Office of the Washington State Climatologist

May 6, 2010

Welcome, Nick!

OWSC is pleased to announce our new State Climatologist - Nick Bond. Nick is a senior research scientist with the Joint Institute for the Study of Atmosphere and Ocean (JISAO) at the University of Washington (UW), with which he has been affiliated since 1990. He is also an affiliate associate professor with the Department of Atmospheric Sciences at UW. His research is on a variety of topics with a recent focus on the effects of climate on the marine ecosystems of the North Pacific. He has a special interest in the weather and climate of the Pacific Northwest, and looks forward to his involvement with OWSC. This newsletter includes an excerpt Nick wrote about the Madden-Julian Oscillation (MJO) and WA weather and climate.

In this Issue

April Summary

The shift to cooler and wetter conditions that occurred at the end of March continued through April with multiple strong storm systems impacting WA. Strong winds and snow in the mountains were common with each system. On April 2nd, sustained winds of 74 mph were observed at Tatoosh Island (off of the Olympic Peninsula) with gusts up to 93 mph. On that same day, gusts of 61 mph were recorded at some of the Puget Sound lowland stations (i.e., Seattle, Bellingham, Everett). Some strong cold fronts passed through, dropping high temperatures well below normal in some cases. There were a few scattered, warm days in which temperatures were warmer than normal (i.e., April 16 and 18 & 19). On the 19th, the Seattle WFO, Ephrata, and Wenatchee all reached record daily high temperatures (72, 82, and 76, respectively). From an overall perspective, however, this was just a short interlude in a cool and wet weather pattern.

Spotlight: The Madden-Julian Oscillation (MJO) and the Weather of WA

A Message from your State Climatologist

The weather of the tropics on time scales of weeks to a couple of months is related to a phenomenon known as the Madden-Julian Oscillation (MJO). The MJO modulates the distribution of deep cumulus convection, and the attendant atmospheric circulation on scales of thousands of kilometers in a band along the equator. The perturbations in the convection and winds in this band travel from west to east, and typically take 40-70 days to circle the globe. They tend to be manifested most prominently from the Indian Ocean into the central Pacific Ocean. The periodicity and strength of the MJO varies; it is considered active roughly one-half the time. The MJO is of particular interest to the weather and climate community because of its remote impacts on higher latitudes.

The MJO impacts the interactions between the tropical and mid-latitude portions of the atmospheric flow aloft. The deep convection with the MJO in the tropics can both trigger disturbances with a sort of a ripple effect extending into higher latitudes, and can influence the propagation and reflection of disturbances originating at higher latitudes. The mechanisms at work here are very complicated and not fully understood, but in a broad sense, appear to be similar to those that operate in association with El Nino/Southern Oscillation (ENSO) in terms of the latter's impacts on the weather on seasonal time scales. It bears noting that just like ENSO, the MJO more predisposes, rather than dictates, weather patterns at higher latitudes. That being said, statistically robust relationships have been documented between the MJO and the atmospheric circulation over the North Pacific Ocean, and with the precipitation over the western U.S. during wintertime, among other aspects of the tangible weather. For example, relatively heavy rainfall and floods are favored in Washington state during early winter (Oct-Dec) when the MJO is in the part of its cycle when deep convection is enhanced near the dateline; it tends to be drier than normal during the opposite phase of the MJO when convection is strong in the Indian ocean.

The dynamics of the MJO, and its influences on the higher-latitude weather are subjects of active research. From a Pacific Northwest perspective, it would be interesting and valuable to determine the degree to which the MJO could be used to help anticipate not just flooding rains but other kinds of episodic events such as arctic-air outbreaks and summertime heat waves. It may also play a role in seasonal transitions, with a notable example here being the timing of the typically rather sudden switch in coastal winds from southerlies to upwelling-favorable northerlies. OWSC intends to examine some of these questions. In parallel, there are efforts underway to improve operational predictions of the MJO itself. It appears that these predictions may soon be feasible with time horizons of a few weeks. Reliable forecasts of the MJO, coupled with statistical relationships based on past occurrences of the MJO, would provide the potential for outlooks beyond the 1-2 week range for which numerical weather prediction (NWP) models have useful skill.

Snowpack Report

The cool and wet pattern that persisted throughout April resulted in some more snow in the mountains. The current (May 3) snow water equivalent percent of normal is shown in Figure 1. While the Olympic Mountains and the southern Cascades are normal to above normal the rest of the state (especially the Spokane and Lower Snake Basins) may have water supply problems this summer. The water supply forecast issued by the Northwest River Forecast Center is shown in Figure 2. Much of eastern WA is projected to have between 50 and 75% of normal streamflow from now through September. Other parts of the state are forecasted to be between 75 and 90% of normal.

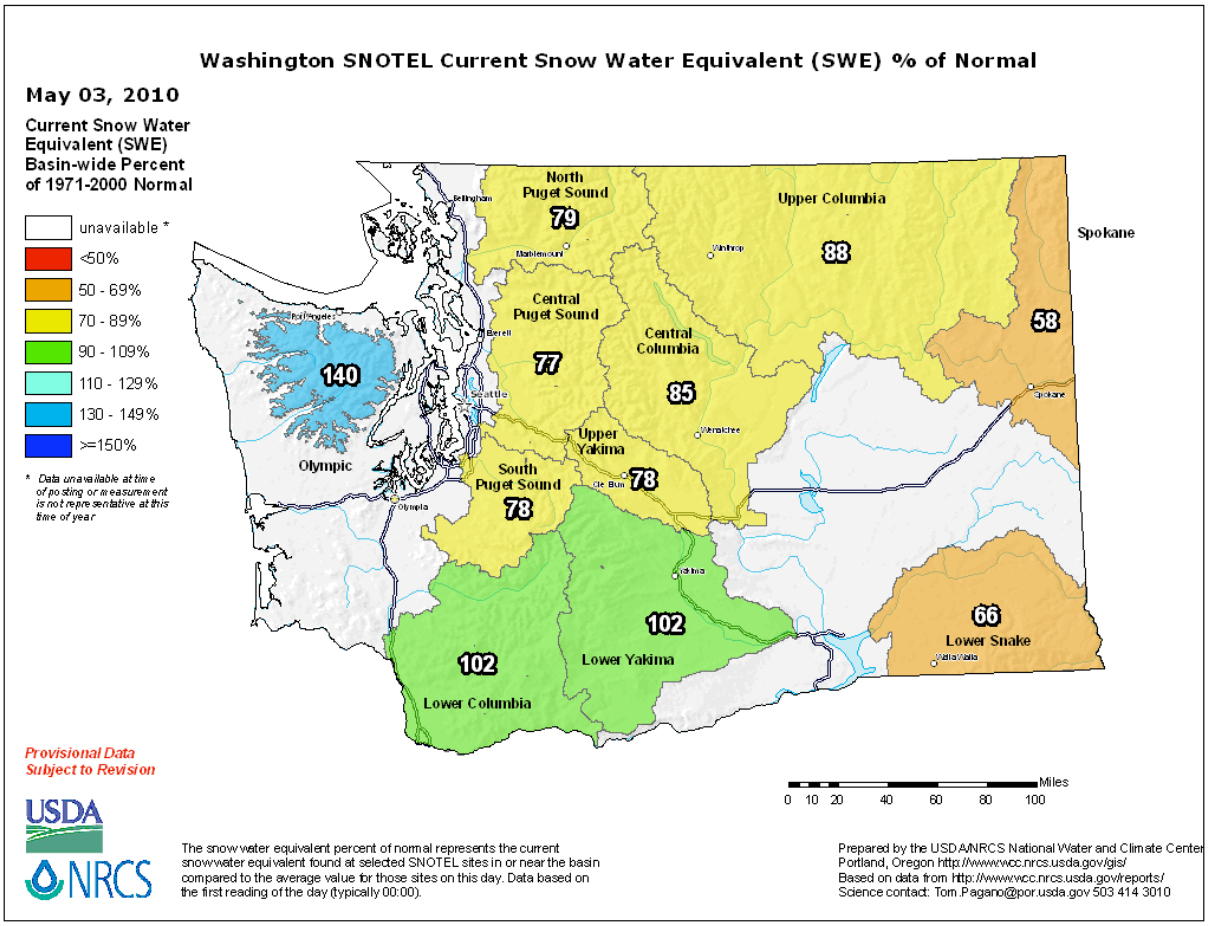


Figure 1: Snowpack (in terms of snow water equivalent) percent of normal for Washington as of May 3, 2010. Image is from the National Resources Conservation Service.

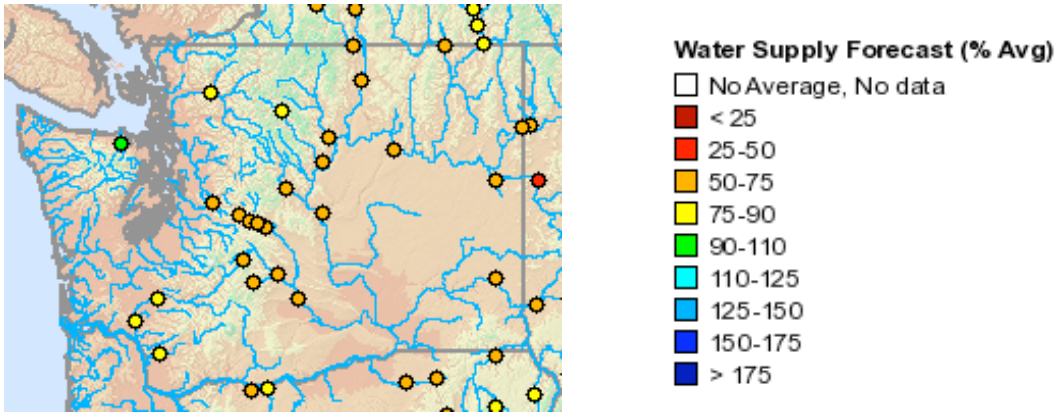
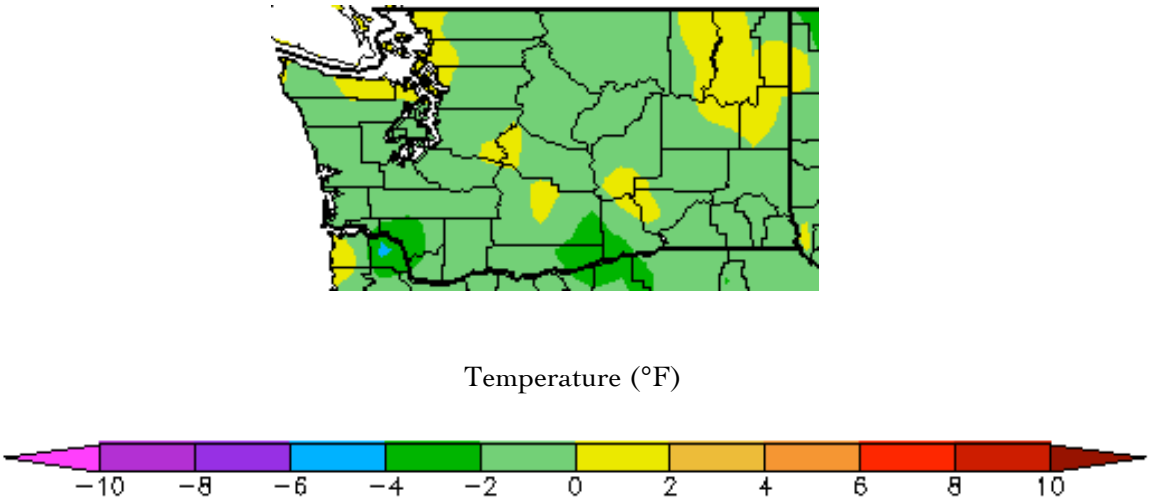


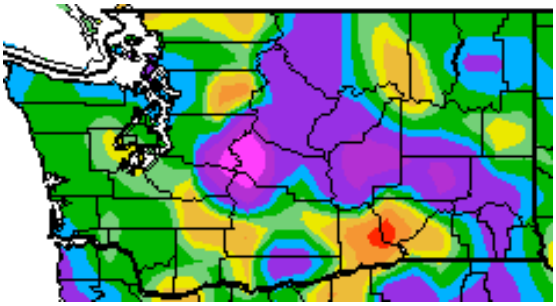
Figure 2: May through September water supply forecast for WA as of April 29, 2010 from the National Weather Service Northwest River Forecast Center (http://www.nwrfc.noaa.gov/water_supply/ws_fcst.cgi).

Climate Summary

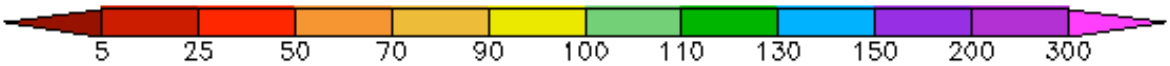
The 3 month streak of above normal temperatures (January, February, and March) has ended. The average April temperatures were very close to normal with most places tending towards the cooler side (see map from High Plains Regional Climate Center below). Of the stations listed in Table 1, Wenatchee had the largest anomaly with a temperature of 1.6°F cooler than normal for April.

April precipitation was generally above normal, with some areas in central WA receiving up to 200% of normal precipitation (i.e., Wenatchee - Table 1). Other places were either right at normal (Pasco and Yakima) or very near (i.e. Olympia and Spokane). There were a few dry spots, like in Benton and Walla Walla Counties that only received 70-90% of normal precipitation.





Precipitation (%)



(April temperature (°F) departure from normal (top) and April precipitation % of normal (bottom). Source: High Plains Regional Climate Center (http://www.hprcc.unl.edu).

	Mean Temperature (°F)			Precipitation (inches)		
	Average	Normal	Departure from Normal	Total	Normal	% of Normal
Western WA						
Olympia	47.5	47.4	0.1	3.34	3.58	93
Seattle	50.2	50.1	0.1	2.75	2.84	97
Sea-Tac	49.5	50.2	-0.7	3.49	2.59	135
Quillayute	46.7	46.7	0	9.89	7.44	133
Vancouver	50.8	50.1	0.7	3.25	3.07	106
Eastern WA						
Spokane	46.8	46.5	0.3	1.21	1.28	95
Wenatchee	49.9	51.5	-1.6	0.88	0.47	187
Omak	48.8	49.6	-0.8	1.21	1.11	109
Pasco	53.1	54.1	-1.0	0.51	0.51	100
Yakima	49.1	48.6	0.5	0.53	0.53	100

Table 1 - April Climate Summaries from around Washington from NWS (climate normal baseline is 1971-2000 except for Seattle WFO that has a baseline of 1986-2000).

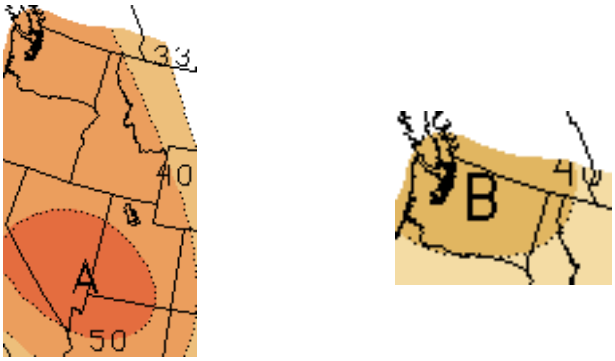
Climate Outlook

The El Niño conditions have weakened since December 2009, but are still persisting, and are expected to last through spring. Neutral ENSO conditions are expected to develop by the boreal summer. The most recent 4-week equatorial sea-surface temperature (SST) anomalies are more than 1.0°C, similar to the previous 4-week period, according to the CPC (http://www.cpc.noaa.gov/products/precip/CWlink/MJO/enso.shtml). While this situation provides some skill in predicting winter conditions in the Pacific Northwest and much of North America, the skill for predicting spring and summer decreases substantially. On average, winters during El Niño years are warmer and drier than typical conditions for WA, and that has generally been the case this year. Consequently, the spring seasonal prediction is mainly based on the recent trends, but also takes into account dynamical forecasts from the NCEP Climate Forecast System (CFS), and the expected decline of El Niño. Remember that when the odds are even, or there is lack of guidance, there is still a 33% chance each for above average, normal, or below average conditions.

The late spring (May-June-July; MJJ) outlook has the chances of above normal temperatures exceeding 40% for the entire state. The precipitation outlook calls for an equal chance of below, equal to, or above normal precipitation (a 33% chance for each) for MJJ.

The summer (June-July-August; JJA) outlook calls for at least a 40% chance of above normal temperatures and at least a 40% chance of below normal precipitation for the entire state.

(May-June-July outlook for temperature (left) and precipitation (right) from the CPC).



(June-July-August outlook for temperature (left) and precipitation (right) from the CPC).