

REGULATORY UPDATE OCTOBER 2023

Water Bulletin Fall 2023

OVERVIEW

After a devastating summer season of drought and wildfires, we are now transitioning into the cooler and traditionally wetter fall and winter seasons, which should bring some relief. As we find ourselves further along in the water-year, supplies are being challenged by ever-declining flows. This has led to a shortage in the system that will have to be managed until the spring (Figure 1). However, the question remains: “What might the water-year look like in 2024?”

EL NIÑO PHASE

Much of this is contingent on the present ENSO cycle, which is gradually evolving into a significant El Niño phase. When El Niño conditions manifest, they typically reroute the jet stream, consequently directing winter storms towards California, while leaving the Pacific Northwest relatively warmer and drier.

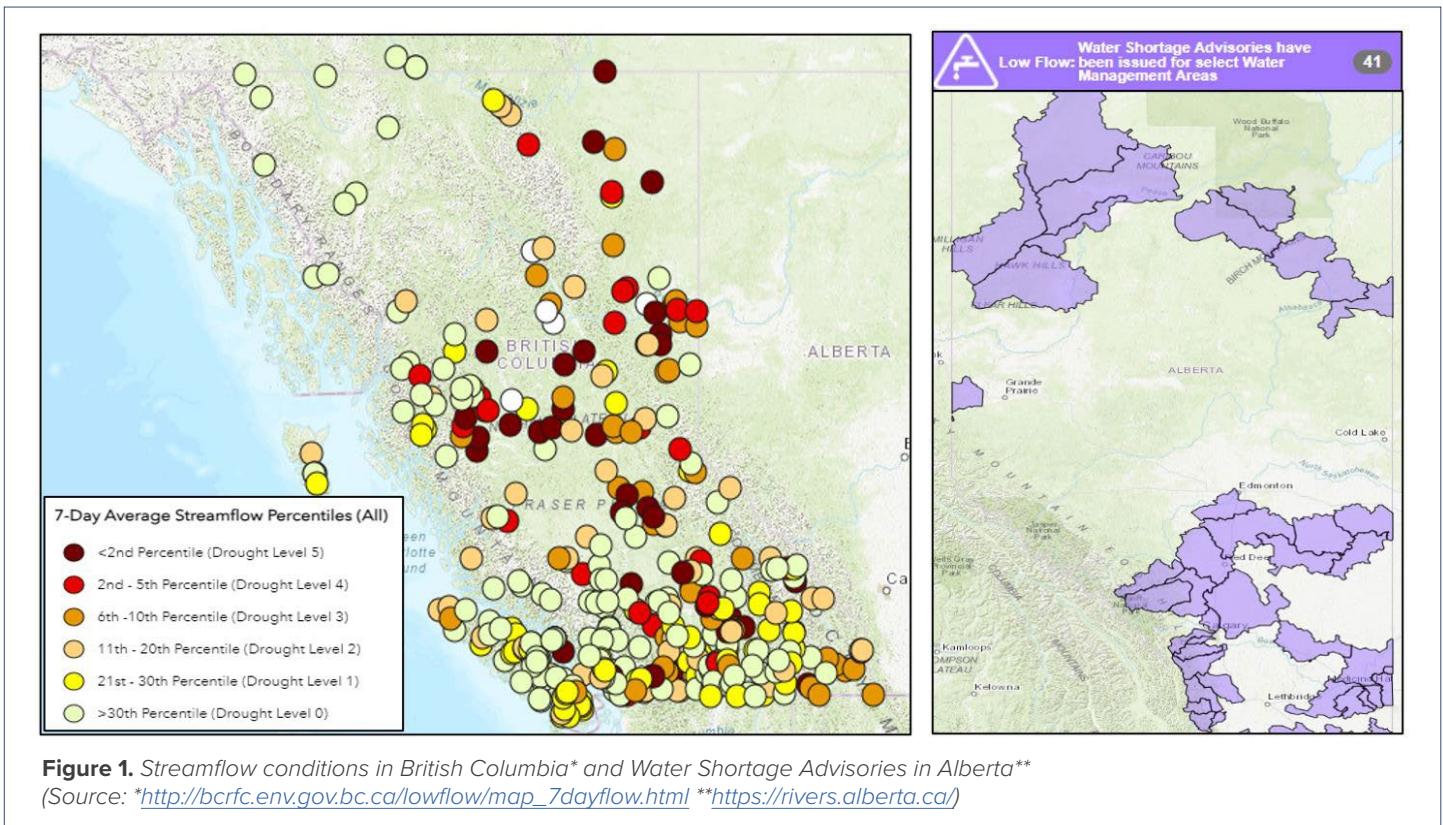
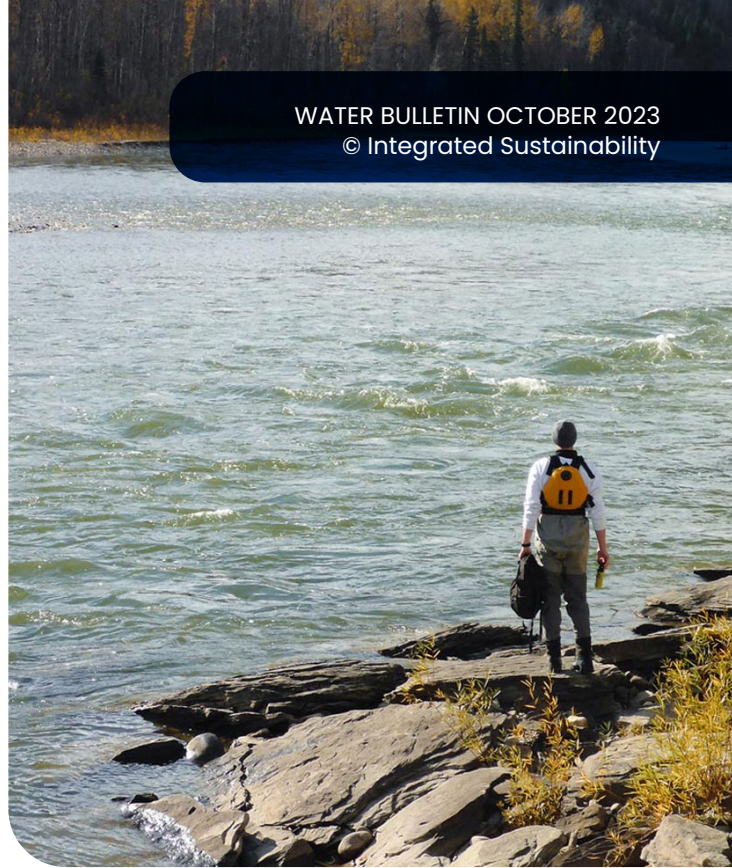
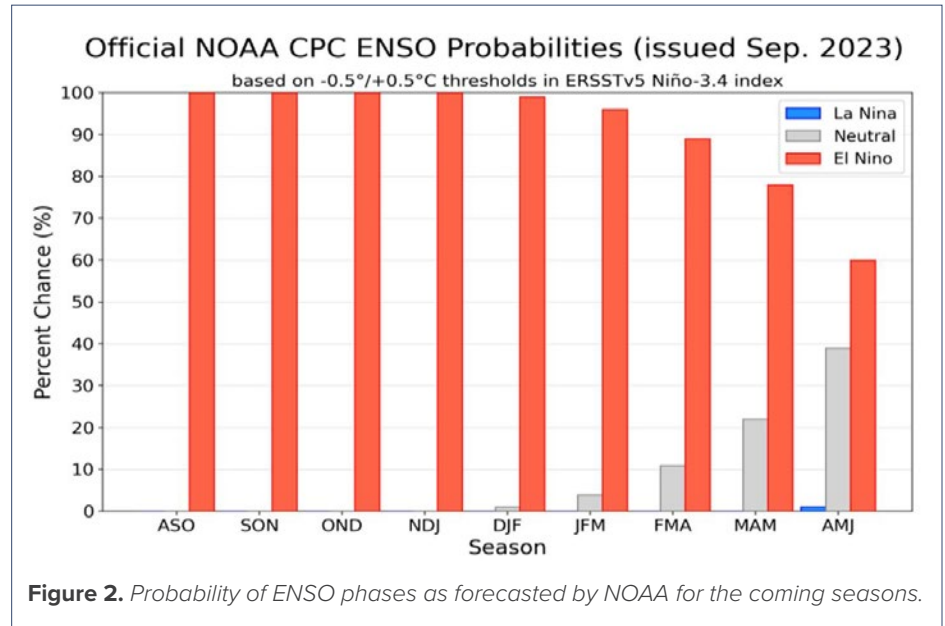


Figure 1. Streamflow conditions in British Columbia* and Water Shortage Advisories in Alberta**
(Source: *http://bcrcfbc.env.gov.bc.ca/lowflow/map_7dayflow.html **<https://rivers.alberta.ca/>)

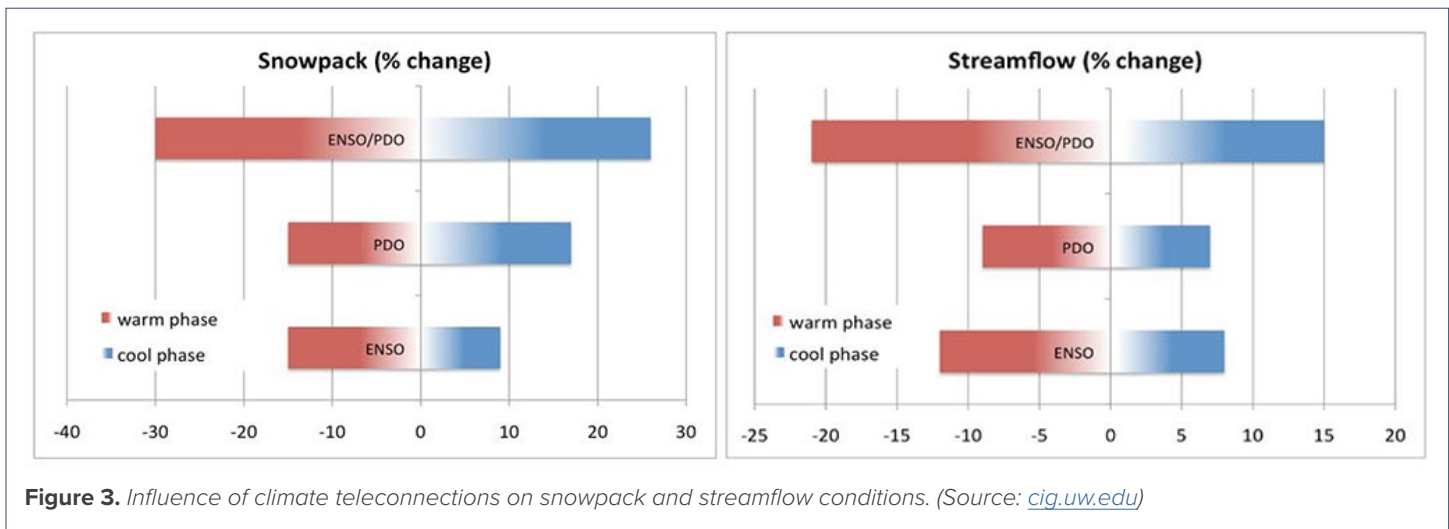
El Niño winters in the Pacific Northwest, including Western Canada, often have milder temperatures and lower amounts of precipitation, sometimes resulting in poor mountain snowpacks. The opposite effect occurs for the southwest United States, where intense rainfall, erosion, landslides, and flooding is a risk – particularly in California. This is generally restricted to the southern half of the state due to a characteristic shift in the storm track that brings moisture from the Pacific Ocean to the North American continent.

According to the Climate Prediction Center at NOAA (the National Oceanic and Atmospheric Administration), the current projection indicates a 100% likelihood of El Niño conditions persisting throughout the winter of 2023/2024 and extending into the spring of 2024 (Figure 2). Given this scenario, the anticipated outcome entails warmer and drier conditions for the forthcoming winter season, accompanied by a reasonable chance of adverse effects on water supplies in 2024.



PACIFIC DECADEAL OSCILLATION PHASE

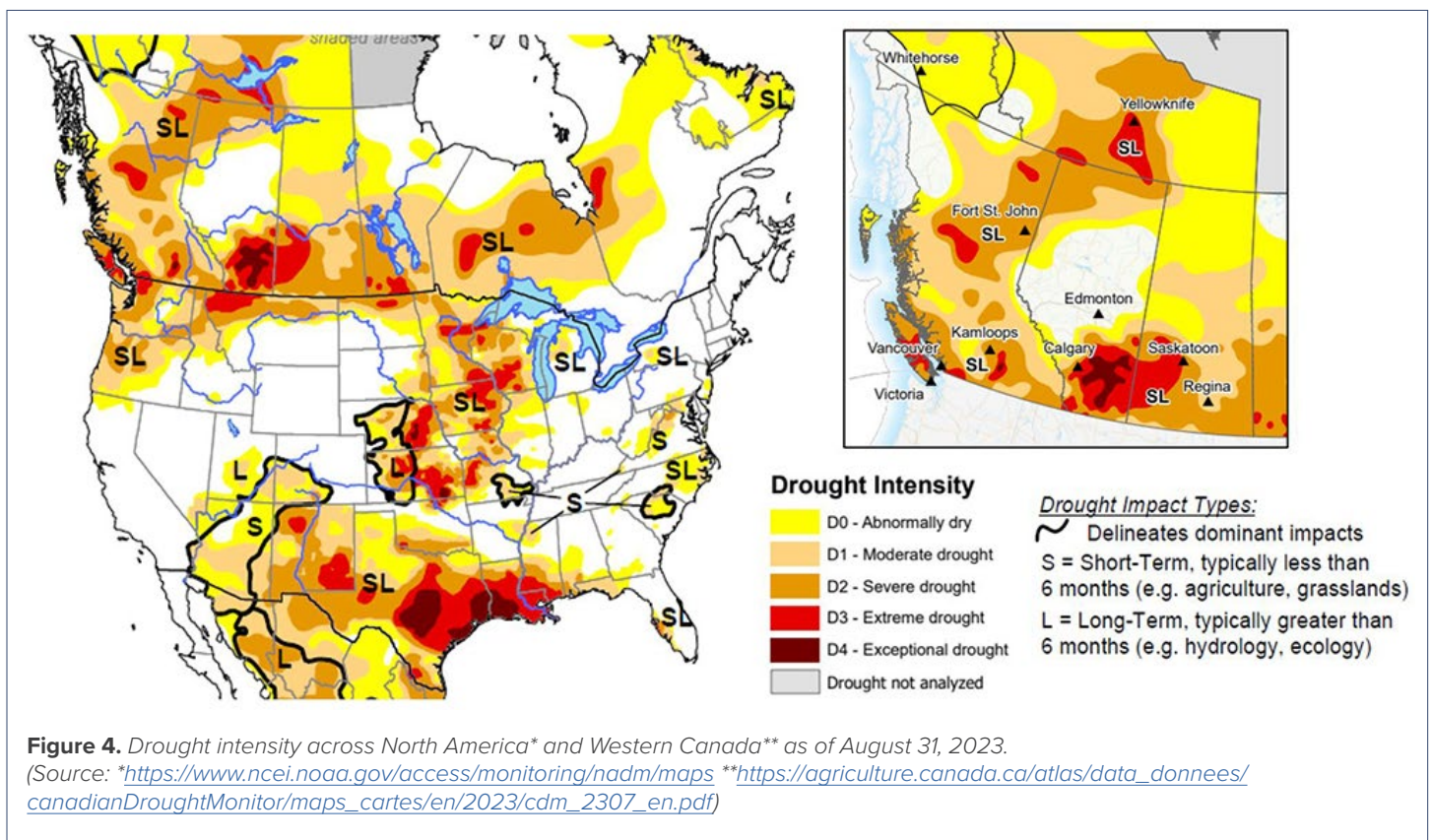
The Pacific Decadal Oscillation, or PDO (i.e. a longer phase climate phenomenon similar to the ENSO), can also have an influence on the water balance of Western North America, and depending on the phase, can have significant influences on flood and drought conditions. Research done by the University of Washington has identified a relationship between the ENSO and PDO phases with respect to snowpack and streamflow conditions (Figure 3).



Although the ENSO is currently in a positive (warm) phase, the PDO has been in a sustained negative (cool) phase since late 2019, with index values ranging from -1.3 to -3.1. For context, the greater the negative (or positive) the index value, the stronger the effect on the water balance of the Pacific Northwest region. Given this current juxtaposition of a positive ENSO phase with a negative PDO phase, the expectation would then be for a less severe reduction to snowpacks and streamflows going into 2024. If, for example, one can expect a 10-15% reduction in snowpacks and streamflows during a positive ENSO phase, as noted in Figure 3, this could be counterbalanced by a 5-15% increase in snowpacks and streamflows due to the presence of a negative PDO phase. This is commonly referred to as destructive interference.

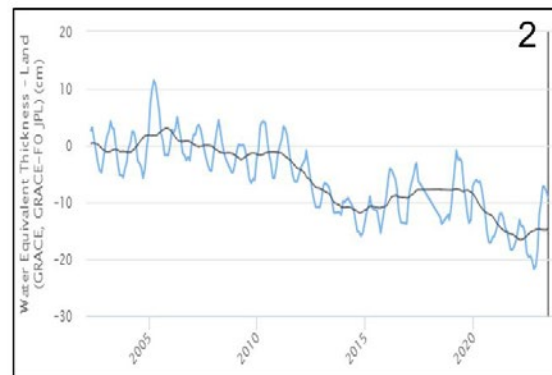
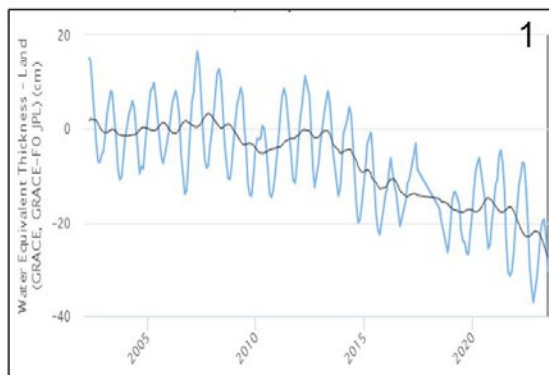
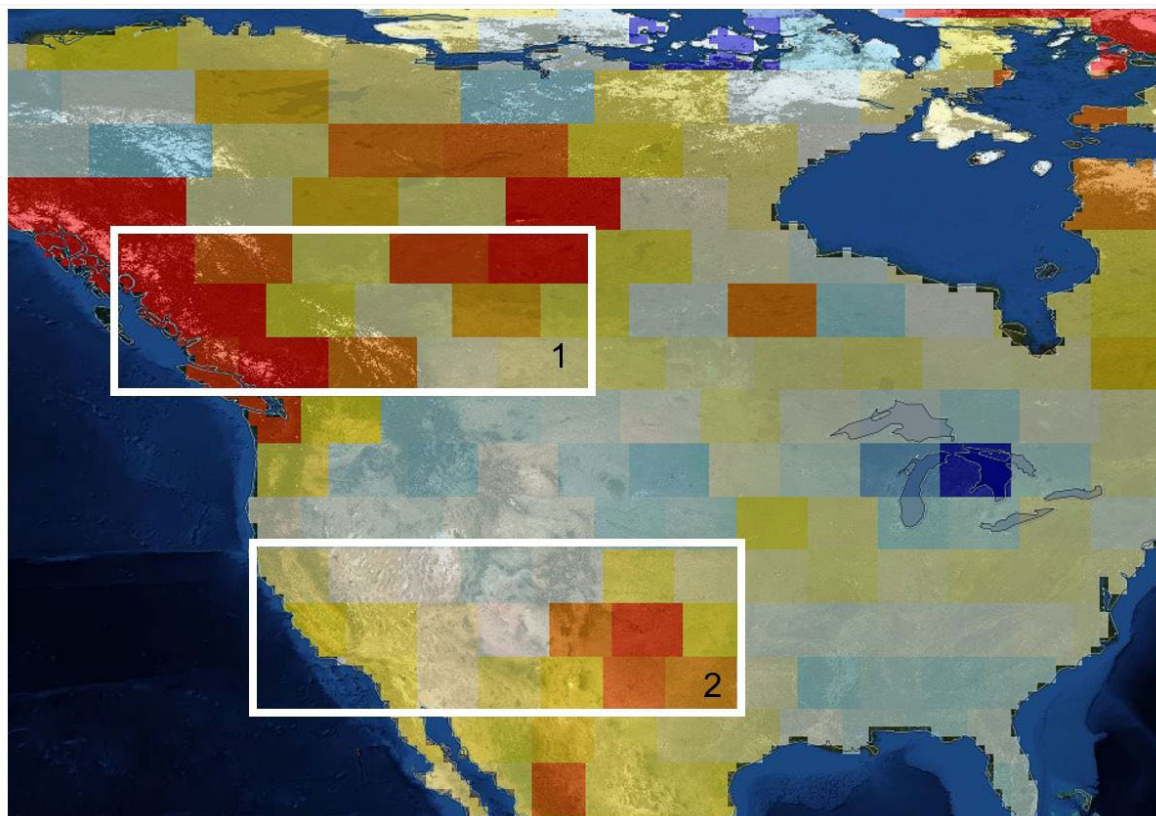
DROUGHT INTENSITY

Regardless of how these climate modes may be interacting with each other over the next few months, drought has persisted over the last year leading to significant moisture deficits in many areas of Western Canada (Figure 4). This condition has now transitioned to a hydrological drought, adversely affecting water systems such as rivers, lakes, and wetlands. Given the magnitude of impacts in some areas, it may take some time to recover to more normal conditions. With the current El Niño phase in place, it appears that improvements may not materialize until the latter part of 2024.



A direct result of this extended period of dry conditions has been an exceptional wildfire season in Canada, with many communities across the country being threatened and some negatively impacted. Such conditions have not occurred for a long time and could persist if the full effects of El Niño play out. When conditions become this dry, basins essentially “dehydrate” and stay that way until the moisture balance shifts back to wetter conditions, a transition that may require a significant amount of time.

Data provided by NASA's GRACE satellite system (Gravity Recovery and Climate Experiment) shows large areas of water deficiency across North America (Figure 5). Comparison of this information with the drought monitor results (Figure 4) substantiates the dehydrated state of Western Canada over the last few years. When considering the amount of water decline since 2014, the volume of loss is staggering (i.e. roughly 39 billion m³). A similar loss of water has also been encountered in the southwest United States, particularly in the areas of central Texas and southern California.



◆ Water Equivalent Thickness - Land (GRACE, GRACE-FO JPL) ◆ 12 Month SMA

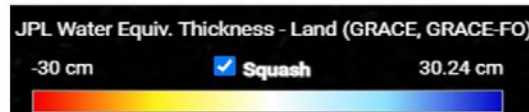


Figure 5. GRACE satellite water equivalent thickness for June 2023 over the North American continent with temporal graphs showing declining trends for Western Canada and Southwest United States from 2002 to 2023. (Source: NASA Jet Propulsion Lab)

Given the current climatic conditions and prevailing water deficits across much of North America, the expectations for 2024 water supplies in Western Canada do not look favourable. If this is the case, enterprises reliant on water for their day-to-day operations should be preparing for leaner supplies in the coming year and possible surface water licence restrictions in addition to those that already exist.

DID YOU KNOW?

Surface water is not the only source that can be utilized to support water-dependent enterprises. Groundwater exists as a viable alternative or enhancement to businesses and activities that rely on surface water for day-to-day needs. Access to groundwater of suitable quantity and quality is somewhat location dependent, but many suitable aquifers exist beneath our landscapes that are capable of providing a suitable offset.

DO YOU NEED?

Integrated Sustainability's dedicated team of water specialists understand the challenges associated with water shortages and can support in ensuring a suitable water strategy is in place to avoid potential water supply disruptions. A conjunctive use approach through ESG consulting engagement, advanced water resource management techniques, and optimizing water usage through innovative water reuse solutions, can provide a significant competitive advantage in safeguarding water security. Contact us today for more information.



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