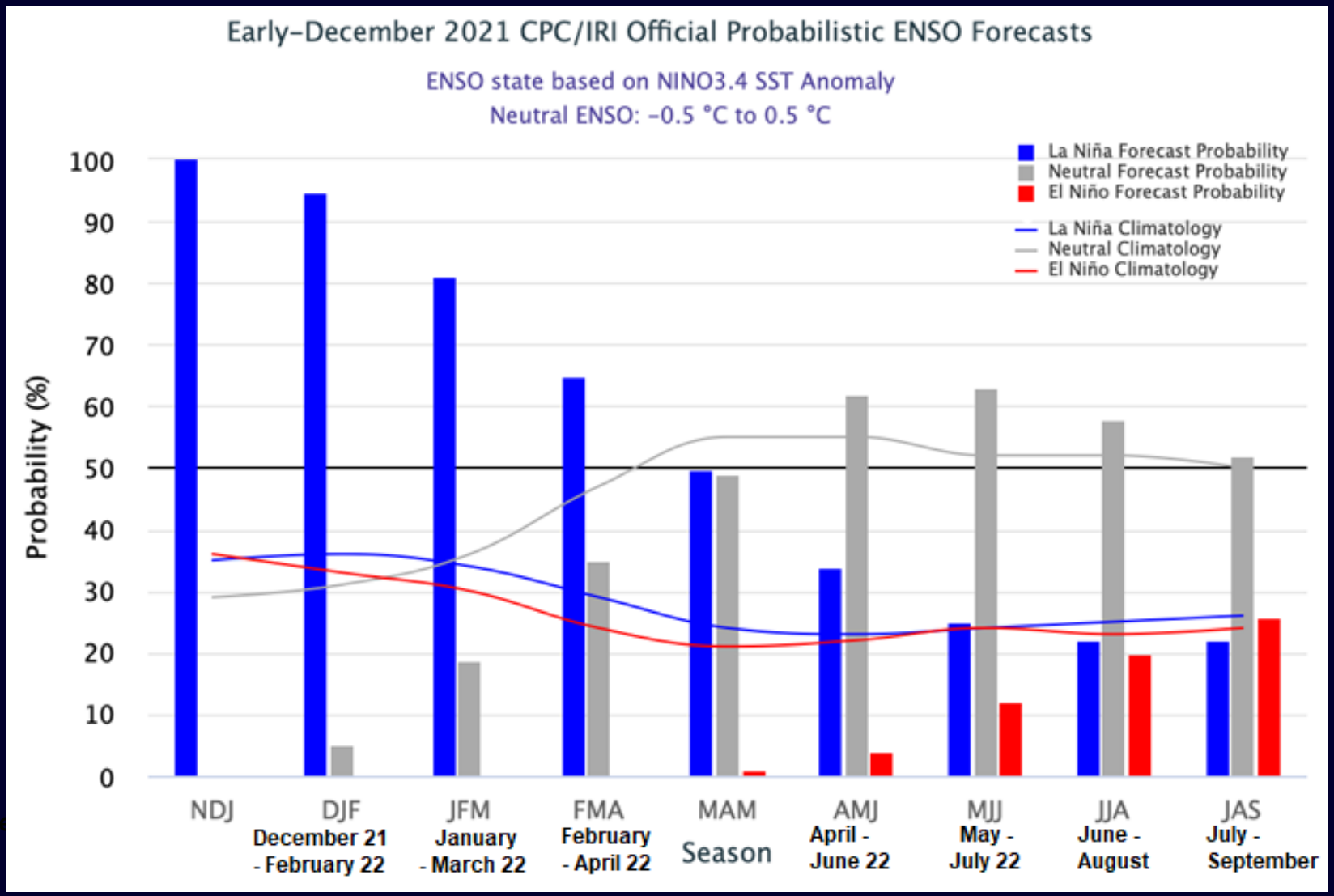
La Niña & Winter-Spring Update

La Niña is favored to continue through the rest of this winter (~95% chance), transitioning to ENSO-neutral during the spring 2022 (~60% chance during April-June).

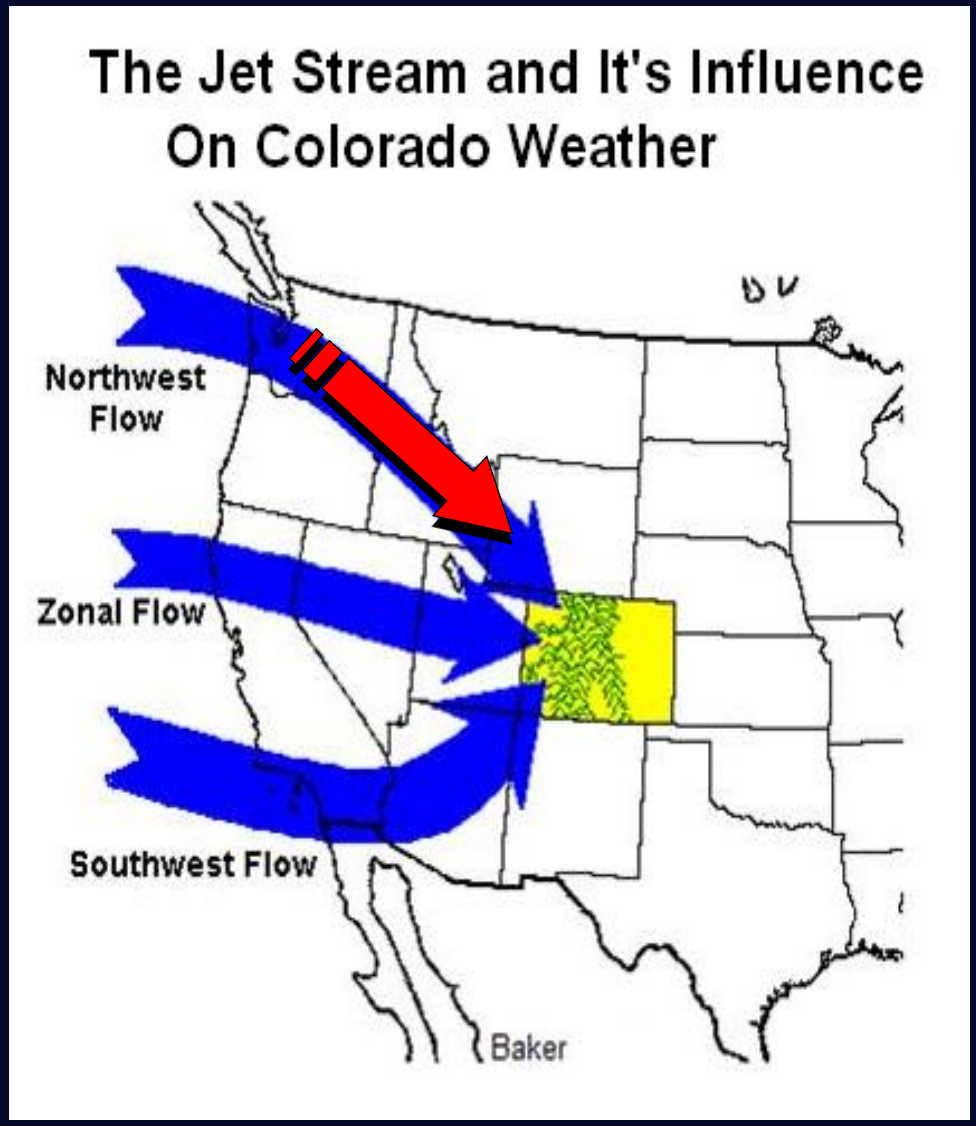
National Weather Service
Boulder, Colorado

The graph shows the probability of La Niña (blue bars), El Niño (red bars) and non-ENSO or neutral conditions (gray bars) for the next nine 3-month climate periods



La Niña is expected to continue through Northern Hemisphere winter 2021-22 and into spring 2022. A transition to ENSO-neutral is expected by April-June 2022.

The Role of the Jet Stream on Colorado Weather

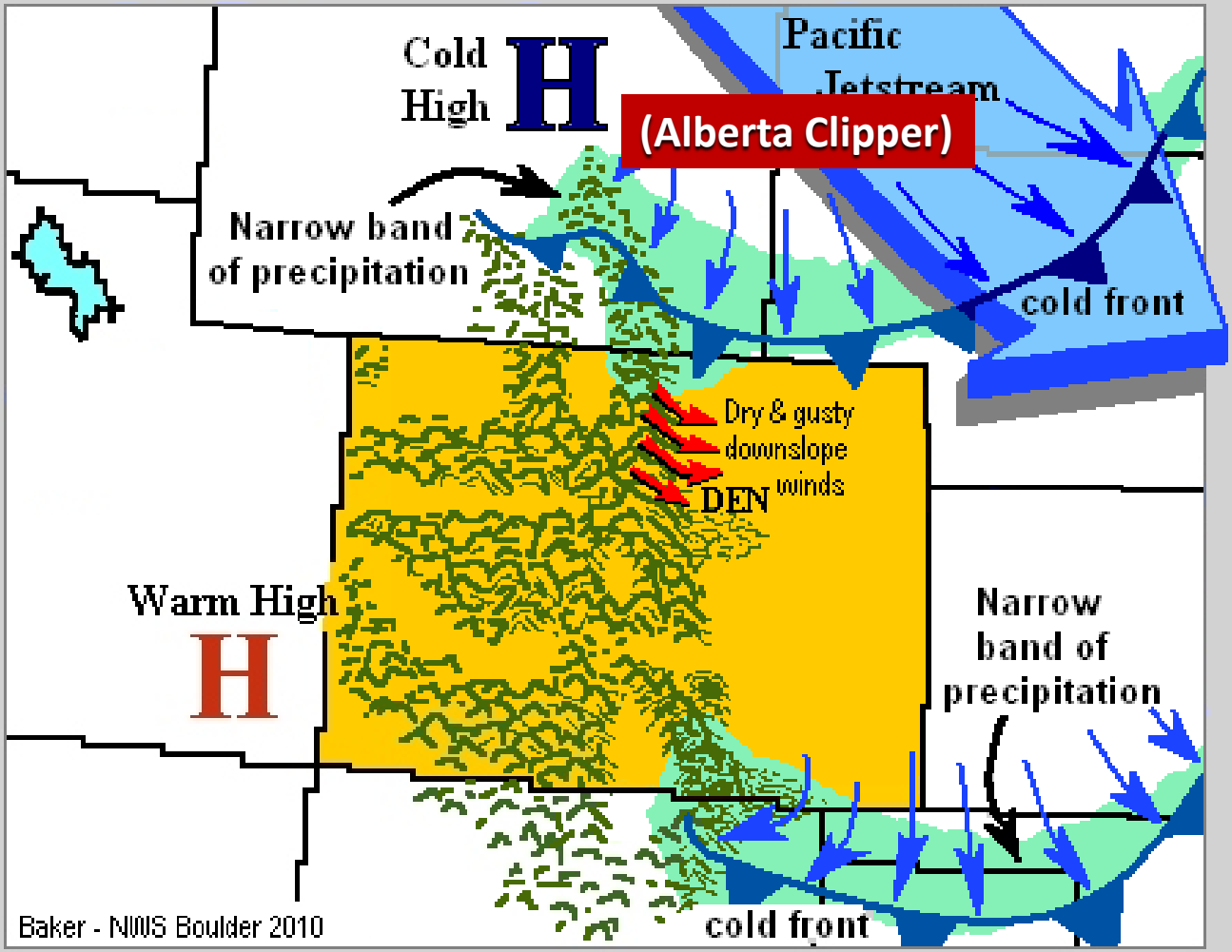


A **<u>northwest jet stream</u>** originating over the Pacific Northwest **has a tendency to produce above normal precipitation and below normal temperatures across western Wyoming and northwest Colorado during the winter season of moderate to strong La Niñas .**

A **<u>northwest jet stream</u> pattern has higher chances of below normal precipitation , above normal temperatures and periods of strong and gusty downslope winds (Chinook and Bora wind events) east of the Continental Divide**, particularly during the fall and spring of La Niña episodes.

Moderate to Strong La Niñas during Autumn

Mean Position of the Pacific Jet Stream During the Autumn Season of Moderate to Strong La Niña Episodes

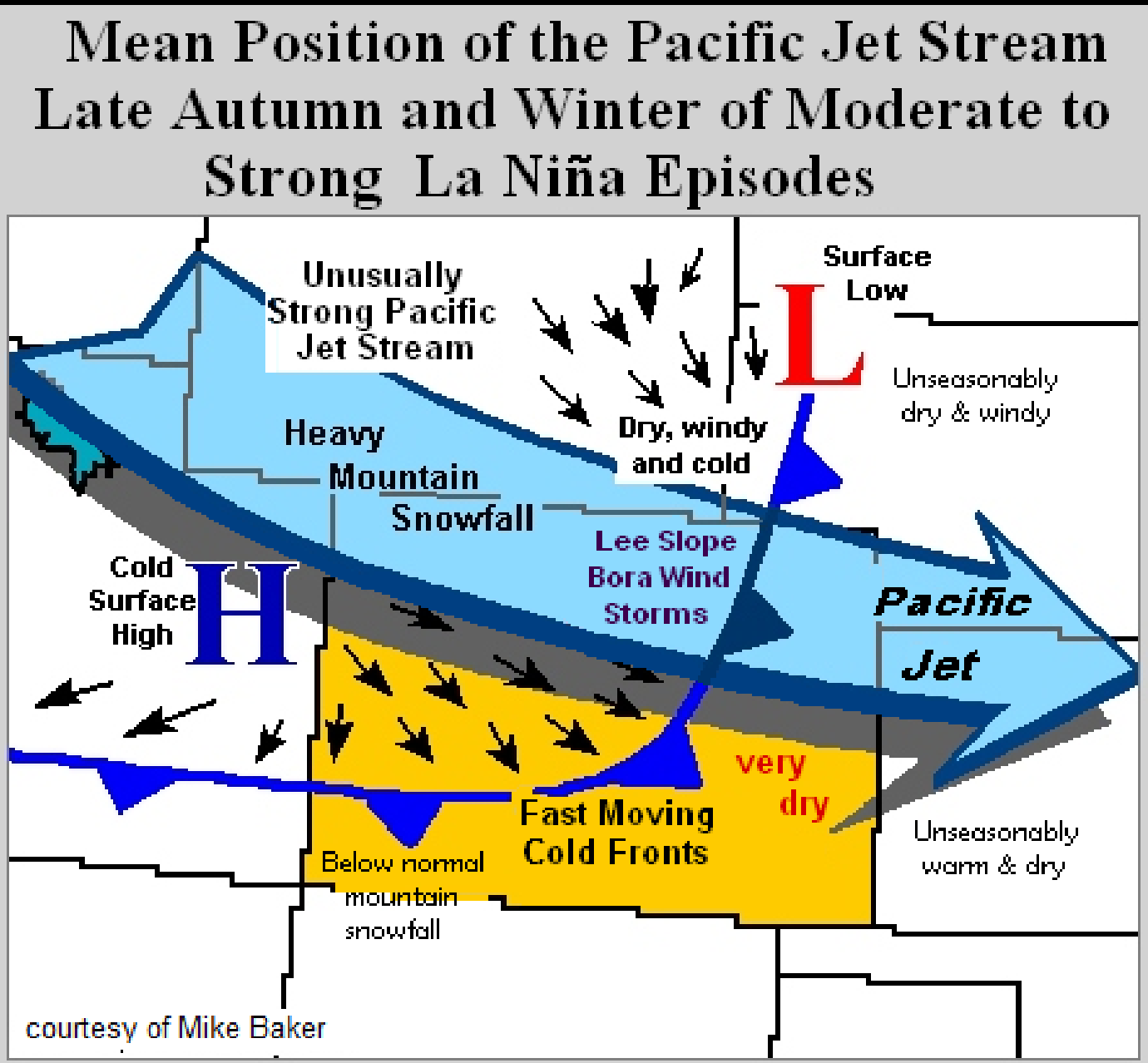


Eastern Colorado may see an increase in the number of "dry" cold fronts, referred to as "Alberta clippers" during the autumn of moderate to strong La Niñas with the Pacific jet stream oriented in this position.

These fast moving cold fronts often produce little precipitation, and due of their fast movement, but often produce strong and gusty northerly winds and sudden drops temperature.

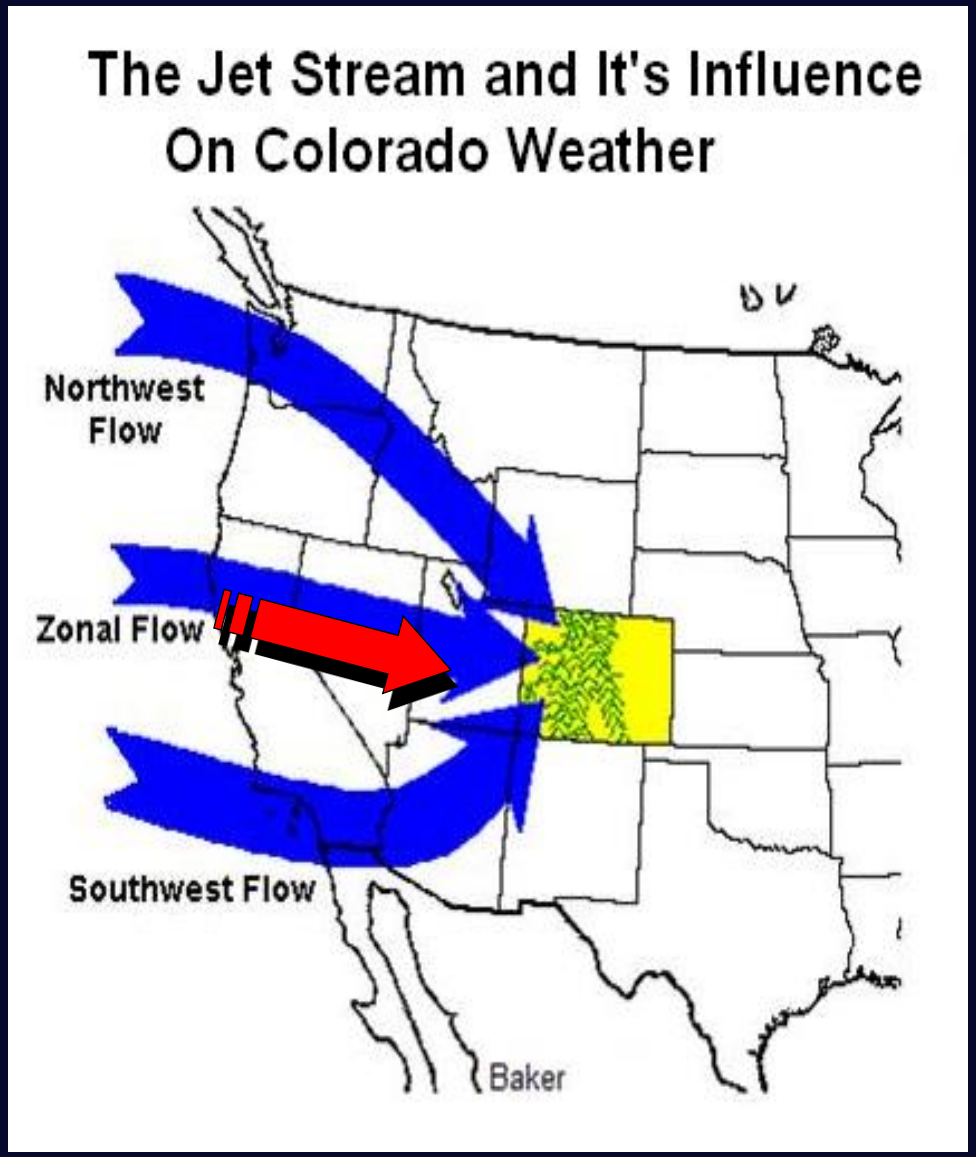
Western Colorado may feel little, if any impact from these high plains frontal systems.

Moderate to Strong La Niñas during Winter



As the west coast high pressure ridge weakens and flattens, the Polar jet stream acquires more of a west-northwesterly Component during late autumn and winter.

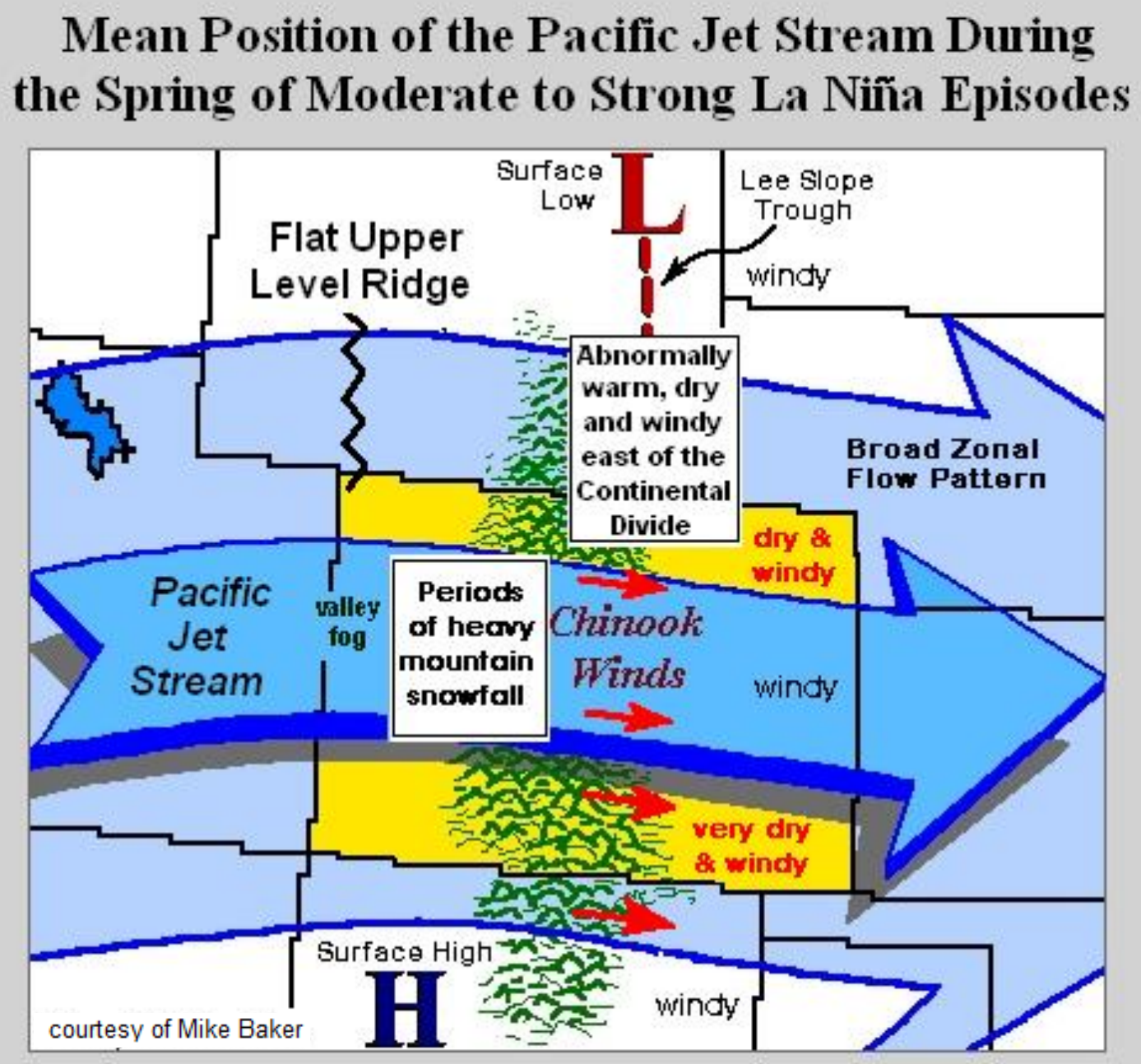
This southward shift in the jet results in an increase, often a significant increase, in precipitation and wind across the northwest plateau and north central mountains of Colorado.



A **<u>westerly or zonal jet stream</u> has a tendency to produce above normal winter and springtime precipitation, increased cloud cover and a greater number of valley fog days across western Colorado**.

This same <u>westerly jet stream</u> pattern is also associated with below to much below normal precipitation, very low humidity and above average temperatures in areas east of the Continental Divide. There is also an increase in the number of potentially downslope wind events (mainly the warmer Chinook type winds) during the spring of La Niñas.

Moderate to Strong La Niñas During Spring



In late winter and spring during the stronger La Niña episodes, the prevailing flow aloft usually becomes predominantly zonal or westerly in direction. This generally warmer and drier flow pattern still manages to produce periods of moderate to heavy snowfall on west facing mountain slopes along and west of the Continental Divide.

Whereas in areas east of the Divide, the weather is often abnormally warm, windy and quite dry for days, if not for weeks at a time.

Weather Patterns Prevailing Across Colorado During Moderate to Strong La Niñas.

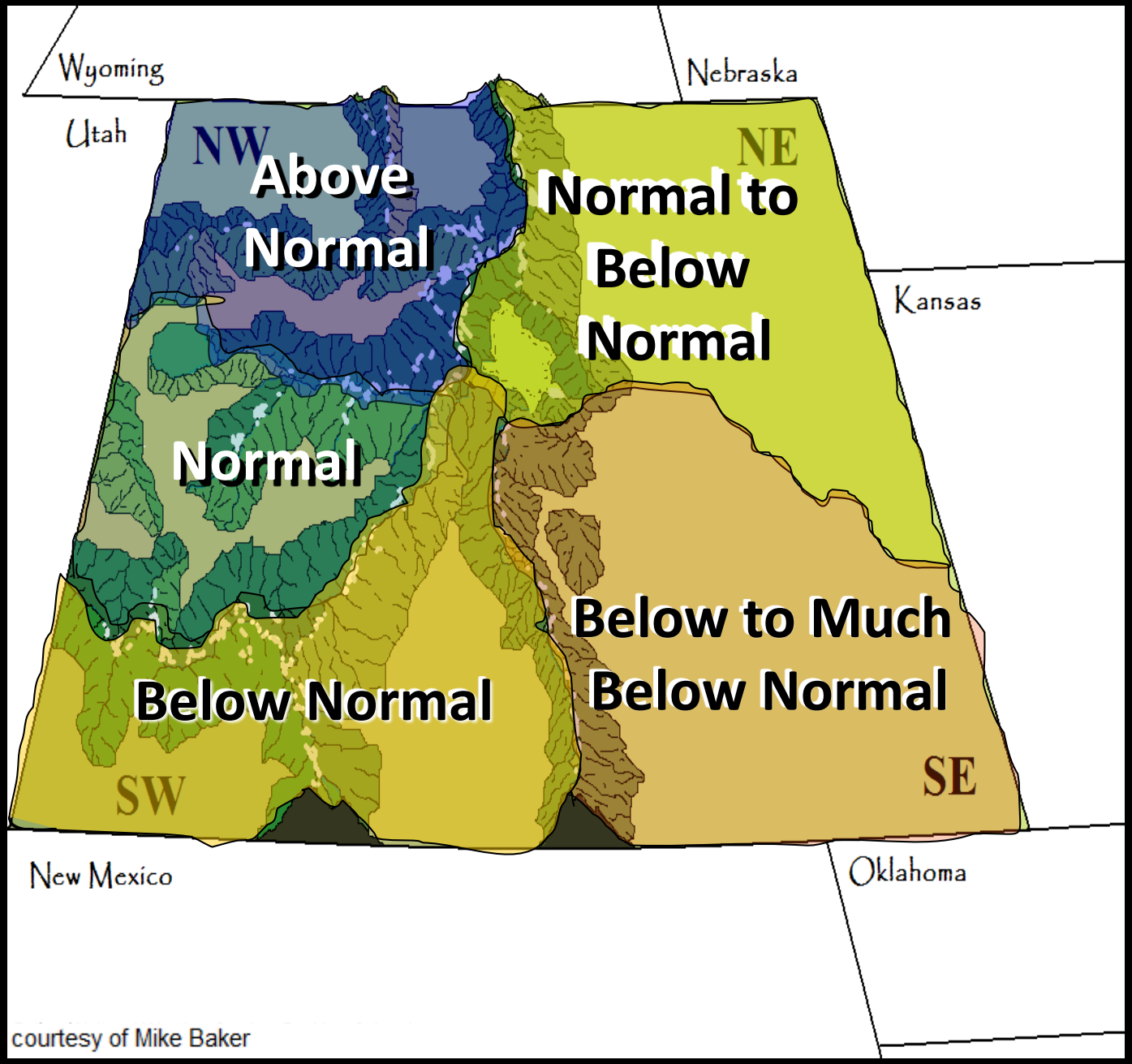
Tends to produce above normal temperatures and below normal precipitation across southern and eastern portions of the state at least through the upcoming winter season.

Meanwhile the northwest and north central portions of Colorado could see above normal precipitation (snowfall) and near to below normal temperatures, particularly this winter and perhaps into spring.

Weather Patterns Prevailing Across Colorado During Weak La Niñas.

Does not have as strong of an influence, with fewer trends generally seen locally during past weak La Ninas.

Typical Cold Season Precipitation Anomalies During Moderate to Strong La Niña Episodes

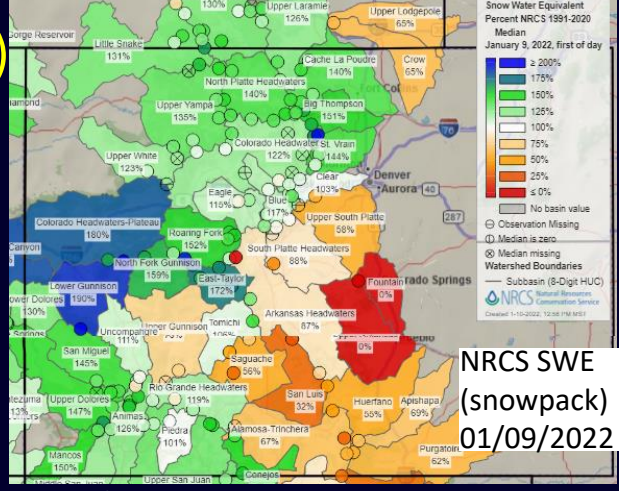


West central and northwest Colorado has higher chances of receiving NORMAL to ABOVE NORMAL precipitation (rain and snow) during Moderate to Strong La Niñas, predominately from mid-winter through mid-spring.

While southwest and eastern Colorado has higher chances of receiving BELOW to MUCH BELOW NORMAL precipitation (rain and snow) during the entire cold season of Moderate to Strong La Niñas.

La Niña so far this Winter (2nd of a 'Double Dip' La Niña)

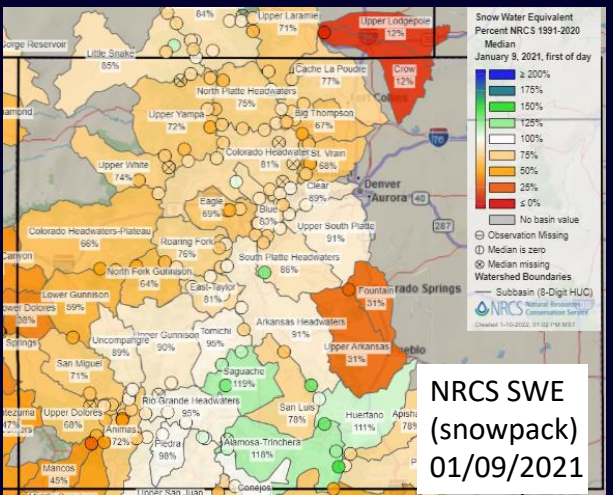
This autumn & winter thus far have followed a 'typical' La Nina more closely than last year. It remains to be seen if this trend will continue, especially into spring. Although there may be a bit of a lag between ocean temperature changes & its impacts on the atmosphere, will La Nina have any influence into spring months, as the outlook calls for a >50% chance of neutral ENSO conditions returning this spring.



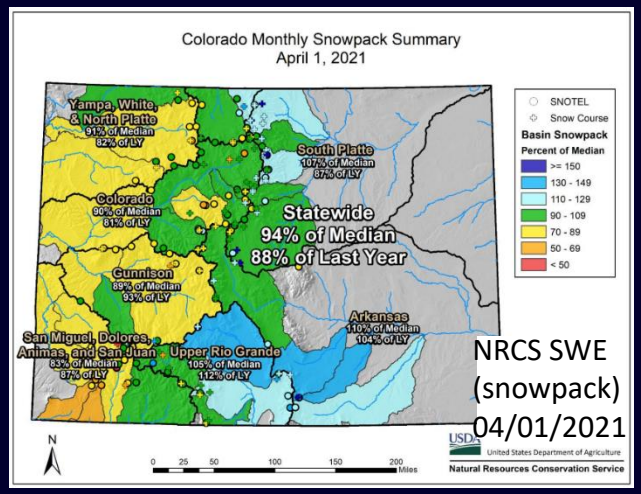
NRCS SWE (snowpack) 01/09/2022

La Niña Last Winter (1st in this 'Double Dip' La Niña occurring 2 winters in a row)

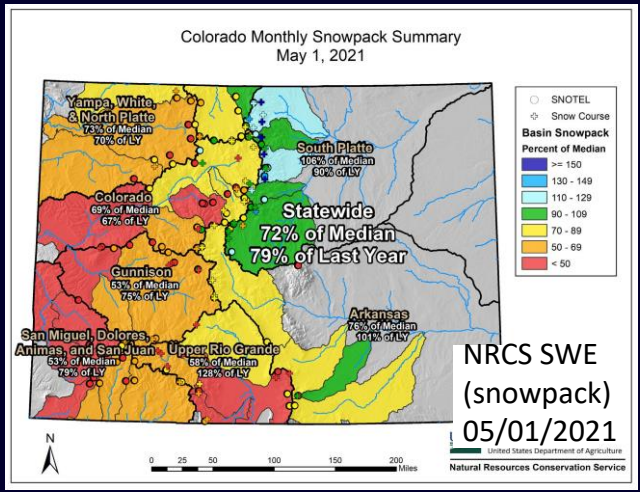
Not all La Niñas are created equally. Other factors besides eastern Pacific Ocean cooling impact our atmosphere. Last winter (2020-2021) La Nina reached Moderate strength. However, unlike 'typical' La Niñas, last winter the only major river basins with normal snowpack levels were east of the divide. The North Platte Basin in far north central Colorado & major basins west of the divide remained drier than normal.



NRCS SWE (snowpack) 01/09/2021



NRCS SWE (snowpack) 04/01/2021



NRCS SWE (snowpack) 05/01/2021