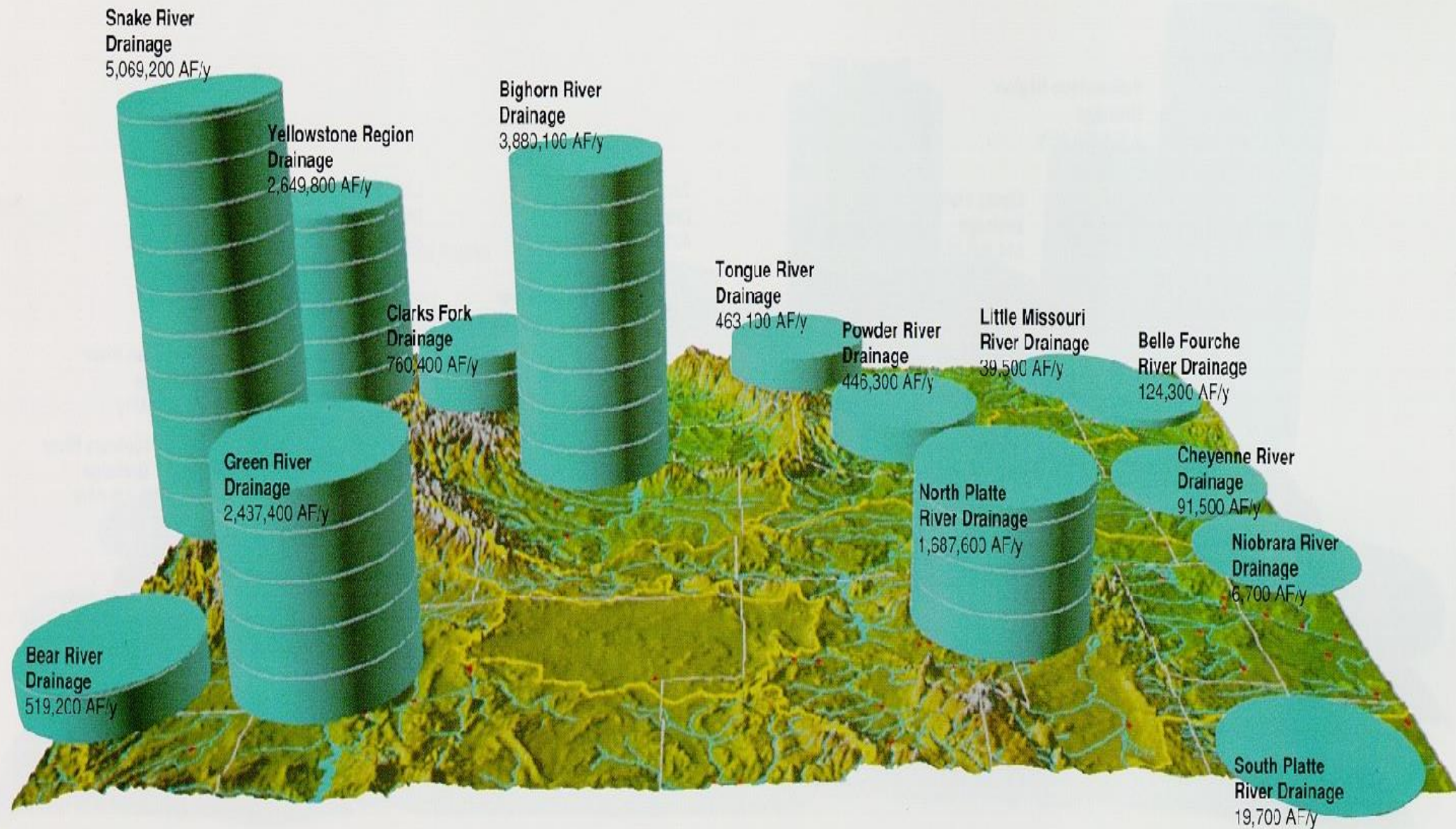


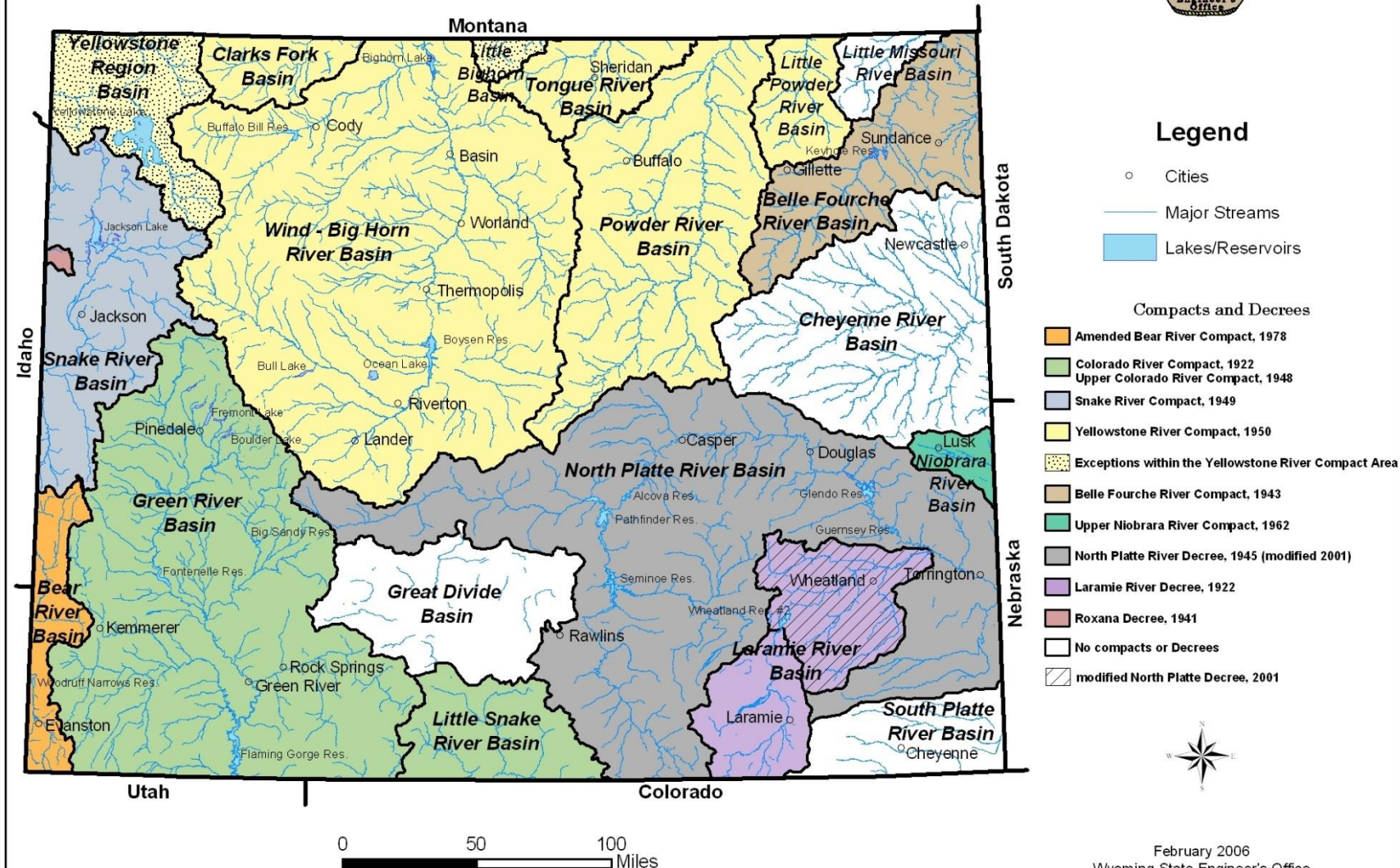
MODIS SNOW PRODUCTS AND ESTIMATING SWE IN WYOMING'S MOUNTAIN RANGES

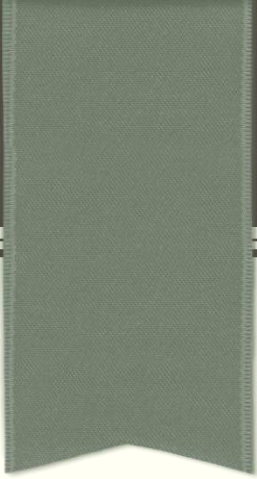
Beth Callaway
Wyoming State Engineer's Office
Interstate Streams Division
January 17, 2018





Wyoming River Basin Compacts and Decrees

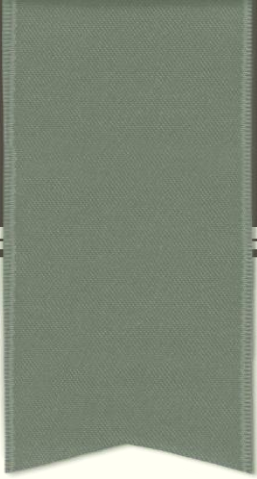




PLATTE RIVER BASIN

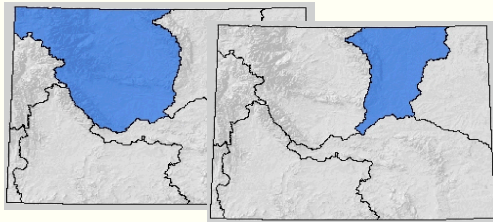
(2001 MODIFIED NORTH PLATTE DECREE)





YELLOWSTONE RIVER BASIN

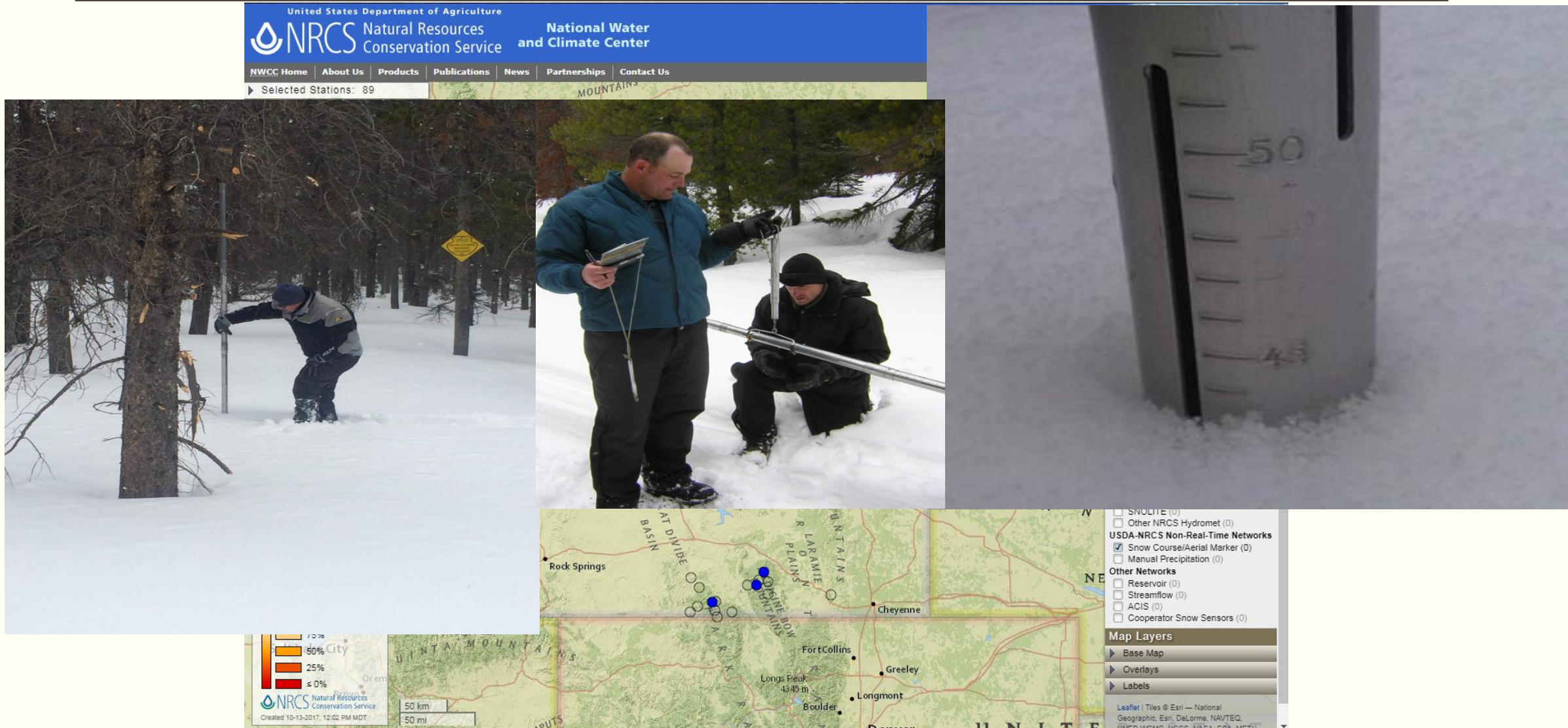
(YELLOWSTONE RIVER COMPACT)



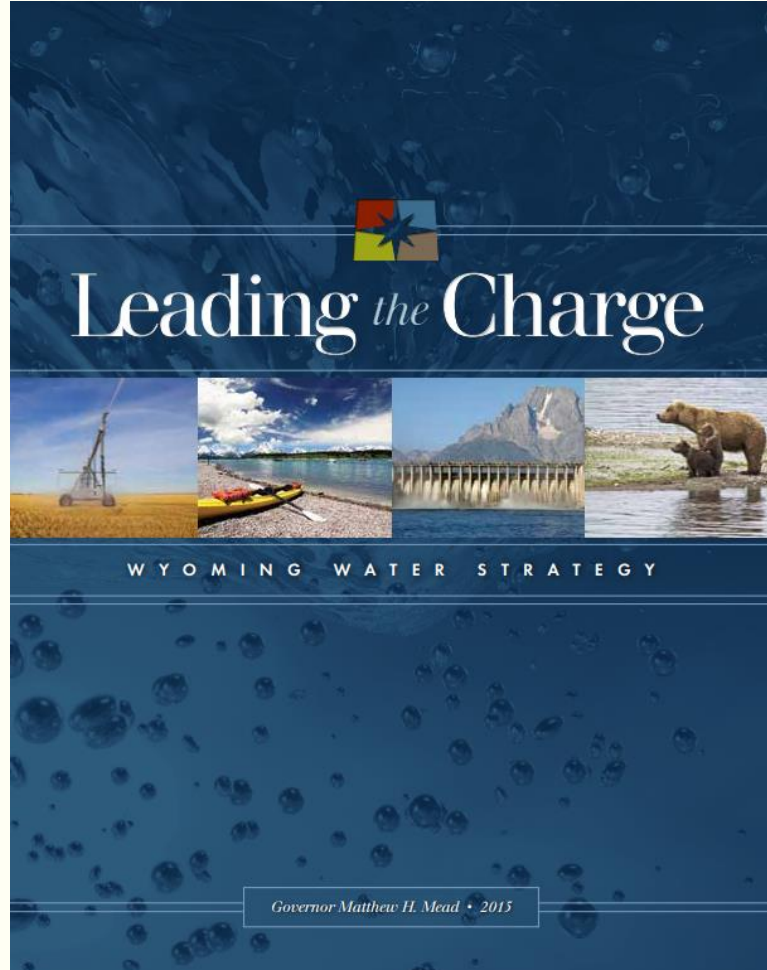
SNOW MEASUREMENT TOOLS



SNOTELs and Manual Snow Courses



MODIS-Based Spatial SWE



2016-17 contract for \$70,000

Goals:

1. Improve the interpretation capacity of snow-driven water supply forecasting.
2. Enhance administrative decision-making during the runoff season.



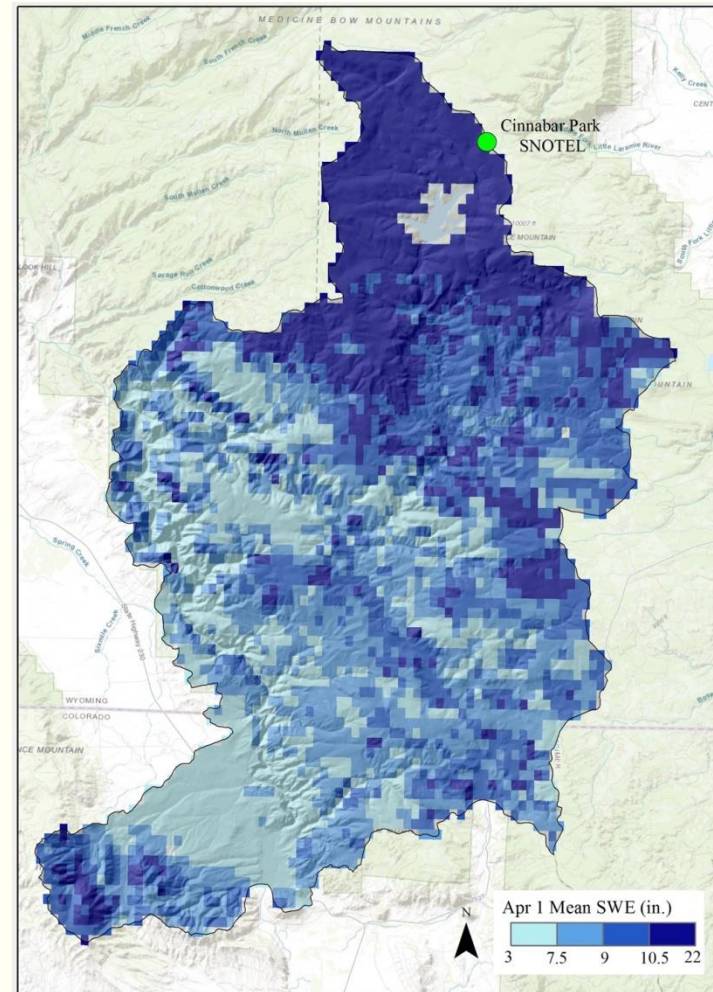
Center for Water, Earth Science and Technology
UNIVERSITY OF COLORADO BOULDER



MODIS-Based Spatial SWE

Datasets:

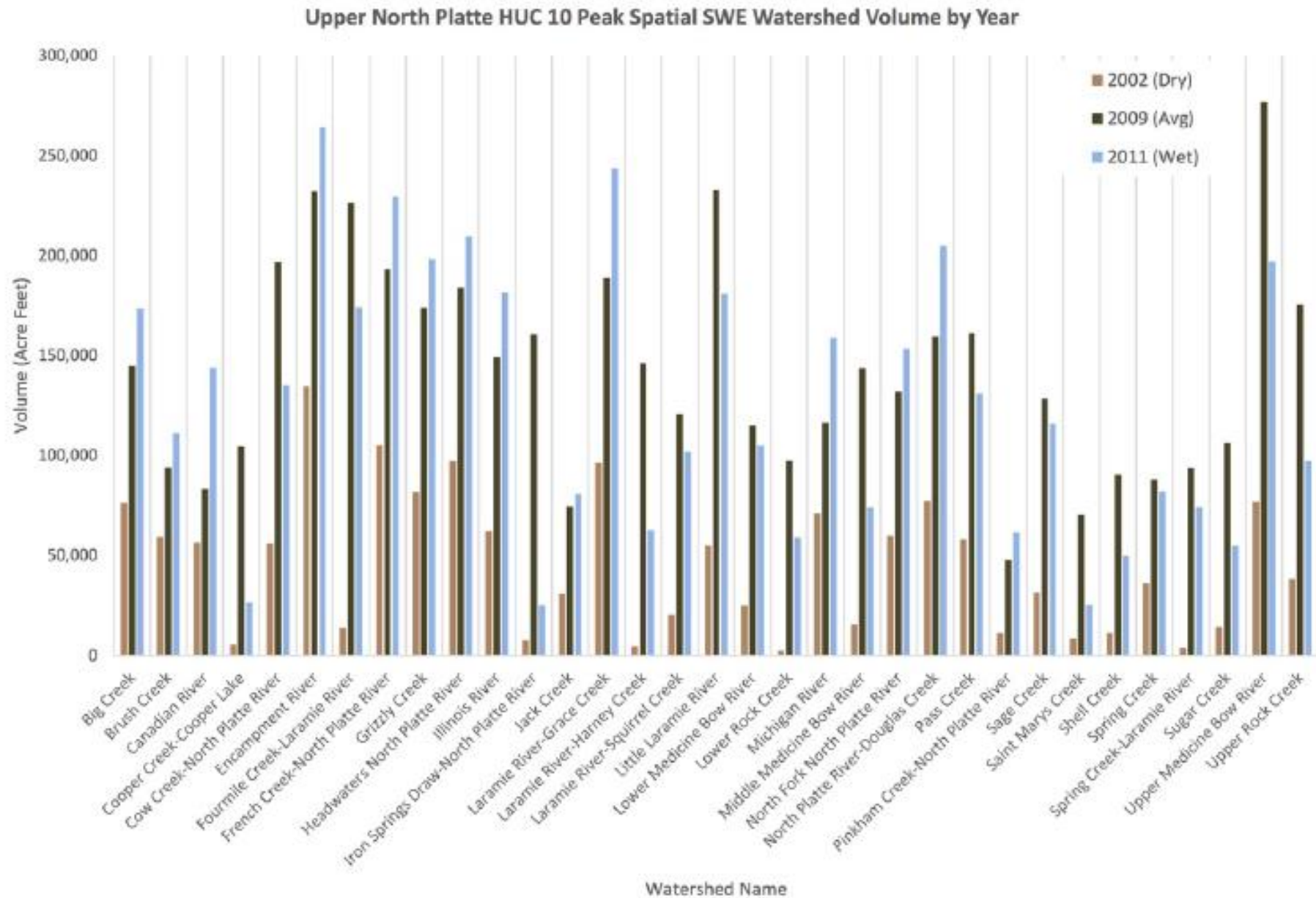
- 1) Spatial SWE (geoTIF digital format) for the first of each month
- 2) Summary tables that list SWE volumes banded by elevation for each watershed



Analysis:

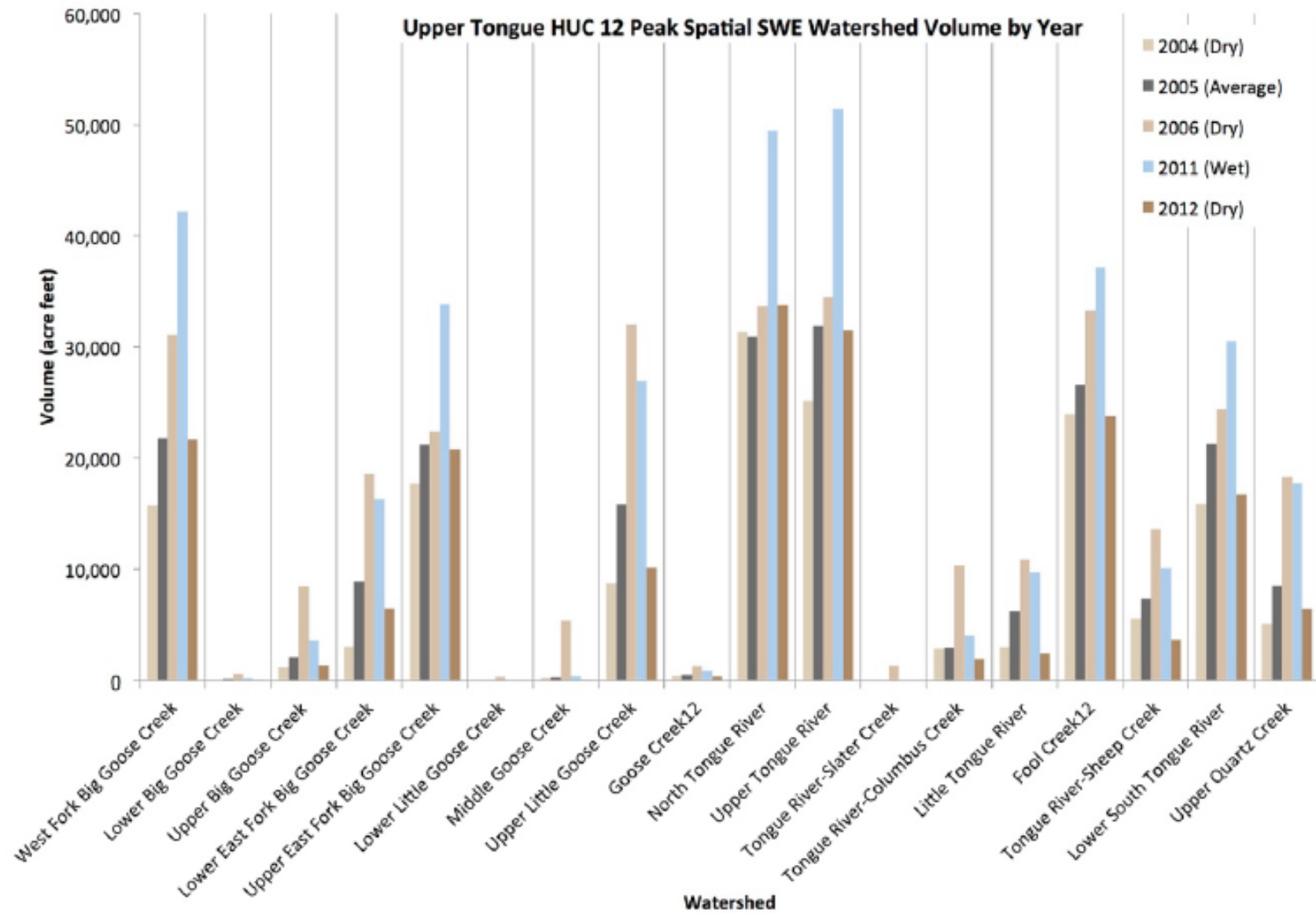
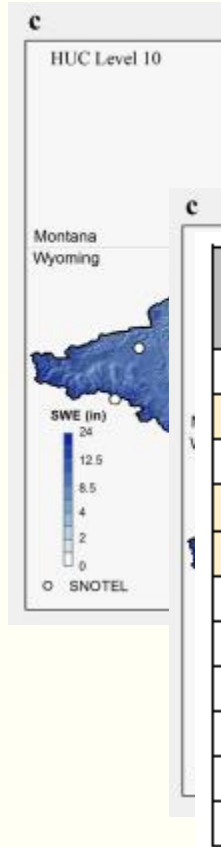
1. Average peak SWE (drainage-wide and total volume)
2. Comparison of the spatial maximum SWE volume for wet/average/dry years
 - North Platte = 2011/2002/2009
 - Tongue = 2011/2004, 2006/2005
3. Possible locations for addition of ground measurement sites

No



SWE

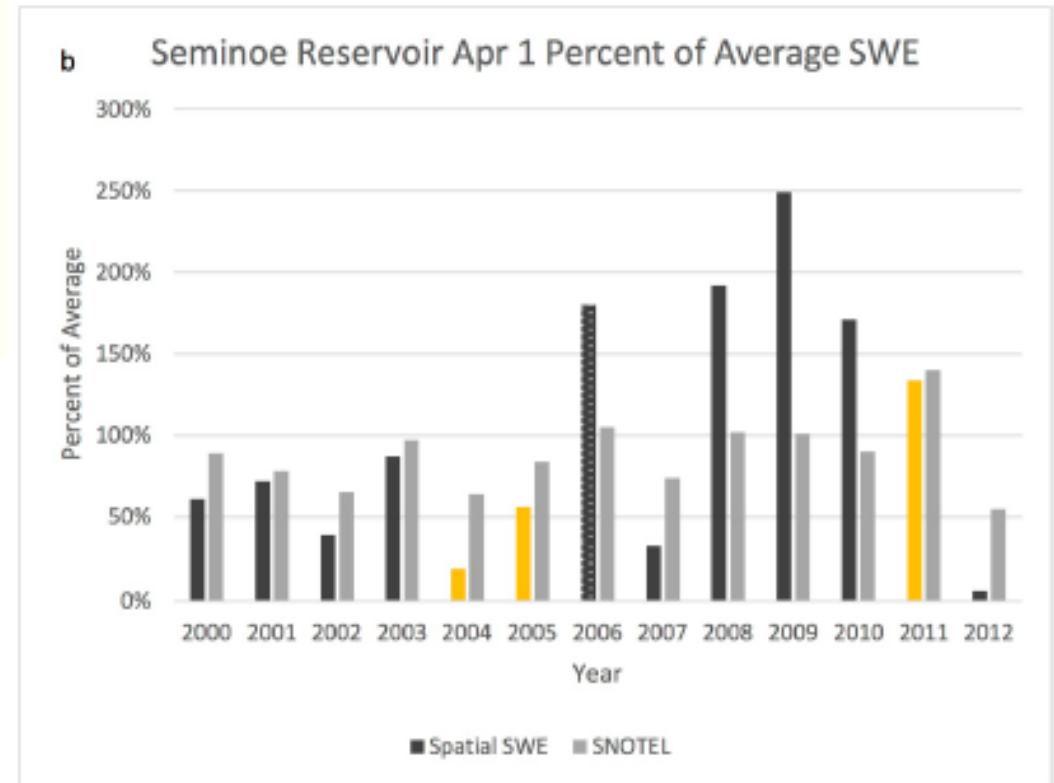
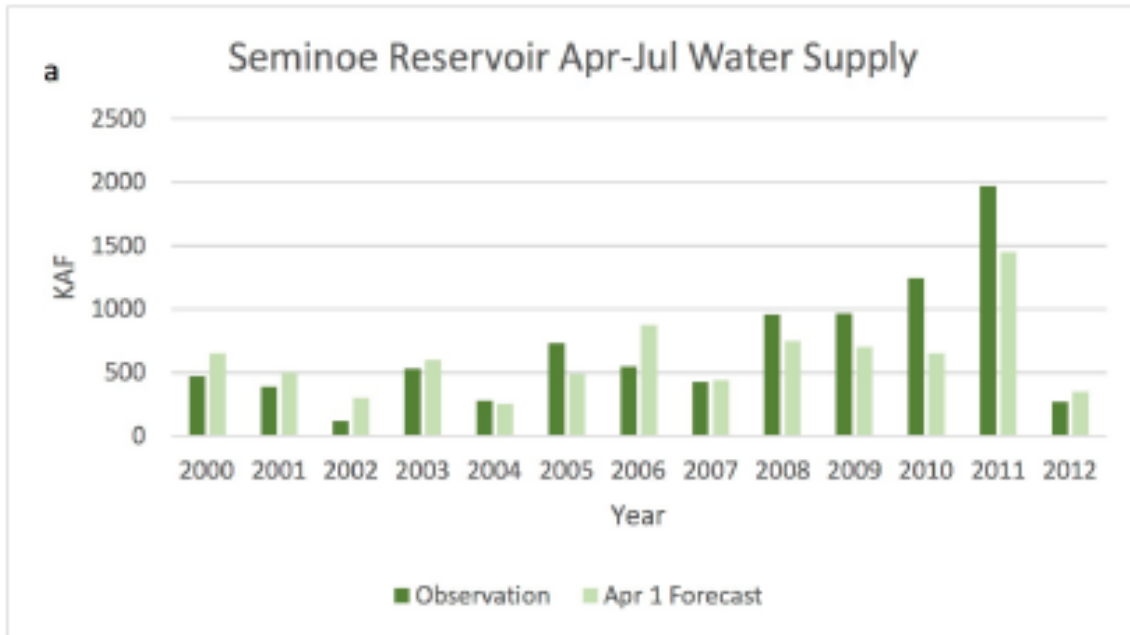
Tongue



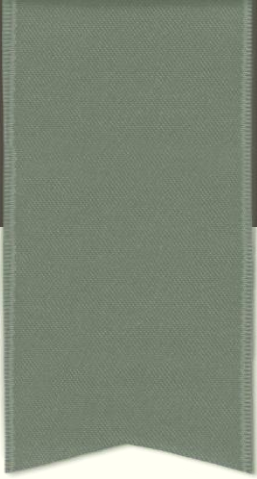
Forecast Comparison

6 of 13 years = forecast **over-predicted** by 147% (avg); SNOTELs measured 29% more SWE

3 of 13 years = forecast **under-predicted** by 68%; SNOTEL measured 106% less SWE



Yellow bars = years when spatial SWE could have been affected by late-season storms



QUESTIONS?

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307-777-7803

<http://seo.wyo.gov>

References

Schneider, D., and N. P. Molotch (2016), Real-time estimation of snow water equivalent in the Upper Colorado River Basin using MODIS-based SWE Reconstructions and SNOTEL data, Water Resour. Res., 52, 7892–7910, doi:10.1002/2016WR019067.