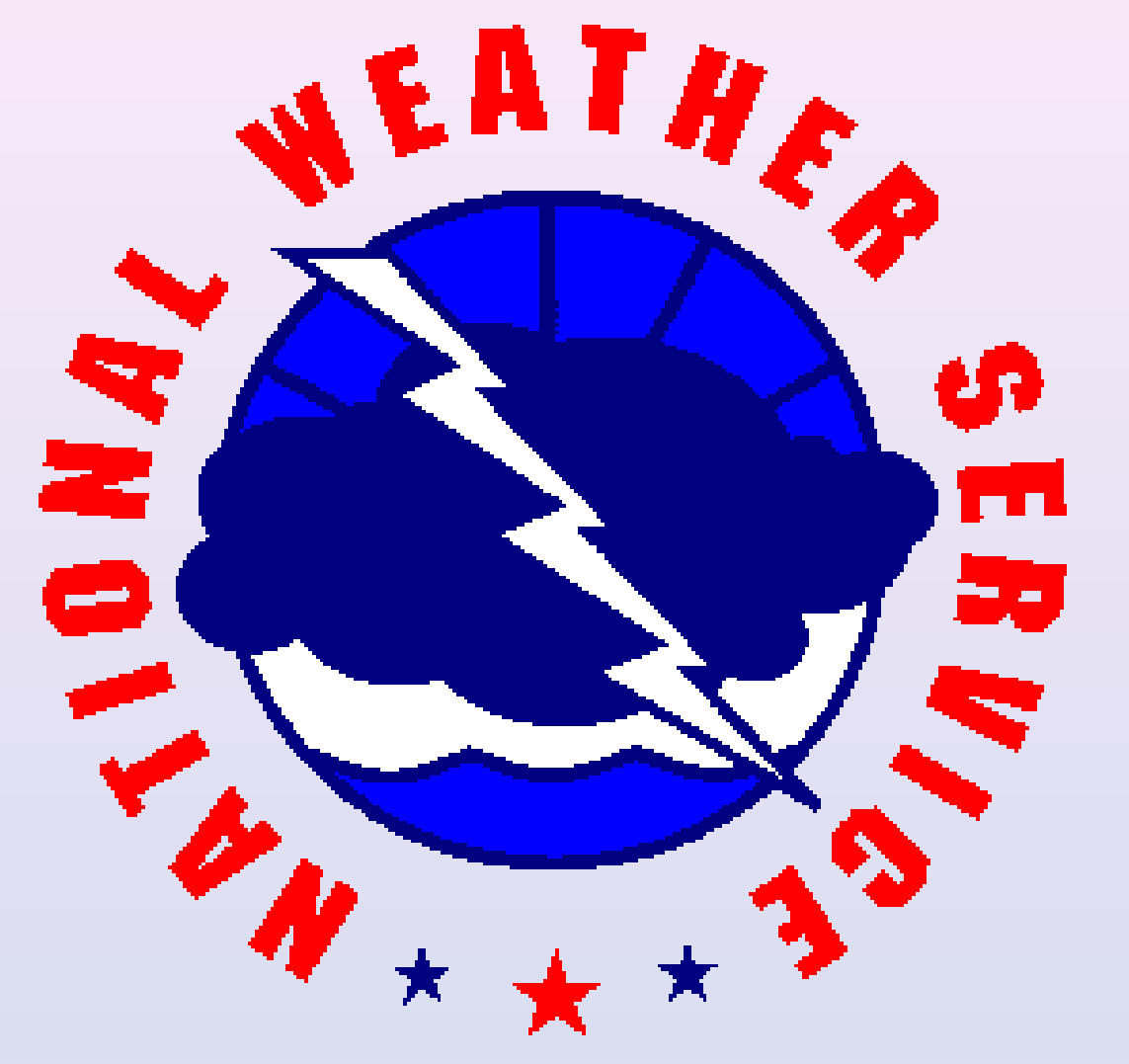




Hydrological impacts and resultant mitigation due to a record snowpack in the central Rockies during the 2011 season.



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2011 Water Season - The potential for disastrous spring runoff flooding was diverted in Northwestern Colorado and Northeastern Utah.

➤ This study will focus on the conditions and impacts across the Yampa River Basin which is indicative of the region. The three highest runoff seasons since 1981 are compared: 2011, 1984, 1997.

➤ The winter of 2010-11 behaved as predicted under moderate La Nina conditions with above normal snowfall across the northern and central mountains of Utah and Colorado.

➤ An unusually active spring weather pattern added to an anomalously high snowpack through July.

➤ At the headwaters of the Yampa River in the Park Range, Tower SNOTEL site at 3200 meters elevation, reached a record Snow Water Equivalent 78.8 inches (200 cm) in June (Center graph).

➤ Cooler than normal spring temperatures produced less peak runoff than the warmer and drier 1984 and 1997 seasons.

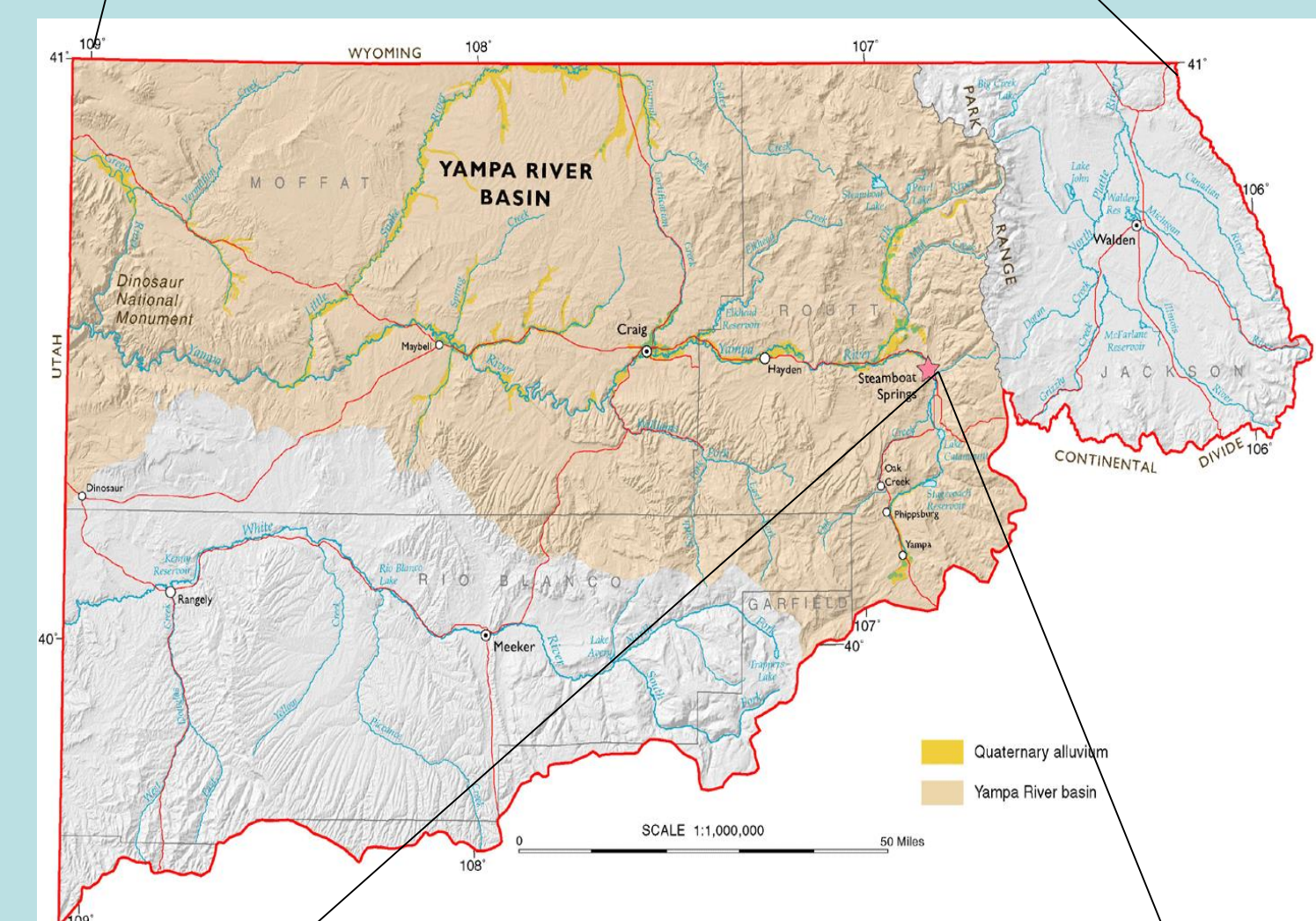
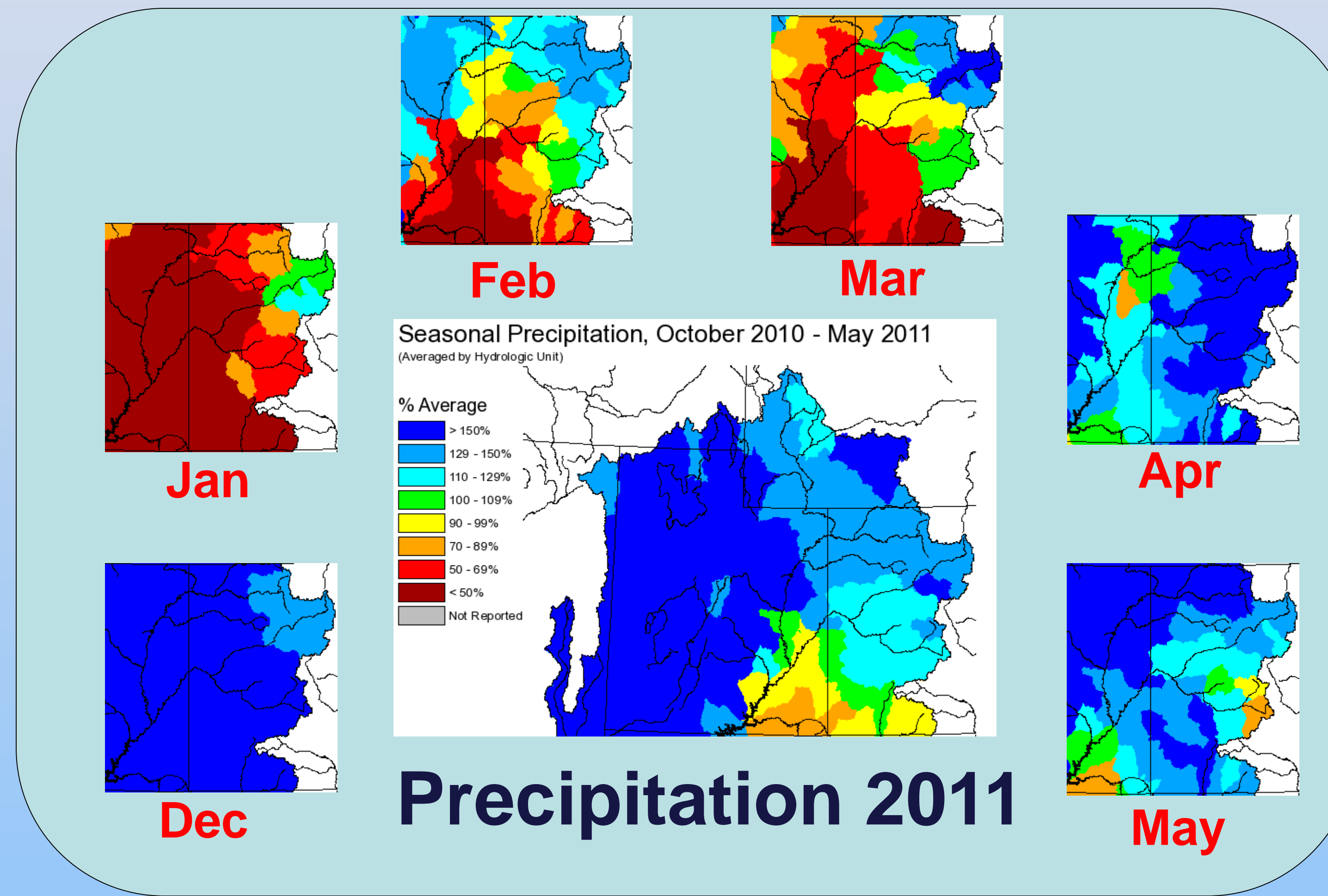
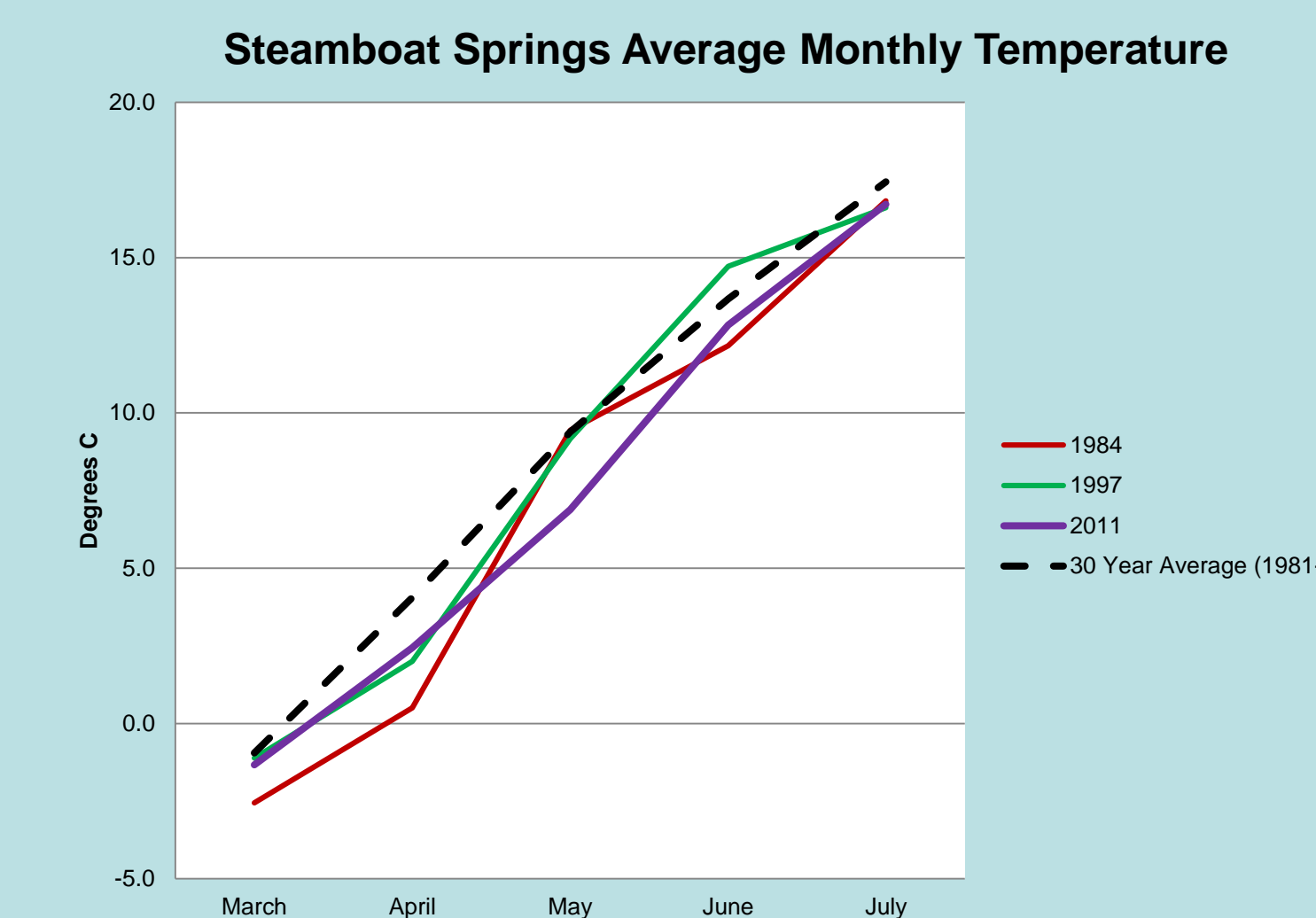
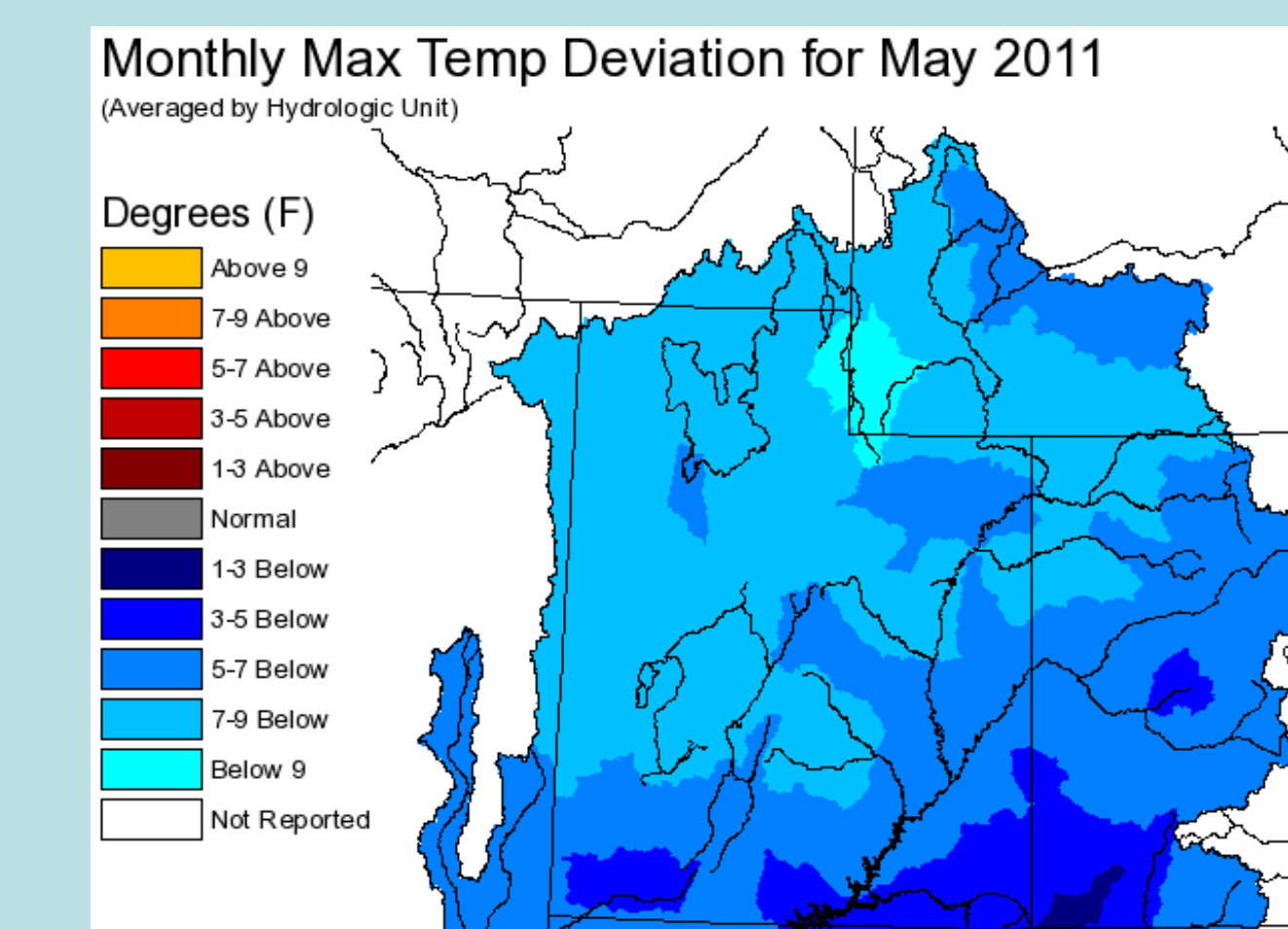


Photo courtesy Bob Struble

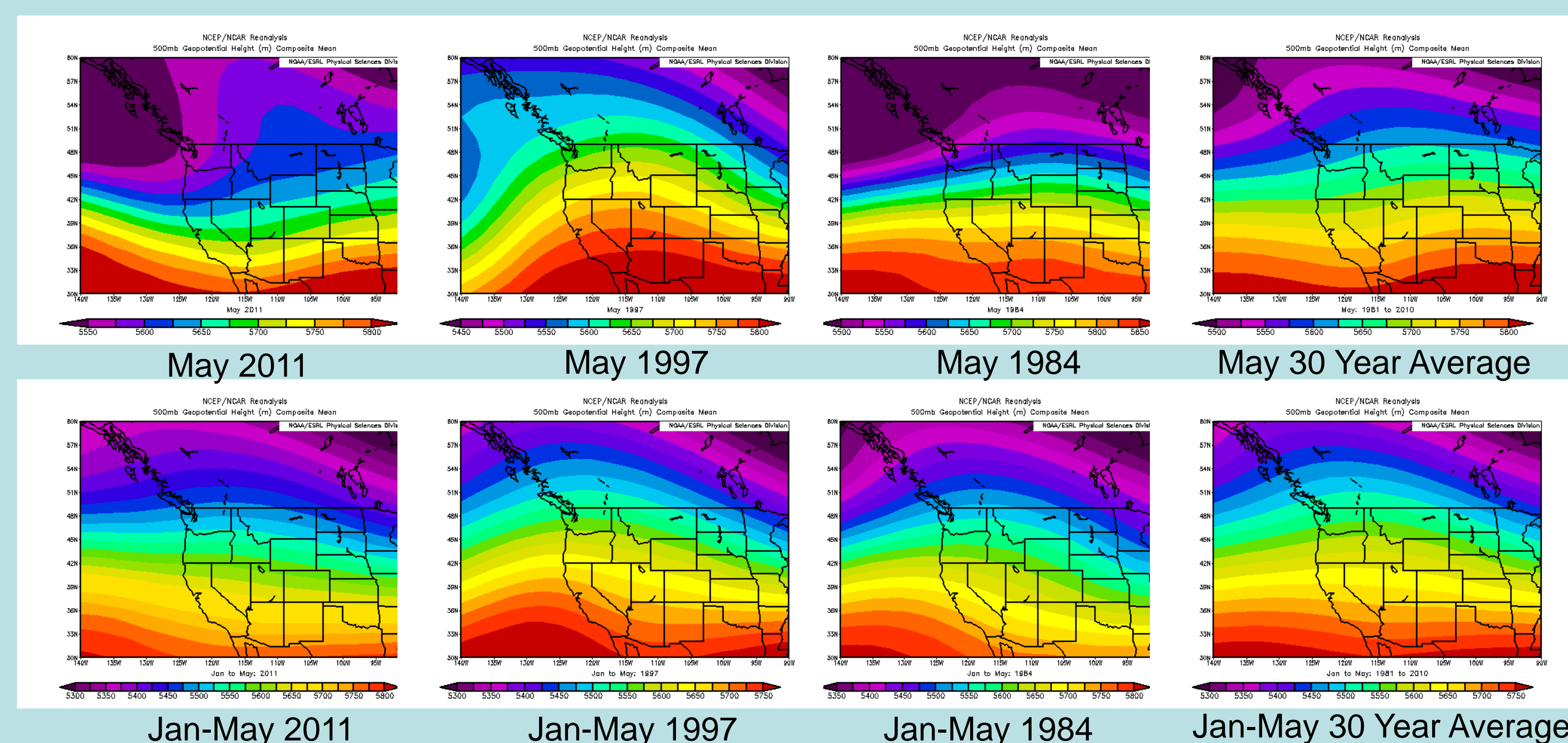


Cooler Than Normal Spring and early Summer

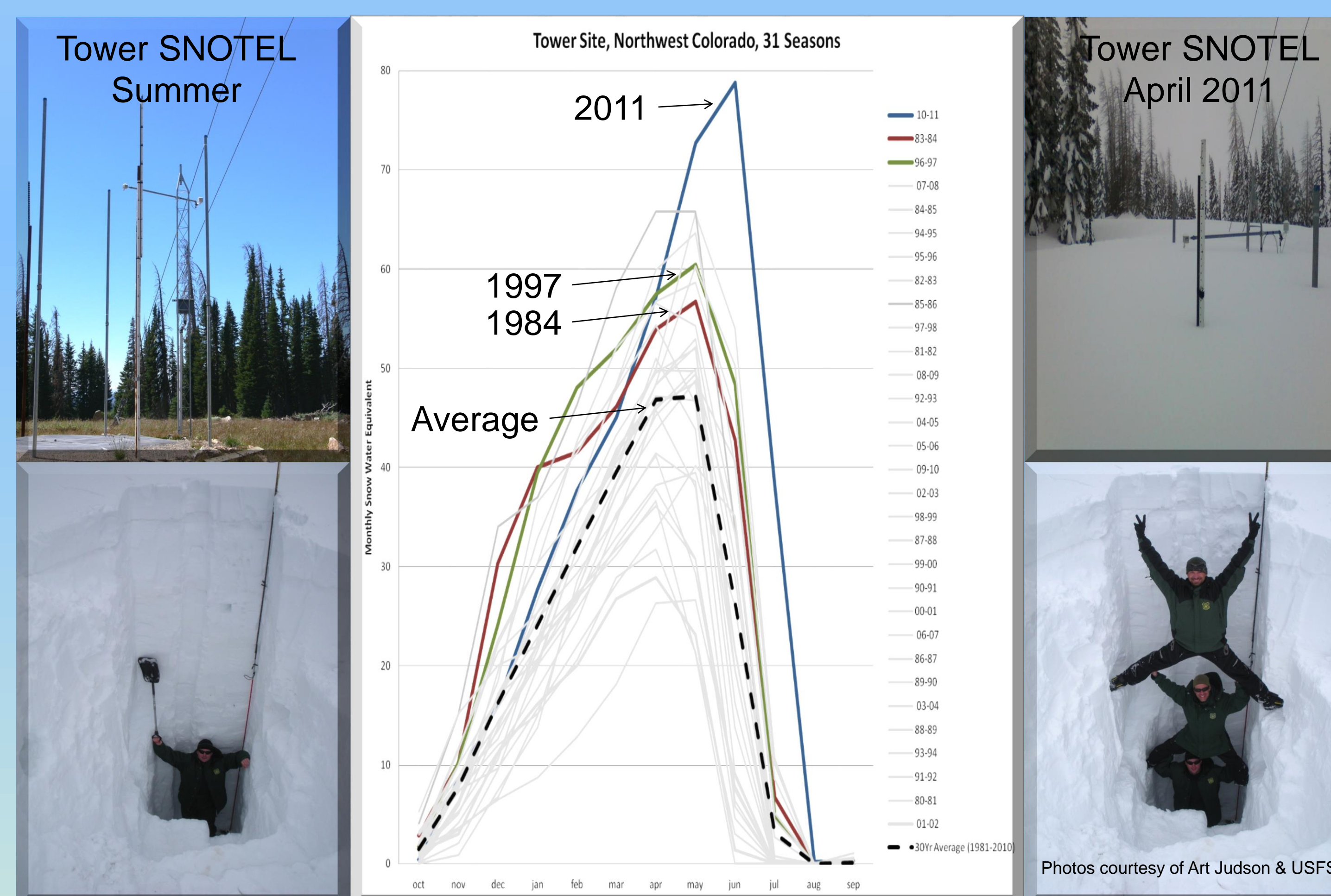


➤ March through July 2011 were much cooler than normal, and were cooler than the other comparison seasons of 1984 and 1997.
 ➤ The mountain snowpack increased into June as additional heavy snowfall occurred, and gently melted through July under these cooler temperatures.

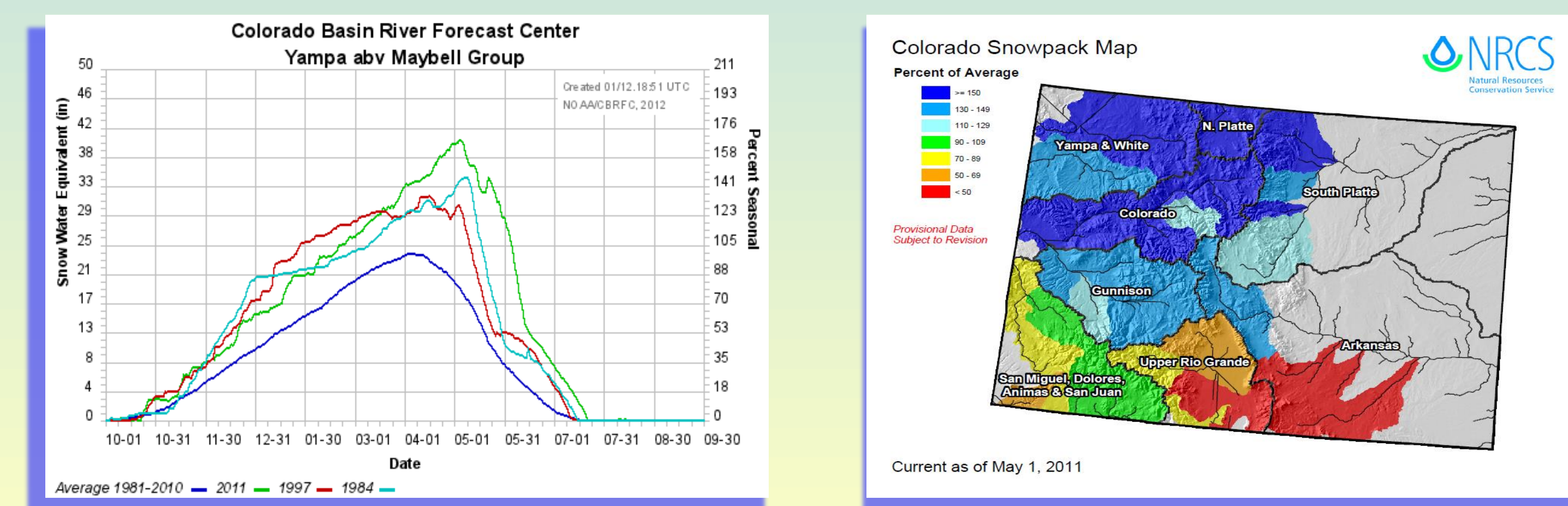
A Comparison of Composite 500 hPa Heights



➤ Upper level weather patterns for the 2011 season show a more active zonal to trough-like pattern.
 ➤ This allowed Pacific storms to produce cool and wet conditions over the northern and central Rockies, including the Yampa River study site.



Snow Water Equivalent



Conclusions

➤ Record breaking snowpack persisted into the early summer 2011.
 ➤ Temperatures remained below normal into July.
 ➤ Only minor flooding occurred along the Yampa and other main-stem rivers in Northwest Colorado and Northeast Utah.
 ➤ A comparison to other large runoff seasons of 1984 and 1997, indicates the cooler temperatures strongly mitigated the peak runoff levels and flood damage.

