

SNOWPACK:
The West is seeing significant declines

Continued from page 1

could not be built fast enough to offset the loss of snow storage – and we don’t have a lot of capacity left for that kind of storage. It comes down to managing what we have in the best possible ways.”

The researchers attribute the snowpack decline to warmer temperatures, not a lack of precipitation. But the consequences are still significant, they point out. Earlier spring-like weather means more of the precipitation will not be stored as long in the mountains, which can result in lower river and reservoir levels during late summer and early fall.

The study considered data from 1,766 sites in the western U.S., mostly from the U.S. Department of Agriculture’s Natural Resources Conservation Service and the California Department of Water Resources. The researchers focused on measurements taken on April 1, which historically has been the high point for snowpack in most areas, though they also looked at measurements for Jan. 1, Feb. 1, March 1, and May 1 – which led to the range of decline of 15 to 30 percent.

They also used a physically based computer model of the hydrologic cycle, which takes daily weather observations and computes the snow accumulation, melting, and runoff to estimate the total snowpack in the western U.S.

“We found declining trends in all months, states and climates,” Mote said, “but the impacts are the largest in the spring, in Pacific states, and in locations with mild winter climates.”

The Pacific states – California, Oregon and Washington – receive more precipitation because of the Pacific Ocean influence, and more of the snow falls at temperatures near freezing. Because the Cascade mountains, which transect the region, are not as steep as the Rocky mountains, they have more area that is affected by changes in temperature.

“When you raise the snow zone level 300 feet, it covers a much broader swath than it would in the inland states,” Mote said.

Mote was one of 12 lead authors on a chapter of the fifth Intergovernmental Panel on Climate Change report looking at the cryosphere, which is comprised of snow, river and lake ice, sea ice, glaciers, ice sheets and frozen ground. Also an author on the fourth IPCC report, he had led a 2005 study on western snowpack levels that had

also documented declines that were less dramatic than those in this new study.

This latest study found:

- California had the highest number of positive snowpack trends since 1955, but lingering drought during the past decade erased most of those gains and snowpack declines still dominated;

- Most of the other western states had only one or two sites that reported increases in snowpack;

- Regions with the most significant decrease in snowpack were eastern Oregon and northern Nevada, though snowpack decreases in excess of 70 percent also occurred in California, Montana, Washington, Idaho and Arizona.

“The amount of water in the snowpack of the western United States is roughly equivalent to all of the stored water in the largest reservoirs of those states,” Mote said. “We’ve pretty much spent a century building up those water supplies at the same time the natural supply of snowpack is dwindling.

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– Philip Mote

“On smaller reservoirs, the water supply can be replenished after one bad year. But a reservoir like Lake Mead takes four years of normal flows to fill; it still hasn’t recovered from the drought of the early 2000s.”

Mote said snowpack levels in most of the western U.S. for 2017-18 thus far are lower than average — a function of continued warming temperatures and the presence of a La Niña event, which typically results in warmer and drier conditions in most southwestern states.

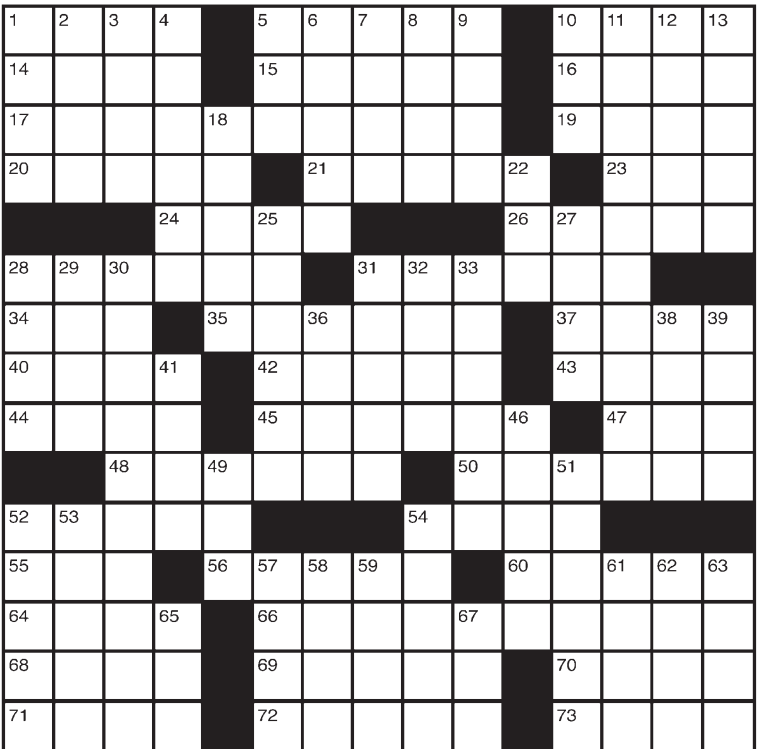
The study was funded by the National Oceanic and Atmospheric Administration’s Regional Integrated Sciences and Assessment (RISA) program, and the U.S. Environmental Protection Agency’s Office of Atmospheric Programs.

Mote is on the faculty of OSU’s College of Earth, Ocean, and Atmospheric Sciences. Other researchers on the study include Sihan Li, University of Oxford; and Dennis Lettenmaier, Mu Xiao, and Ruth Engel of the University of California, Los Angeles.

The Nugget Newspaper Crossword

By Jacqueline E. Mathews, Tribune News Service

- ACROSS**
- 1 Skin potatoes
 - 5 Deadly
 - 10 Lubricates
 - 14 As dumb as ___ of rocks
 - 15 Excuse
 - 16 Ebb’s opposite
 - 17 Minor fault
 - 19 Sheet of floating ice
 - 20 Lopsided
 - 21 Close or Ford
 - 23 Neighbor of Canada: abbr.
 - 24 Deserve
 - 26 First phase
 - 28 Actress Hawn
 - 31 Jupiter or Mars
 - 34 Make fun of
 - 35 Pad of paper
 - 37 Envelop
 - 40 Cribbage markers
 - 42 Fido’s restraint
 - 43 Wise man
 - 44 Tiny cut
 - 45 Shelf above a fireplace
 - 47 One and nine
 - 48 Kleenex, e.g.
 - 50 Friendliest
 - 52 Beverage
 - 54 Sworn promise
 - 55 Curved edge
 - 56 “A Doll’s House” playwright Henrik ___
 - 60 Speediness
 - 64 Eden resident
 - 66 Unintentional
 - 68 Greek cheese
 - 69 Most popular search engine
 - 70 Peaceful
 - 71 Ash or alder
 - 72 Sharon or Oliver
 - 73 Peepers
- DOWN**
- 1 Dad
 - 2 Lincoln and Vigoda
 - 3 Music style
 - 4 Go beyond
 - 5 Passing craze
 - 6 Straighten
 - 7 Work the soil
 - 8 Competent
 - 9 Roaring beast
 - 10 Take ___; leave
 - 11 Draw pictures for a book
 - 12 Baggy
 - 13 Perspiration
 - 18 Expect
 - 22 Prefix for profit or partisan
 - 25 Kingdoms
 - 27 Latest info
 - 28 Spaces
 - 29 ___ house; realtor’s event
 - 30 Legal
 - 31 Means of transportation
 - 32 In case
 - 33 Greek goddess of wisdom
 - 36 Boyfriend
 - 38 Grows gray
 - 39 ___-up; confined
 - 41 Twirl
 - 46 Limber; moving gracefully



Created by Jacqueline E. Mathews

3/7/18

— Last Week’s Puzzle Solved —



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3/1/18

- 49 Enjoy a snow sport
- 51 Possibility
- 52 Uncomfortable indoor breeze
- 53 Equestrian
- 54 French ___ soup
- 57 Sea inlets
- 58 “Get lost!”
- 59 Resound
- 61 Remain
- 62 “A ___ of Two Cities”
- 63 Large trees
- 65 Name with Ginnie or Fannie
- 67 Female animal

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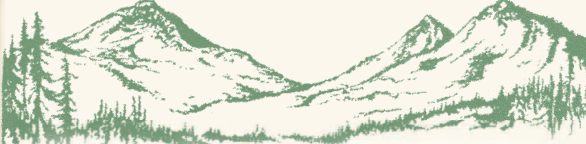
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