



Natural Resources Conservation Service  
P.O. Box 2890  
Washington, D.C. 20013

## **Subject: May 1, 2013 Western Snowpack Conditions and Water Supply Forecasts**

The following information is provided for your use in describing western climate and water supply conditions as of May 1, 2013. *This Update reflect Alaska and California data.*

### **OVERVIEW (*April's moisture in the Interior West stalls advancing drought*)**

April was warmer than normal across California (>+5°F). Nearer to normal temperatures extended from the Pacific Northwest to New Mexico. Below normal temperatures extended from the eastern slope of the Montana Rockies to southeastern Colorado (<-5°F). It is important to note that percentages may increase in the spring from new snowfall, but also when snowmelt is delayed and median values start to decline to zero as the snow melts. This was the case last month as snowmelt was delayed by cooler temperatures while several basins increased in snowpack from the April storms. Surplus precipitation fell over the western Washington ranges, northernmost Rockies, and from southwestern Utah to eastern Colorado and Wyoming (Fig. 1). Alaska precipitation percent of normal pattern was dominated by surplus moisture, however below normal values occurred over the Kenai Peninsula (Fig. 1a). Because of late snow storms over areas of the Interior West, some streamflow forecasts showed improvement compared to the [April 1 forecasts](#). However, areas from the Sierra Nevada to the southern Rockies (including the Snake River drainage) that have seen persistent dry conditions since early January have continued to decline in forecasted flows. The preliminary Colorado River forecast [inflow](#) predictions for [Lake Powell](#) suggest the [4<sup>th</sup> lowest](#) since 1963 when the Glen Canyon Dam was constructed.

### **SNOWPACK**

April began with the least amount of snowpack in the West over the central and southern Rockies and over the Sierra Nevada (Fig. 2). The most snowpack included the northern Cascades; an isolated drainage in central Nevada; scattered drainages in Arizona; the Upper Columbia River; and most regions within Alaska. Areas west of the Continental Divide had decreases in snowpack (with the exception of Washington and northern Idaho) while the areas east of the Divide had increases (with the exception of the Southwest) as noted in Fig. 3.

A map containing a daily update of the westwide snowpack is available at the following URL - <http://www.wcc.nrcs.usda.gov/gis/snow.html>

### **SEASONAL SNOW-WATER EQUIVALENT**

Neutral El Niño Southern Oscillation (ENSO) conditions this water year have resulted in a more typical La Niña winter, with the western states north of latitude 40°N experiencing above normal amounts of precipitation (Oregon being a notable exception). Below normal amounts were recorded south of 40°N (Fig. 4). For Alaska, normal to above normal snow-water equivalent (SWE) values have occurred across the state, with the Kuparuk Drainages having the only deficit.

Monthly and seasonal precipitation maps are available from the following locations - <http://www.wcc.nrcs.usda.gov/gis/precip.html> and <http://www.cbrfc.noaa.gov/wsup/westwide/westwide.cqi>.

## SPRING AND SUMMER STREAMFLOW FORECASTS

April weather created an increase of snow over the northern mountains, but it didn't make up the shortfall of previous months over large portions of the western U.S. For much of the West, April was wetter than January, February, and March combined, but it may be a case of too little, too late. The USDA Secretary has designated many counties in the Western states as eligible for USDA drought assistance.

Though recent snow events have made small improvements in expected water supplies in some areas, most of these changes are insignificant (Fig. 5). California, southern and eastern Oregon, Nevada, southern Utah, southern Colorado and especially New Mexico will experience major water shortages due to sustained drought conditions and low reservoir storage. Water resource managers face difficult decisions due to these shortages. The southern tier of the Western states should prepare for potentially increased vulnerability to forest and rangeland fires and mandatory water restrictions. In addition, wildlife that depends on surface water is going to be impacted.

There are a few exceptions to the dry forecasts. The North Cascades and the headwaters of the Missouri and Columbia Rivers are near normal. For the rest of the West there is no silver lining. It's going to be a long, hot, dry summer.

**Alaska** - Snowpacks across Alaska generally saw increases during April as cold temperatures delayed meltout and spring storms boosted peak levels. Much of the state has snowpacks which are normal to much above normal. Only the Koyukuk Basin and the Kotzebue Sound area continue to have below normal snowpacks, though not by much. Several sites in the Upper Yukon Basin and the Tanana Basin had record high snowpacks.

**Arizona** – The water year-to-date precipitation for the central Arizona mountains has been 80-90% of average in the Verde River Basin; 100-105% in the Tonto River Basin; 65-85% in the Salt River Basin. April precipitation varied from 5-45% of average in the Verde Basin, to 90-135% in the Tonto and Salt basins.

The Salt River system reservoir storage is 89% of average; 88% of last year. The Verde River system reservoir storage is 98% of average; 238% of last year. The San Carlos Reservoir is nearly empty.

**California** – California experienced major storms in November and December which delivered above normal precipitation. Since then, the months of January, February, March, and April have been some of the driest on record, adding minimal precipitation in the form of rain or snow. Precipitation for the month of April ranged from less than 2% of average in the south to about 75% in the north. The Sacramento valley recorded less than 50% at most measurement sites.

The snow measurement sites throughout the West have some "colorful" names. Two of these sites in California, Furnace Flat and Dismal Swamp, sum up the statewide snowpack. It is dismal at best. Many sites are snow-free at this time and most of the rest are below 30% of median. There are only 2 or 3 high-elevation sites that have enough snow to break the 50% of median plateau. Snowmelt runoff will be very poor.

With a few exceptions, major reservoirs in California have near average storage for this time of year, even with the lack of precipitation during the last four months. Lake Oroville is at 101% of normal storage, Lake Shasta is 92% of normal storage, Trinity Lake is at 101% of normal storage, Folsom Lake is at 91% of normal storage, New Melones is at 95% of normal storage, Don Pedro is at 99% of normal storage, and San Luis is at 58% of normal storage.

Most seasonal streamflow forecasts are less than 50% of average over the entire state, based on the new 30-year averages. The highest forecast for the entire state is 68% of average for the Pit River inflow to Shasta Lake, whereas the lowest is 13% of average for the Tule River inflow to Success Reservoir.

**Colorado** – After three consecutive months of below median snow accumulation in Colorado, multiple storm systems in April brought the moisture that had been hoped for all season. The state received above average precipitation during April, which primarily occurred as snow, and brought snowpack totals to near normal levels in the northern basins. The southern portion of the state did not benefit from these storm systems. Warm and dry conditions dominated the Upper Rio Grande basin, the combined San Juan, Dolores, Animas, and San Miguel basins and the southern tributaries of the Gunnison basins during April.

Reservoir storage remains below average across most of the state but conditions should improve in the northern basins as the recent snow begins to run off.

The most recent streamflow forecasts mimic the snow and precipitation conditions across the state; big improvements in the northern basins and further decline in the southern basins. Overall, though, the water supply outlook this month is better than just a month ago, demonstrating how big a difference a few snowy days can make.

**Idaho** – April precipitation was similar to the trend established in the previous months, with above average amounts in the northern part of Idaho, well below average in the Wood and Lost basins, and near average amounts in select basins of southern Idaho and the Upper Snake.

Below normal temperatures delayed snowmelt and allowed snowpack percentages to slowly creep higher. Several basin snowpacks increased due to April storms. May 1 snowpacks, as a percent of median, are near normal in the Panhandle, Clearwater, and Upper Snake basins. Basins in the 65-85% of median range include the Salmon, Payette, Boise, Big Wood, Big Lost, Little Lost, Willow, Portneuf, Goose, Salmon Falls, Bruneau, and the Bear. Basins nearly melted out with less than 50% of median snowpack include: Rathdrum, Little Salmon, Weiser, Mores, Little Wood, Blackfoot, and Owyhee. Even with the delayed melt, the current snow levels in most basins are only in the 50-85% of their seasonal peaks which normally occur in April. With these values below 100%, the higher elevation stations still have snow, but there is not a lot there to sustain streamflows.

In general, changes from last month's forecasts, in volumes or percentages, mirrored the April precipitation and delayed snowmelt. Forecasts increased slightly in the Panhandle, Clearwater, and Upper Snake; but held steady in the Salmon and west-central mountain streams. Forecasted volumes decreased in the Wood and Lost basins, due to the fourth consecutive month of below normal precipitation. Above normal April precipitation in the basins south of the Snake River and in the Bear River brought slight relief, but not enough to make any major improvements in their water supply.

**Montana** – The month of April was a dramatic change from the warm and dry weather experienced during the latter half of March, with cool wet weather under northwest flow dominating the month across most of the state. March started the transition to an isothermal spring snowpack at low- to mid-elevations; however April ended this trend and even added snow water to our seasonal snowpack.

If cool wet weather further delays snowmelt there is a greater opportunity for higher than average snowpack melt rates this spring. This is because the upcoming months offer increased solar radiation, longer days, higher average daily temperatures, and warmer overnight low temperatures. The ideal scenario for the coming months would be a return to more seasonal

temperatures, which functions more like a dimmer switch, slowly transitioning into our runoff season, not like a light switch turning the temperatures up abruptly.

State-wide, streamflows are forecast to be 96% of average. West of the Continental Divide streamflows are forecast to be 104% of average and east of the Divide streamflows are forecast to be 86% of average.

**Nevada** - Nevada is experiencing a second, consecutive very dry year. Once again, the season is ending on a very warm, dry note. Low- and mid-elevation snow have already melted off, leaving very little snow at high elevations to provide what will be a limited streamflow runoff season. The Humboldt River peaked in March, whereas the rivers in western Nevada likely peaked during last week's warm spell. Streamflows are expected to be well below average for the entire state this season. Water supply needs will become an issue for those areas with inadequate or no reservoir storage. Impacts from this year's dry conditions are already being felt across the state. Low streamflows, poor green-up on the range, and water-stressed vegetation are just a few of the early season results of a dry winter. Water users will need to work closely with their suppliers this season to be able to best meet their needs.

Streamflow forecasts for Nevada and eastern California are expected to be well below average for the entire state. Streamflow forecasts are the highest in the Snake River basin at 63% of average. The lowest expected flows are in the Owyhee River basin at 5% of average.

**New Mexico** - Despite a series of storms which brushed New Mexico during April, very little meaningful precipitation was received. These storms brought some periods of cooler temperatures with them, which helped delay melting of high-elevation snow, but they did not produce any significant gains in the snowpack. Much like last year, as of this final Basin Outlook Report for 2013, it looks like New Mexico is going to have an extremely low runoff year, with the peak runoff probably having occurred for most of the state.

**Oregon** – As of May 1, water supply conditions vary widely across Oregon. The northern part of the state and the west side of the Cascades should have adequate water supplies this summer, while southeastern Oregon and the Klamath basin will likely have greatly reduced water supplies. The snowpack across the majority of Oregon's mountains never reached normal peak levels this winter and began melting earlier than normal. This will result in lower streamflow runoff this summer. Reservoir levels are near normal in some parts of central and southern Oregon, which leaves those basins in a better position for summer water supplies than those basins with lower reservoir levels, such as the Owyhee and Malheur basins.

On April 18, Oregon Gov. John Kitzhaber signed an Executive Order declaring a state of drought emergency in Klamath County. This declaration provides the state with additional water management tools to assist irrigators, municipalities, and other water users. The latest drought monitor update continues to outline expected drought persistence in the regions of southern and southeastern Oregon, as well as likely drought development across much of the rest of Oregon.

Below normal snowpacks, early snowmelt, and lack of spring precipitation throughout most of southern and eastern Oregon have resulted in well below average summer streamflow forecasts. The lowest May through September streamflow forecasts are in the Klamath, Harney, Owyhee, Malheur, Lake County, Burnt, Powder, Crooked, and Goose Lake basins, which range from 20-60% of average. Areas with slightly more promising outlooks can be found in the John Day, Rogue, and Umpqua basins, where forecasts mostly range from 50-80% of average. The highest May through September forecasts in Oregon range from 70-100% of average in the Willamette, Deschutes, Hood, Sandy, Grande Ronde, Umatilla, Walla Walla, and Willow basins.

**Utah** – April was cool and wet over northern Utah and was an improvement over what has been a very dry winter. A wet May would go a long way to reducing water use early in the season. While northern Utah had a great April, southern Utah and particularly the southeast remained very dry. Snowpacks have basically melted out on the Escalante, Dirty Devil, and southeast Utah basins, with the Sevier and the Price in the 50% to 70% range. Snowpacks in northern Utah are mostly in the 65% to 85% range with a few areas higher.

April precipitation was average to much above average (100%-135%) over northern Utah and below to near average over southern Utah (65%-95%), which brings the year-to-date precipitation to below normal statewide at 81%.

Current soil moisture saturation levels in runoff producing areas are: Bear – 80%, Weber – 79%, Provo – 77%, Uintah Basin – 71%, SE Utah – 71%, Sevier – 78%, and SW Utah – 69% of saturation.

Reservoir storage is currently at 73% of capacity statewide which is 18% less than last year at this time.

General runoff conditions are extremely poor in southeastern Utah and generally poor for the remainder of the state. May-July streamflow forecasts range from 11% for the White River below Tabbayne Creek, to 59% of average for Lakefork above Moon Lake. Surface Water Supply Indices range from 4% for Moab to 53% for the Lower Sevier. Surface water supply indices below 25% include: Weber, Ogden, Provo, East Uintah Basin, Price, Joes Valley, Ferron, Moab, Upper Sevier, and the Virgin. Water users with reservoir storage may have short supplies this year and those reliant on direct streamflow will experience shortages.

**Washington** – April brought additional mountain snow to Washington, as well as above normal runoff. The chilly, wet April weather bolstered mountain snowpack and delayed early snowmelt. Above normal temperatures since May 1 have brought on the spring freshet in earnest. Weather forecasters are calling for a dry spring and summer with probable chances of near to above normal temperatures.

The May 1 statewide SNOTEL readings were 121% of average. During the month of April, the National Weather Service and Natural Resources Conservation Service climate stations reported much above normal precipitation in all river basins, helping to maintain near to slightly above average water year totals. Due to above normal snowpack and precipitation, all reservoirs in Washington are in good shape. Streamflow forecasts vary from 72% of average for the Snake River below Lower Granite Dam to 155% of average for S.F. Tolt River near Index.

**Wyoming** - The SWE across Wyoming is just below normal for May 1<sup>st</sup>, at 98%. Monthly precipitation for the basins varied from 67-142% of average. Year-to-date precipitation for Wyoming basins varies from 64-100% of average for an overall average of 88%. Forecasted runoff varies from 48-131% of average across the Wyoming basins, for an overall average of 78%. Basin reservoir levels for Wyoming vary from 23-154% of average, for an overall average of 98%.

State Basin Outlook Reports can be accessed at: <http://www.wcc.nrcs.usda.gov/cgibin/bor.pl>

## RESERVOIR STORAGE

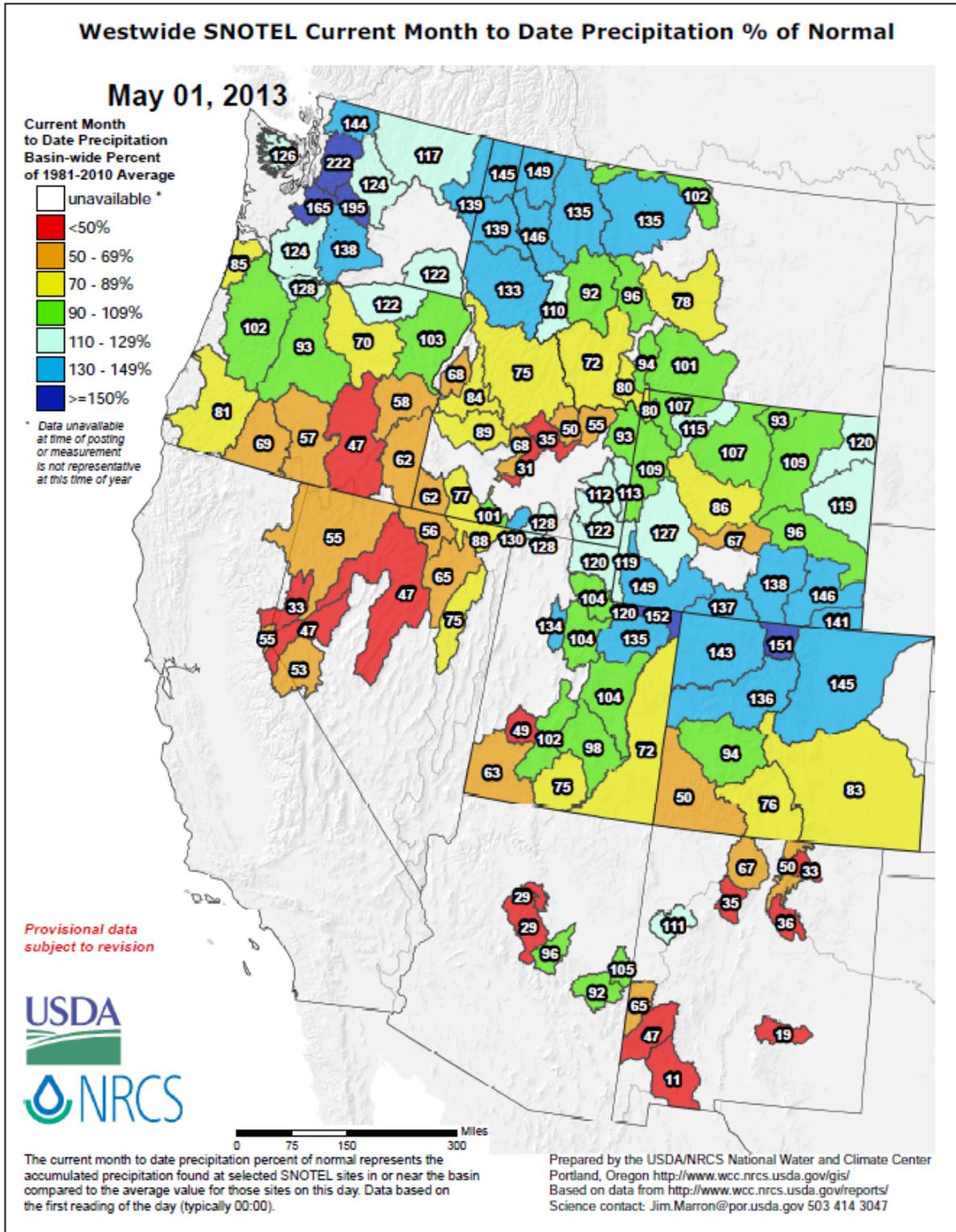
As a general rule, cold temperatures delayed snowmelt in April over the northern and eastern regions of the West, thus keeping streams low and reservoir storage gains at a minimum. In addition, because of low natural flow for this time of year and low return flows in some rivers, water managers are balancing delivering water based on inflows. As a result, water users are

hopeful that the delayed melt in April will provide for more water in May when the temperatures warm up. This seems logical and could allow for more runoff in a smaller time period; however it is difficult to say with certainty because of other natural climate variability. The cold temperatures have delayed snowmelt, reduced irrigation, and produced snowmelt rates of half an inch per day or less that can be absorbed by the soil. What is certain and needed now to improve the runoff is rain. Cold and wet is better than just cold. Wet weather would reduce irrigation demand even more, allow farmers to utilize the spring precipitation to replace irrigation water, and allow the water saved to be used later this summer when it will be dry. Another option to melt snow and increase efficiency or maximize the amount of water that reaches the reservoirs is a temperature increase. This would increase snowmelt rates to 1-2 inches per day, exceeding maximum soil infiltration rates, and thereby allowing more water to reach the reservoirs. However, this option would not benefit natural streamflow water right holders as much, nor those planning late summer river rafting trips.

Statewide (average) reservoir levels (Fig. 7) show no significant changes since last month with the exception of a moderate decrease in Arizona's level. California, Idaho, Montana, Utah, and Wyoming are near normal. The remainder of the western states are below normal, especially Nevada and New Mexico. California data will be provided at a later date.

#### **FOR MORE INFORMATION**

The USDA-NRCS National Water and Climate Center Homepage provides the latest available snowpack and water supply information. Please visit us at <http://www.wcc.nrcs.usda.gov>



**Fig. 1: For April 2013, precipitation was generally well above average west-wide, with the exception of the southern Cascades, Great Basin, Sierra Nevada, Idaho Snake River region, and scattered across basins over the southern half of the Four Corner States. Significant moisture occurred over the northern Cascades, northern Rockies, Uinta, northern Colorado, and southern Wyoming.**

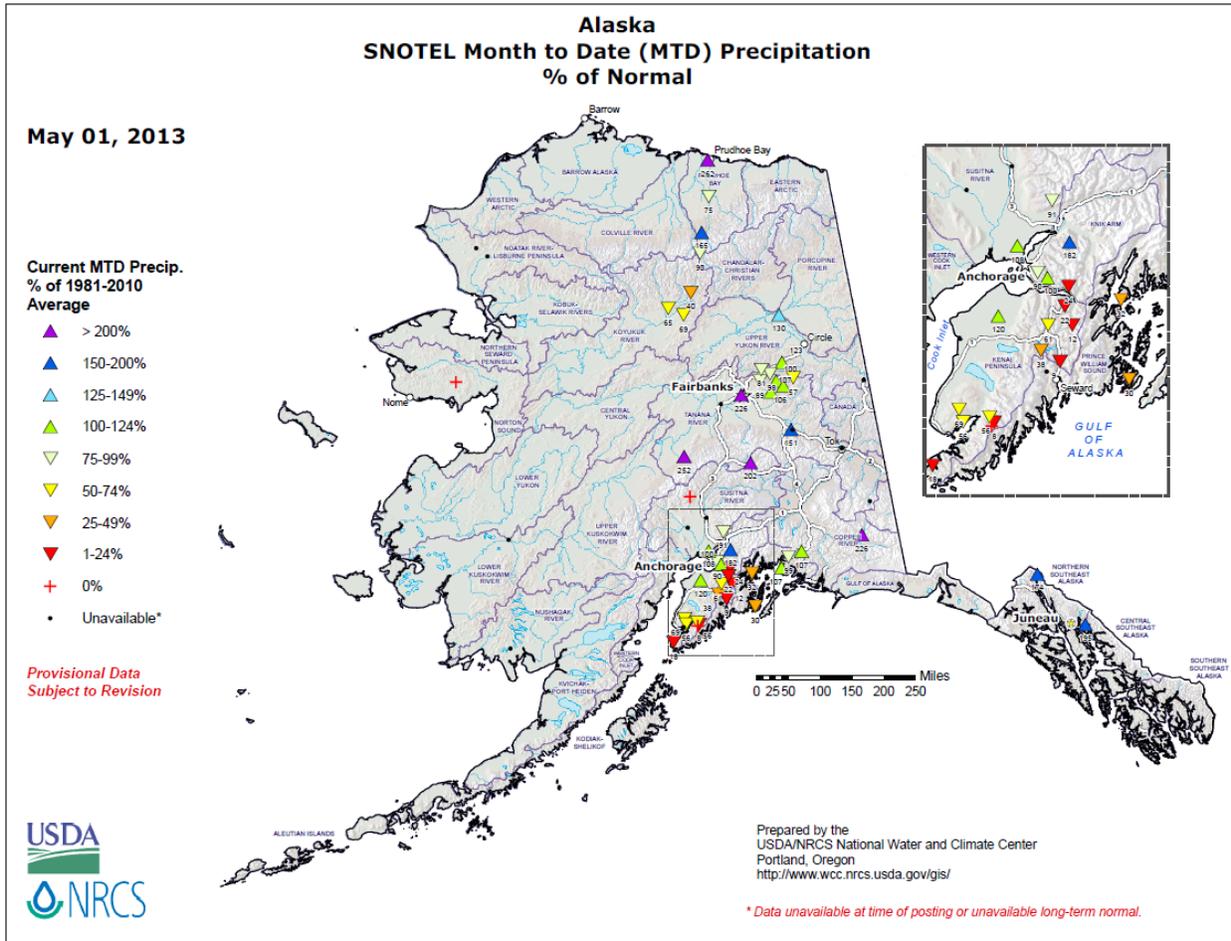


Fig. 1a: For April 2013, [Alaska](#) first class weather station summaries can be found at:

- [Annette](#)
- [Yakutat](#)
- [Bethel](#)
- [Cold Bay](#)
- [Kodiak](#)
- [Anchorage](#)
- [King Salmon](#)
- [McGrath](#)
- [Saint Paul](#)
- [Valdez](#)
- [Barrow](#)
- [Fairbanks](#)
- [Nome](#)
- [Kotzebue](#)

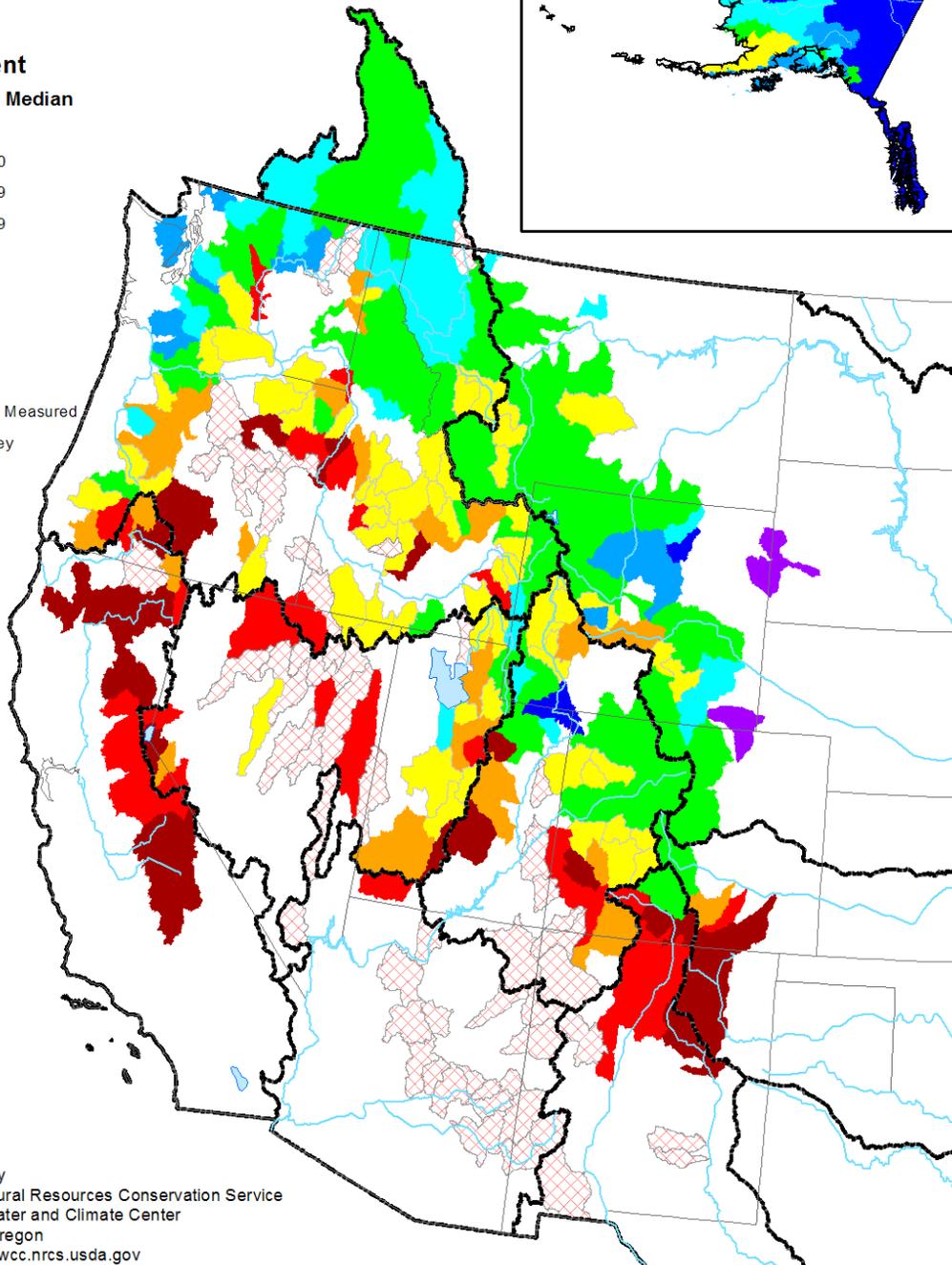
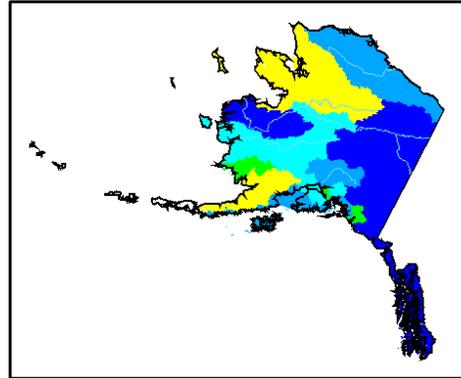
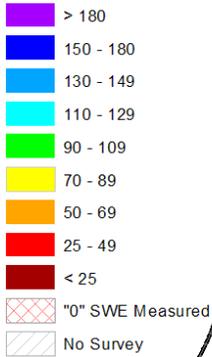
April is usually a dry month across much of Alaska. However, during the month, above normal amounts of precipitation fell over the Panhandle and parts of the Interior. The Kenai Peninsula was a notable exception, where precipitation was sparse.



These links are dynamic and update on the 1<sup>st</sup> of each month

# Mountain Snowpack as of May 1, 2013

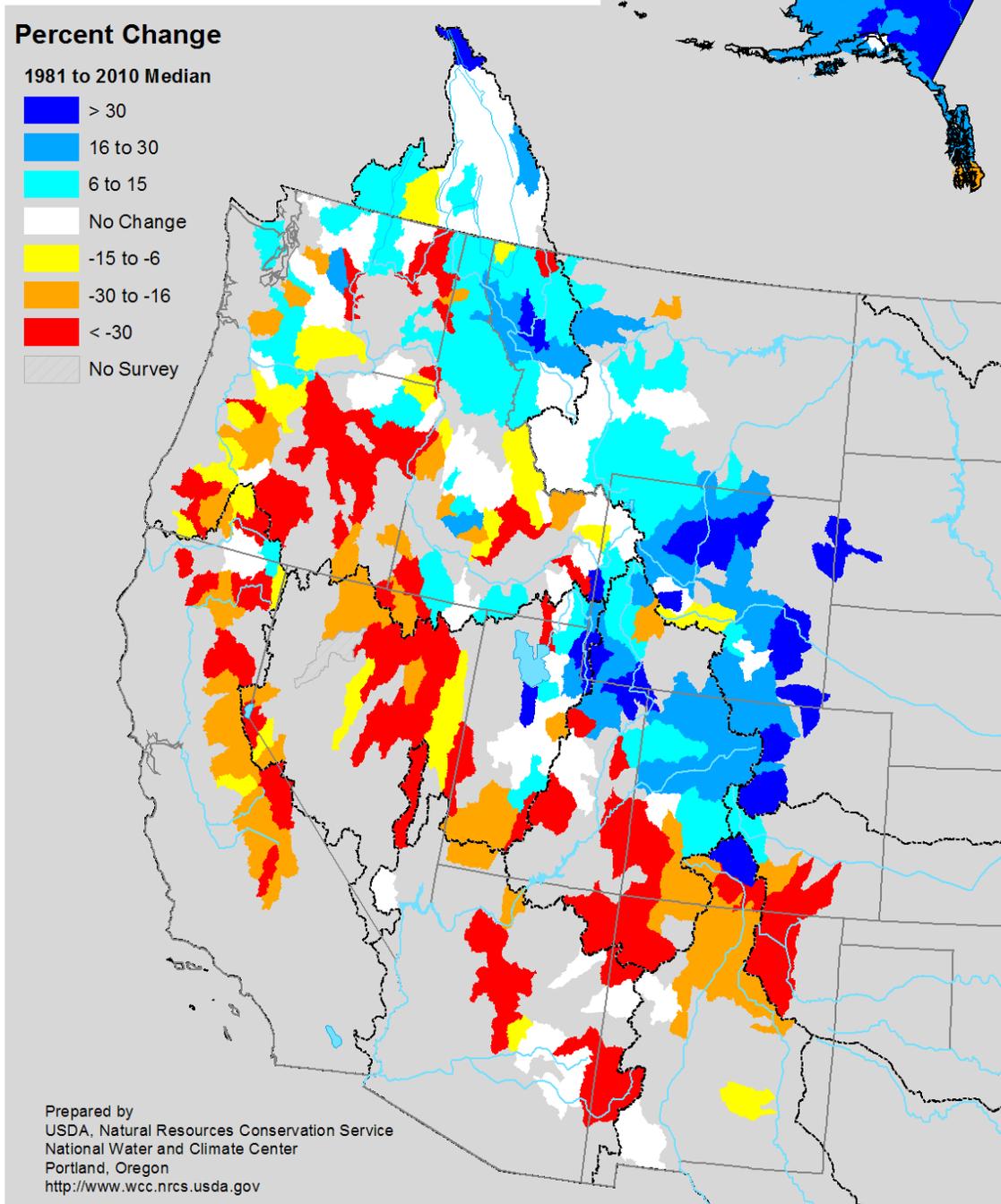
Percent  
1981 to 2010 Median



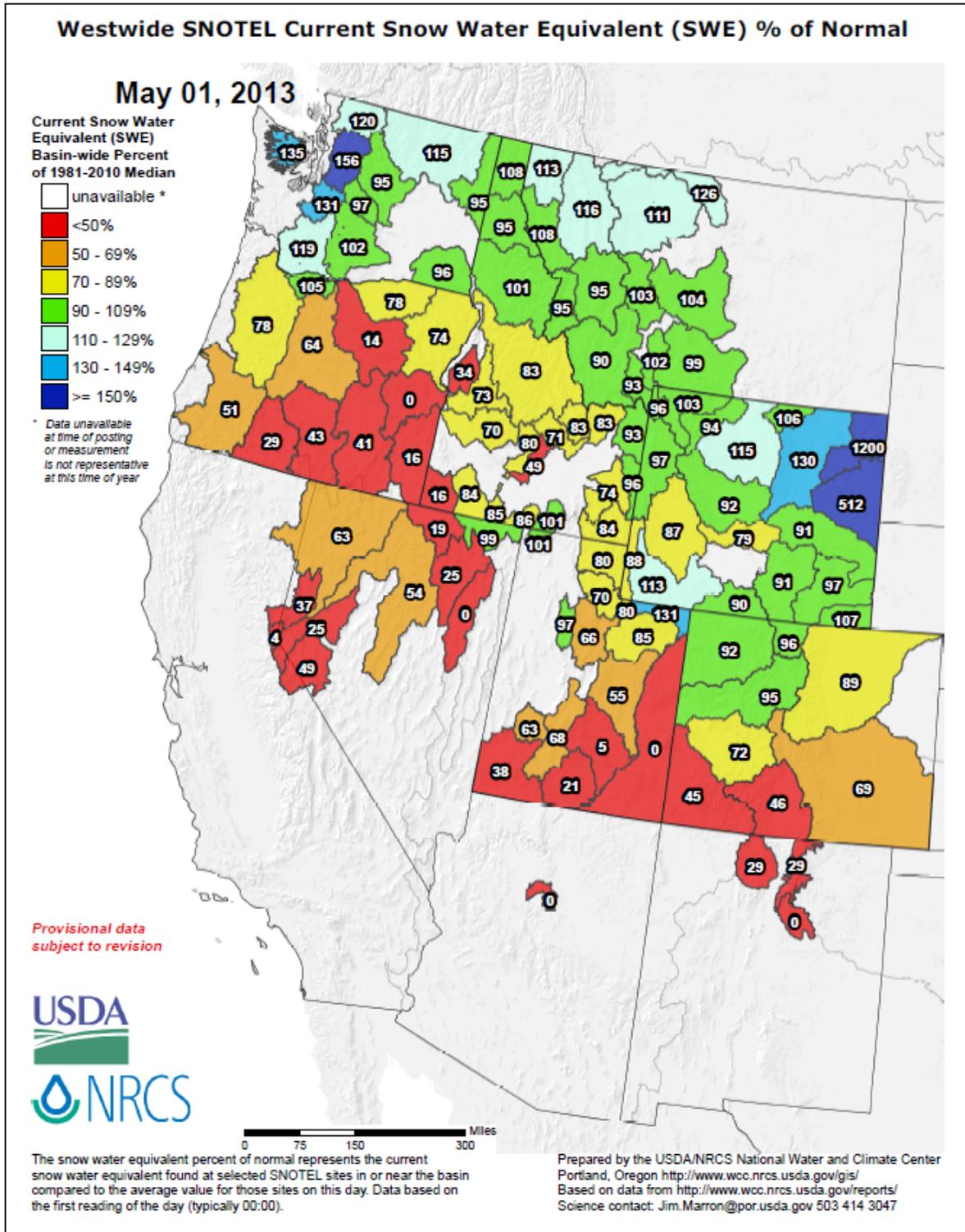
Prepared by  
USDA, Natural Resources Conservation Service  
National Water and Climate Center  
Portland, Oregon  
<http://www.wcc.nrcs.usda.gov>

**Fig. 2: Snowpack values on 1 May 2013. The Washington Cascades and northern half of the Rockies are holding at or above the long-term average. Many basins have melted out over eastern Oregon, northern California, Nevada, and parts of the Southwest. Alaska shows much of the state with above normal values due to a wet and cold April.**

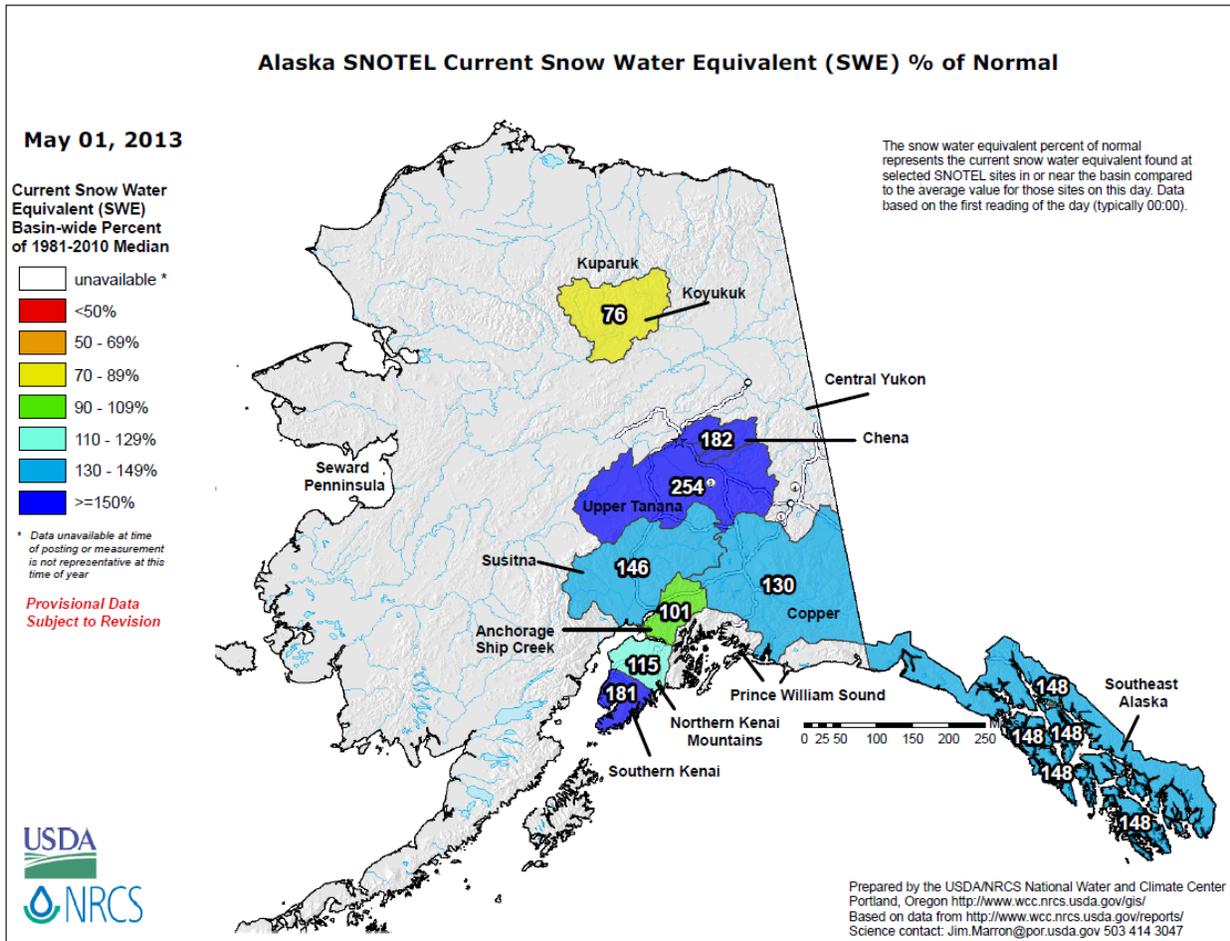
# Mountain Snowpack Change between April 1 and May 1



**Fig. 3: Mountain snowpack changes between April 1 and May 1, 2013. The northern and eastern tier of the West fared better than over the southern and western tier. These increases reflect either increased snowfall during the month and/or a slower snowmelt than is typically experienced during this latter part of the season. Alaska experienced mostly gains across the state with losses over the southernmost Panhandle.**



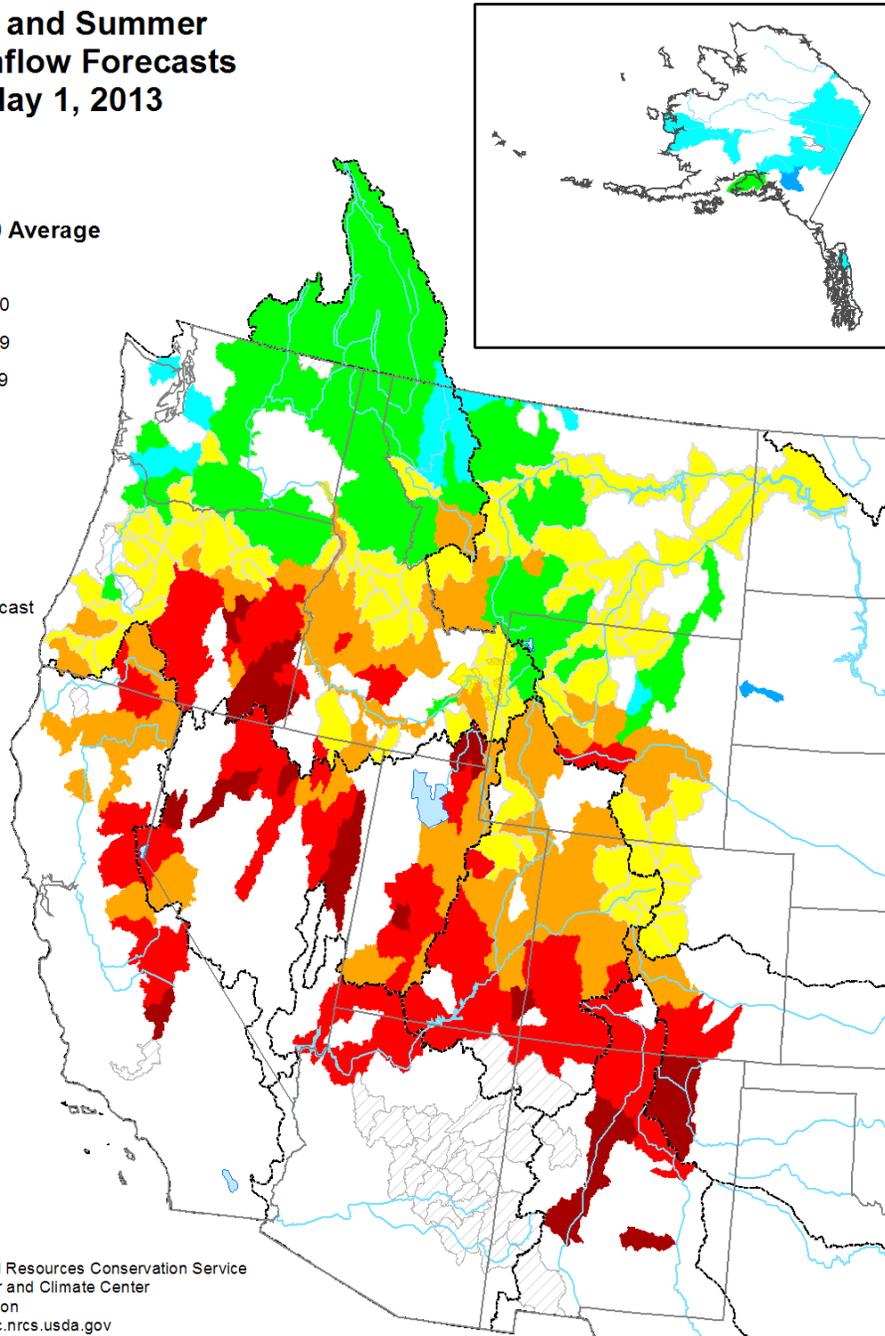
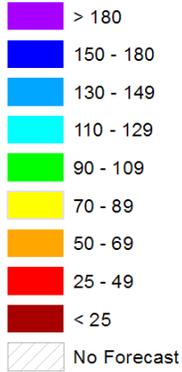
**Fig. 4:** As of May 1, 2013, SWE percent of normal map reveals surplus values over the Washington Cascades, northern Montana, Uinta, and the northeast drainages in Wyoming where snow cover is unusual this late in the season. Near average conditions exist over parts of the northern and central Rockies. Melt-out is complete over Arizona and most of New Mexico. The remainder of the West reflects substantially lower snowpack. Select this [link](#) for an up-to-date version of this map.



**Fig. 4a:** As of May 1, 2013, the [Alaska](#) SWE map indicates that much of Alaska has normal to well above normal values. The Kuparuk basin is the only location with a deficit. Recent colder weather over the state has slowed snowmelt. Select this [link](#) for an up-to-date version of this map.

### Spring and Summer Streamflow Forecasts as of May 1, 2013

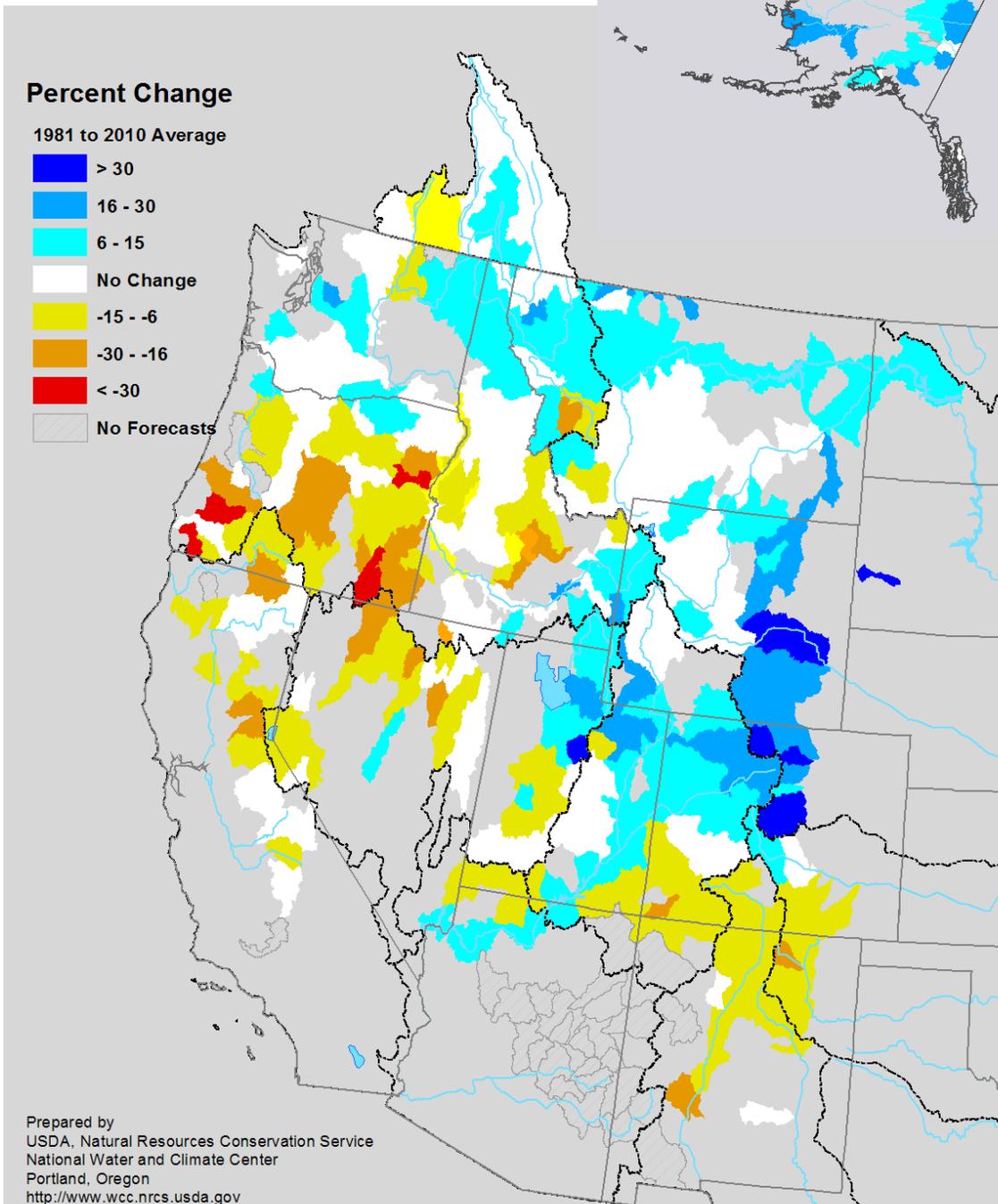
Percent  
1981 to 2010 Average



Prepared by  
USDA, Natural Resources Conservation Service  
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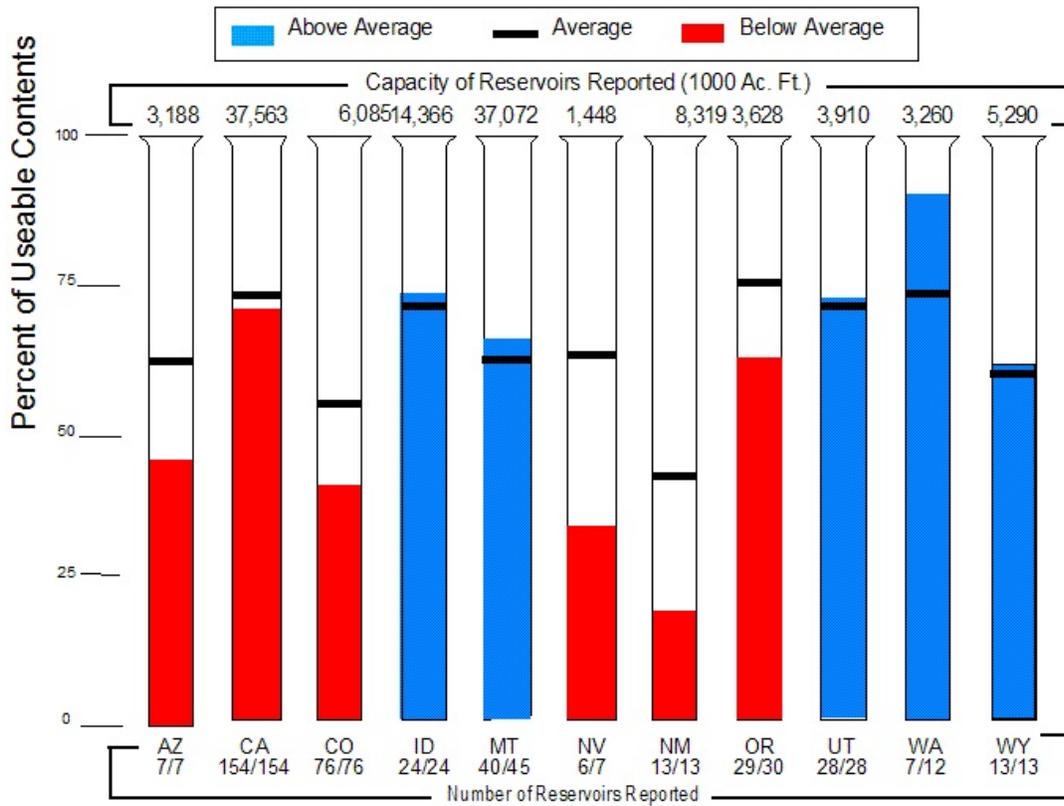
**Fig. 5: Seasonal Water Supply Forecasts – May 1, 2013. While about one-third of the northern tier of the West is expected to have near normal spring and summer streamflow, the opposite conditions are expected over the southern tier with the majority of drainages at significantly below average values.**

### Change in Spring and Summer Streamflow Forecasts from April 1 to May 1, 2013



**Fig. 6: Change in streamflow forecast between April 1 and May 1, 2013. While many basins are showing a month-to-month improvement (blue shades), these improvements in most cases are not enough to bring the forecast to average flows. Basins that have below average forecasts continue to trend downward at the start of May.**

### Reservoir Storage as of May 1, 2013



Prepared by: USDA, Natural Resources Conservation Service, National Water and Climate Center, Portland, OR  
<http://www.wcc.nrcs.usda.gov>

**Fig. 7: Reservoir Storage - May 1, 2013.** The states that continue to run the risk of some water shortages are Nevada and New Mexico, followed closely by Arizona. Idaho, Montana, Utah, California, and Wyoming are at near-average levels. Washington is the only Western State with a sizable surplus.