Influence of Climate Signals on 2011 Water Supply Forecasts at Dworshak, ID and Libby, MT

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Background:
Predicted values of seasonal inflow volumes at key reservoirs guide the operations of the Columbia River system for multiple purposes, including hydropower, flood control, fish and wildlife, and water quality. The Corps of Engineers has developed principal components regression models to provide these water supply forecasts for Libby Dam, Montana and Dworshak Dam, Idaho. These regression models make optimal use of both climate variables and current basin hydrometeorologic variables (such as recent rainfall and snowpack water content).

Libby Water Supply Forecast Model

The recent review and update to the Libby WSF equations considered 720 variables developed from ten climate models, along with site characteristics from numerical precipitation and snow models. This updated model incorporates the dominant area and precipitation variables within each season of these climate models. Nino34, ONI, principal components analysis was used to identify the principal variables for the successful forecast equations.

Water Supply Forecasts during 2011

Discussion: While the official water supply forecast volumes are calculated monthly from the Corps' statistical equations, additional forecasts are issued by other agencies for these same sites at up to daily frequencies (i.e., the NWRFC issues 53 ESP forecasts for over 200 locations at least once a week). The two charts above display how the various forecasts played out over the 2011 winter-spring forecast season.

Insights and Conclusions: 2011 was quite an unusual year with a consistently wet and cool winter and spring, with snow accumulation continuing well past the typical early-April dates. Throughout the winter and early spring months the inflow forecasts seemed to increase with each passing week, making for challenging operational decisions. Fortunately, the long, cool spring months also provided a slow melting of the large snowpack, such that the runoff didn’t pose any substantial flood control issues. All of the Dworshak volume forecasts that existed merely relied on on-site observations of precipitation and snow and were consistently lagging the statistical water supply forecast that included the extremely large SOI climate signal from the previous September. Beginning on 1-April the alternative forecasts began converging with the official Dworshak forecast. The official statistical volume forecast for Libby also exceeded the alternative forecasts for the winter months, providing some foresight of the large runoff to come, but the direct benefits derived from the climate variables appears to be marginal.