

PNNL exploring implications of global warming

Western states face a significant drop in rain and snowpack runoff, allegedly because of global warming, which could reduce water supplies as much as 30 percent over the next 50 years, according to a recent *USA Today* article.

Scientists at Pacific Northwest National Laboratory have developed models to estimate the impact of global warming on water resources in the western United States. "Water-resource managers are looking toward more scientifically based solutions to address increased demands on their agencies," said Mark Wigmosta, chief scientist with PNNL's hydrology group. "Our modeling techniques can help them make better decisions by illuminating potential tradeoffs between cost and risk."

Researchers have developed a modeling system that links regional climate models with distributed watershed models. Applying the models to the Yakima River Basin, scientists created an historic climate simulation based on observed carbon-dioxide emissions from fossil-fuel combustion. They compared the results with three future climate simulations based on likely increases in global population, economic growth and energy production.

All three simulations indicated more rain than snow falling in fall and winter, causing increased winter runoff and decreased winter snowpack, primarily as a result of higher air temperatures. With more precipitation falling as rain in fall and winter, the Pacific Northwest will lose a lot of natural water storage in the snowpack. Less winter snowpack would mean an earlier runoff.

This change may significantly affect fish populations in the Yakima River. For example, adult fall Chinook salmon begin their upstream migration in the Yakima in the fall, and the resulting salmon smolt begin migrating downstream the following spring. But under future climate scenarios, stream temperatures remain high later in the fall, which may delay upstream migration of adult salmon.

In addition, spring snowmelt occurs more than a month earlier, further compressing the time available for spawning, incubation and rearing before the smolt migrate downstream. Other fish species — even other Chinook-salmon runs — will be affected differently.

Storing increased runoff in the fall and winter and releasing it during the historical spring snowmelt may be one solution. However, when considering changes in operating procedures, water-resource managers must also consider other, often conflicting, water uses such as irrigation.

"We believe the research we're doing will help water-resource managers make increasingly difficult decisions about how to use water resources in the future," Wigmosta said.

To read the entire *USA Today* article, see http://www.usatoday.com/weather/news/2002-11-21-western-snowpack_x.htm. ■