Idaho

2008 Fall Water Supply Summary
and
2009 Water Supply Outlook Information

This issue of the Idaho Water Supply Outlook Report provides Idaho water users with a summary of how the 2008 water year ended, a recap of 2008 streamflow forecast accuracy and information on how the 2009 water year is starting to take shape. Online readers can click on the blue text to follow links providing additional online information. Below is a full list of topics in this report:

- **2008 Water Year Summary – Precipitation, Snow, Streamflow**
- **2008 Streamflow Forecast Accuracy Analysis – Under Over and Right On!**
- **2008 Fall Precipitation, Reservoir Carryover Storage and Soil Moisture**
- **2009 Snowpack Levels Needed for Adequate Surface Irrigation Supplies**
- **Daily Guidance Streamflow Forecasts Using SNOTEL Data**
- **Daily Water Supply Forecasts and Early Season Streamflow Forecasts**
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- **Changes in Idaho Daily SNOTEL Update Report**
- **La Nina - El Nino - Southern Oscillation Index Information**
- **2009 Outlook**

2008 Water Year Summary

Precipitation for water year 2008 ranged from 80% of average in the Little Wood, Big Lost and Little Lost basins to 112% of average in the Clearwater basin. The water year, which starts October 1 and ends September 30, may not be the best moisture index to compare with the 2008 runoff. Timing of when moisture fell and amount that fell as snow or rain is also important. The winter of 2007/2008 was colder than recent years and allowed most of the moisture to fall as light, dry snow and even fooled some of the Snow Survey staff and surveyors around the state as to the amount of water in the snow. There was no winter thaw to settle the snowpack and very limited rain on snow events to produce a mid-winter runoff.

Low elevation snowpacks in Idaho's Panhandle Region were more than twice normal and at record high levels on April 1. Higher elevation snow in the Panhandle did not reach record levels, but was above normal with 135% of average in the Spokane basin. Elsewhere in the state, April 1 snowpacks ranged from 90-125% of average. Statewide spring and summer streamflow for the April-July period that ranged from 55% of average in the Big Wood River to 165% in the North Fork Coeur d'Alene River.

In central Idaho, the dry second half of winter and dry spring played a critical roll in determining efficiency of the snow to produce streamflow. There were two significant dry spells. Lost-Wood Divide SNOTEL site only received 6.4 inches of precipitation from February to May, lowest in 26 years. The previous low of 6.5 inches fell just the year before in 2007! The second dry spell was in the spring; April-June precipitation amounts were record low at only 37% of average for the four station SNOTEL index in the Big Lost basin. Combining these dry periods a total of 22.9 inches of precipitation accumulated between February and June at these four station SNOTEL sites (Lost-Wood Divide, Bear Canyon, Stickney Mill and Hilts Creek) setting a new record low. This was 8.7 inches less than the previous record which was 31.6 inches in 2001. The maximum amount was 87 inches in 1995! The data record starts in 1982 when automated SNOTEL stations were installed to collect daily, high elevation precipitation amounts.

Cold winter temperatures kept streamflow at minimal levels and the lack of a winter thaw kept the snow frozen in place until spring. When spring arrived, streams increased rapidly going from near record low levels in March to very high levels from abundant low elevation snowmelt. Annual streamflow hydrographs for the 2008 water year can be viewed by accessing the **Peak Streamflow** page and then selecting the "Year" option for basins you are interested in.

2008 Streamflow Forecast Accuracy Analysis – Under, Over and Right on!

Streamflow forecast accuracy varied across Idaho due to the reasons mentioned above, cumulative drought effects and below normal spring precipitation. Cool to near average temperatures provided a bonus by keeping higher elevation snow in the mountains longer and helped to sustain streamflow later into the summer. Below are links to the 2008 Idaho Streamflow Forecast Review and a Fall Summary Presentation given in October that also investigates this topic and more.

The following documents require Adobe Acrobat.

2008 Idaho Streamflow Forecast Review (318KB)

Fall Summary Presentation (2.8MB)

2008 Fall Precipitation, Reservoir Carryover Storage and Soil Moisture

October-November precipitation ranged from 60% of average in northern Idaho to just over 100% of average in eastern and southern Idaho. Reservoir carryover is better than last year at this time in some reservoirs, less in others and is mainly due to runoff during the spring and summer of 2008. Soils typically need 2-5 inches of fall rain or spring snowmelt to saturate dry soils from the previous summer. Fall streamflows are also an indicator of soil moisture and are used as variables to predict next year's runoff. Fall flows are not unusually high or low this year, except in the Clearwater basin where streams jumped significantly in mid-November following a one day precipitation event with amounts of 2-4 inches, setting records at some sites. Soils are probably saturated in the Clearwater basins, but elsewhere additional moisture is needed to fill the soil moisture void from last summer. Use the **IDAHO SNOTEL Soil Moisture and Soil Temperature Graphs** to track current conditions and the peak streamflow graph links above to visualize how fall streamflow conditions are leading into winter.

2009 Snowpack Levels Needed for Adequate Surface Irrigation Supplies

Each fall we predict the amount of snow needed to provide adequate surface irrigation supplies for the following summer season. Our 2009 prediction is based on the September 30, 2008 reservoir storage levels that are projected to March 31, 2009 storage levels assuming below normal increases due to dry trends. The streamflow needed to meet surface irrigation demands is the difference between March 31 reservoir storage and the total amount of water needed to meet needs as defined in the **Surface Water Supply Index (SWSI)**. Finally, the snowpack needed for 2009 is determined by looking at years when there was a good snowpack but 'worst case scenarios' for runoff occurred; these include years in the middle of consecutive dry years, years with low soil moisture and/or groundwater levels, or years with a dry spring. 1989 is a good example of a poor runoff year; snowpack was near average, but runoff was much below average due to a dry spring and cumulative drought effects. Other poor runoff years with a good snowpack are also listed in analysis below. Amounts needed vary by basin and reservoir carryover storage, but in general, an April 1 snowpack of 80-120% of average is needed to produce April-July volumes that are 45-100% of average. This year's prediction for specific basins can be found here:

The following documents require Adobe Acrobat.

2009 Snowpack & Streamflow Needed for Adequate Irrigation Supply as of 10/15/2008 (66KB)

Daily Guidance Streamflow Forecasts Using SNOTEL Data

These volume forecast models use a combination of current daily SNOTEL snow water and precipitation data and seasonal peaks that correlate to the April–July runoff volumes. Using the **Daily Guidance Streamflow Forecast** page you can access early season forecasts for specific basins. The "Scatter Graph" option will help you find other years with similar starts. Daily Forecasts are available for the following basins.

St Joe at Calder	**Dworshak Reservoir Inflow**
Lemhi River near Lemhi	**Salmon River at Whitebird**
Middle Fork Salmon River at MF Lodge	**Boise River near Boise**
Big Wood River near Hailey	**Little Wood River near Carey**
Big Lost River below Mackay Reservoir	**Teton River near Driggs**
Snake River near Heise	**Oakley Reservoir Inflow**
Salmon Falls Creek near San Jacinto, NV	**Owyhee River near Rome, OR**
Bruneau River near Hot Springs	**Bear River**

Email Notification of Idaho's Water Supply Reports

The *Idaho Water Supply Outlook Report* is available on the internet usually by the fourth business day of the month, while you may not receive the bulletin in the mail until several business days later due to the time it takes for printing and shipping. This season we are building an email address list, to notify you when we publish the report online. Our email will provide you immediate notification and include a hot link to the publication's web location **http://www.id.nrcs.usda.gov/snow/watersupply/.** By clicking on the link, you will access the monthly *Idaho Water Supply Outlook Report* as soon as the report is completed. Additionally, by joining the email list you will also be notified of other products that are only available online, such as water supply outlooks made in June and future fall summaries.

Please contact Adam Birken at (208) 685-6989 or **adam.birken@id.usda.gov** if you would like to receive a monthly email notification:

Changes in Idaho Daily SNOTEL Update Report

Requests were received over the years to show more detail in Idaho's SNOTEL Update Report. The change this year was splitting the Idaho Panhandle Region into the Spokane basin and Northern Idaho Panhandle Region, and adding the Snake Basin above American Falls.

Additionally we added two new reports called the Idaho Northern and Idaho Southern. These reports show individual basins and regions in finer detail based on SNOTEL sites in those areas. For example, you can now view the five individual basins in the Salmon River basin on a daily basis that are normally only summarized in our monthly Idaho Water Supply Report. The Snowpack and Precipitation Update Report for Idaho Northern and Idaho Southern is accessible directly from the **Current Water Year Data** page or you can access the other update report formats using the 'Special Report' dropdown menu for Idaho Northern or Idaho Southern Idaho from the **SNOTEL Update Report** page.

La Nina - El Nino - Southern Oscillation Index Information

The NRCS uses El Nino, La Nina, the Southern Oscillation Index (SOI) (ENSO) and a combination of other indexes to forecast streams, especially in the northern half of Idaho. The NRCS has used SOI as a forecasting

variable since the early 1990s and is now utilizing other variables such as Trans Nino Index (TNI) and Pacific Decadal Oscillation (PDO). Following 'El Nino - La Nina' links from our **Related Links** web page you can gain more knowledge about these indexes. Be sure to check out the analysis by the NRCS National Water & Climate Center titled **Southern Oscillation Index Statistical Correlation with Spring Runoff in the Western US**.

Currently, the ENSO and SOI are neutral for 2009; this means that not as much emphasis can be put on them this year. Typically, in La Nina years the storm track is across the Pacific Northwest and it is drier in the Desert Southwest. In El Nino years, storms generally favor the Desert Southwest and Pacific Northwest is drier. This is not always the case and exception years can be viewed in the individual Surface Water Supply Index (SWSI) tables. The PDO has longer term affects on regional storm tracks and may have shifted to a cool, wet phase. The PDO shifts from cool and wet to warm and dry phase every 20-30 years and impacts different parts of the country differently. Stay tuned as more is being learned about PDO with each passing year. Remember learning about El Nino during the heavy snow years in early 1980s? Now, we can't talk about the weather without discussing this natural occurring phenomenon in the Pacific Ocean and its worldwide impacts.

2009 Outlook

There are many forecasts available. Links are provided from the Idaho NRCS **Related Links** page under the 'Weather and Climate' section for short, medium and long term forecasts. Below is information from other forecasts that may differ from the NWS Climatic Prediction Center's forecast that were released on November 20. Some forecasts are based on climatology or are weighted on recent warming trends, but this trend did not occur in 2008.

In 2008 temperature departures across the US averaged approximately 1/3 above normal, 1/3 near normal and 1/3 below normal. The prior 10 year period experienced a distribution on average of 6/10 above normal, 3/10 near normal, and 1/10 below normal. Whether La Nina or the cool phase of PDO is responsible for this significant change is highly debatable, however, the long period trend of increased annual temperatures seems to be on hold, at least for now.

The tropical atmosphere is still behaving more like La Nina although officially, sea surface temperatures are near average. The northern regions of the West are statistically more likely to see above normal precipitation and below normal temperatures than its southern counterpart. However, in neutral (ENSO) or weak La Nina years, weather often takes on a Schizophrenia personality with variability the dominant characteristic. This may be the rule for the coming winter.

Temperature and precipitation outlooks for the Western states show that we could expect a somewhat typical La Nina weather pattern; drier to the Southwest and wetter to the Northwest with near average temperatures but with larger cooler anomalies for the Pacific Northwest and warmer anomalies for the Southwest in the spring. The opposite could occur this fall, warmer Pacific Northwest and cooler Southwest. Early season snowpack will be somewhat delayed across much of the West although the Pacific Northwest will hopefully catch up to normal much later in the season.

This information was from mid-November. It is now early December and the question that remains on everyone's mind is "when are the storms coming?" 2007 started in a similar manner and was dry until mid-December when the cold storms started tracking across the state. SNOTEL maps at the start of December show that many sites were at or near record low snow water equivalent amounts on **December 3**. For current SNOTEL maps see **GIS Products**.

A slow start this winter has Idaho's snowpacks in early December at only 15-65% of averages. This slow start means that it will take above normal precipitation in next few months to catch back up to normal by winter's

end, which can still happen this early in the game if we receive several good storms soon. However, if we get into February and are still below normal, the chance of returning to normal by April decreases. Follow this link to see **Snow Graphs - Illustrating the Chance of Snowpack to Recover by April 1.** These snow graphs are based on first of month Snow Water Equivalent (SWE) for January, February, and March and are sorted from low to high amounts. These amounts are compared to how the winter accumulation season ended on April 1. The graphs are based on the historic snow index data.