% of Normal)
MEI vs. April 1 SWE

Northern Idaho

Central Idaho

1 Apr SWE (cm)

Oct-Feb MEI

-2 0 2

La Niña neutral El Niño
Modulation of Freezing Level during El Nino Years

Composite NDJFM 0°C Height Anomaly (m)
El Nino Events (MEI$_{NDJF}>1$)

Freezing Level 100m higher
Modulation of Freezing Level during El Nino Years

Composite MAM 0°C Height Anomaly (m)
El Nino Events ($MEI_{NDJF}>1$)

Freezing Level 100-200m higher
Summary

1) El Nino generally associated with **sub-par precipitation** across the state, impacts accentuated over the northern portion of the state
   - Strongest in early to mid-winter due to the enhancement of the subtropical jet and direction of storm track over the southern tier of the country
   - Spring precipitation (MAM) increases during El Nino events

2) El Nino generally associated with **warmer** than normal condition
   - Higher freezing level results in a decrease in the percent of precipitation falling as snow for lower-elevation watersheds, accelerates spring melt
   - Likelihood of extremely “warm” spring

3) Influence of long-term trends with a moderate El-Nino are likely to result in **sub-par winter for Idaho snowpack**, particularly lower elevation watersheds over the central and northern portion of the state