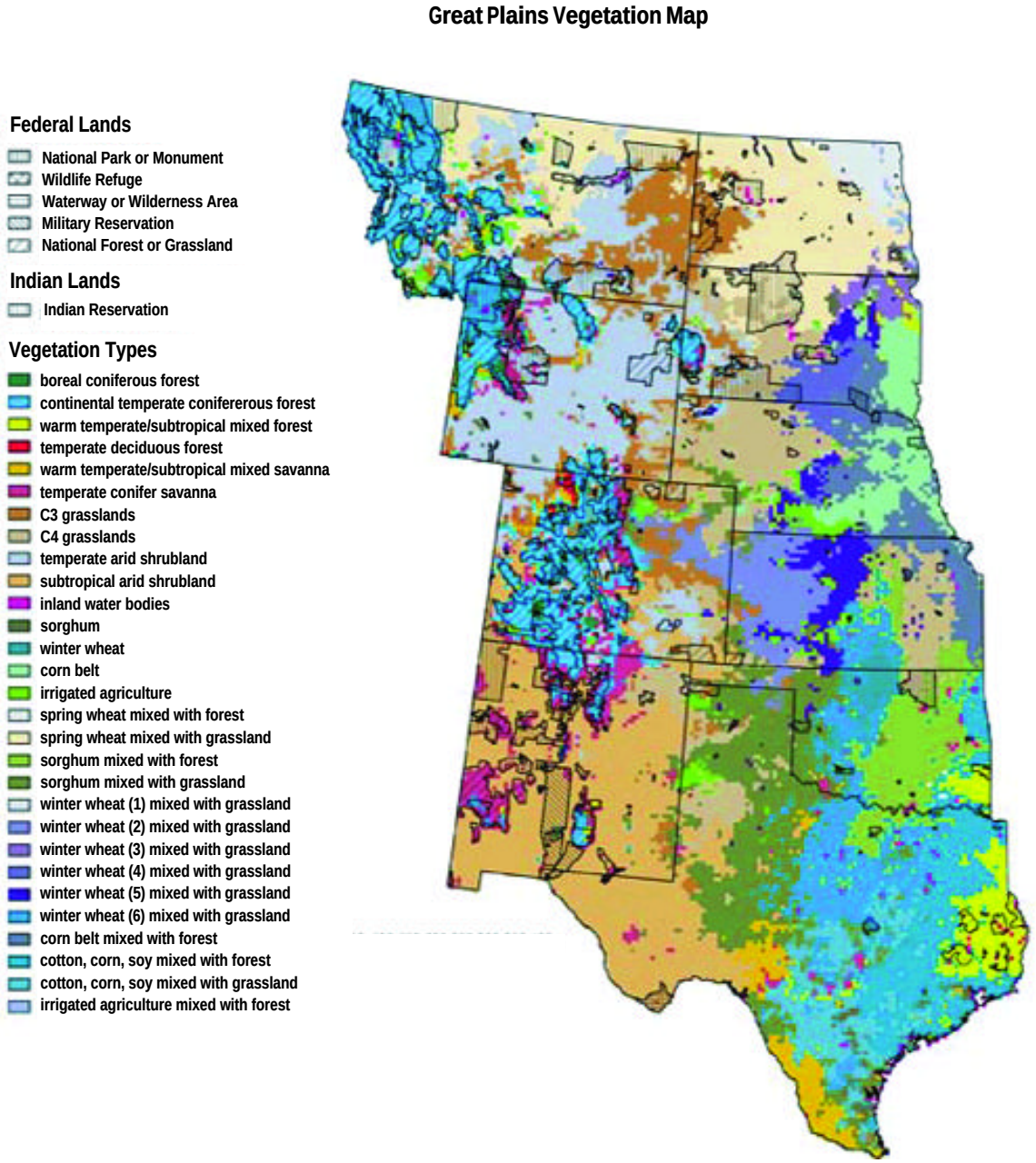

Figure 1. Distributions of the naturally occurring vegetation and the current planted agricultural crops are strongly linked to the gradients of temperature (north to south) and precipitation (west to east) within the Great Plains. Outlines show the federal land holdings in the region (vegetation map from Natural Resource Ecology Lab, Colorado State University. Potential natural vegetation according to VEMAP members, 1995).

Great Plains Climate

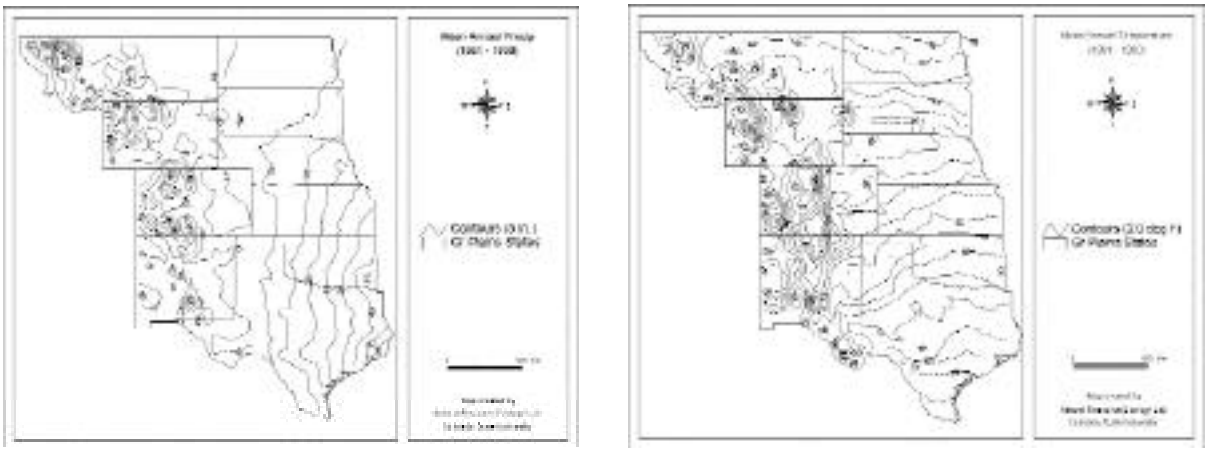

Figure 2. Great Plains climate is characterized by a strong north-south temperature gradient and a strong east-west precipitation gradient (averages based on the 1961-1990 period; data from Dennis Ojima, VEMAP climate).

Great Plains Agicultural Exports

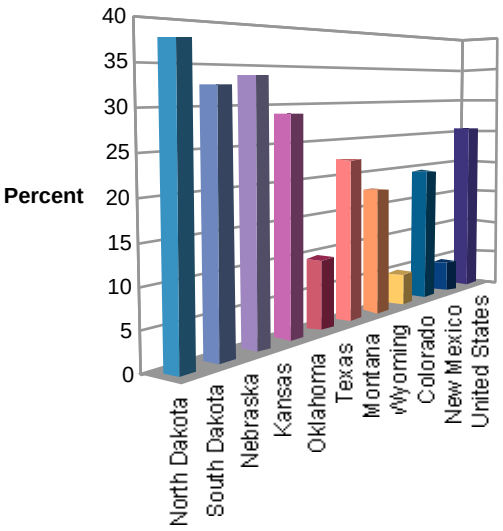

Figure 3. Agricultural exports are an important percentage of the total agricultural production within each state. (USDA, 1997 Census of Agriculture).

Agricultural Land Comparisons

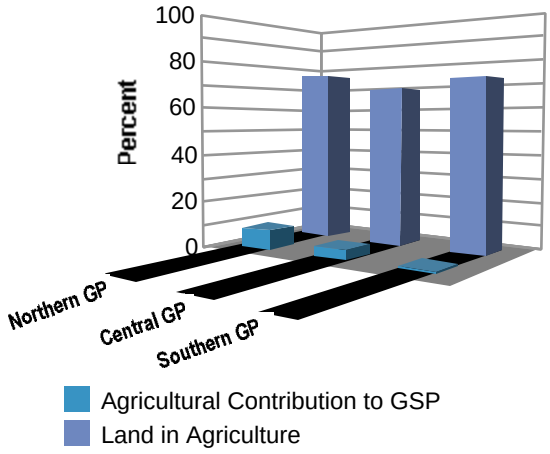

Figure 4. The Northern Great Plains are more dependent on agriculture than the Central which is more dependent on agriculture than the Southern Great Plains, yet agriculture dominates land use in all regions of the Great Plains. (Economic data from US Dept of Commerce, Bureau of Economic Analysis, Regional Economic Analysis Division, June 1998, and land use data from USDA, 1997 Census of Agriculture.)

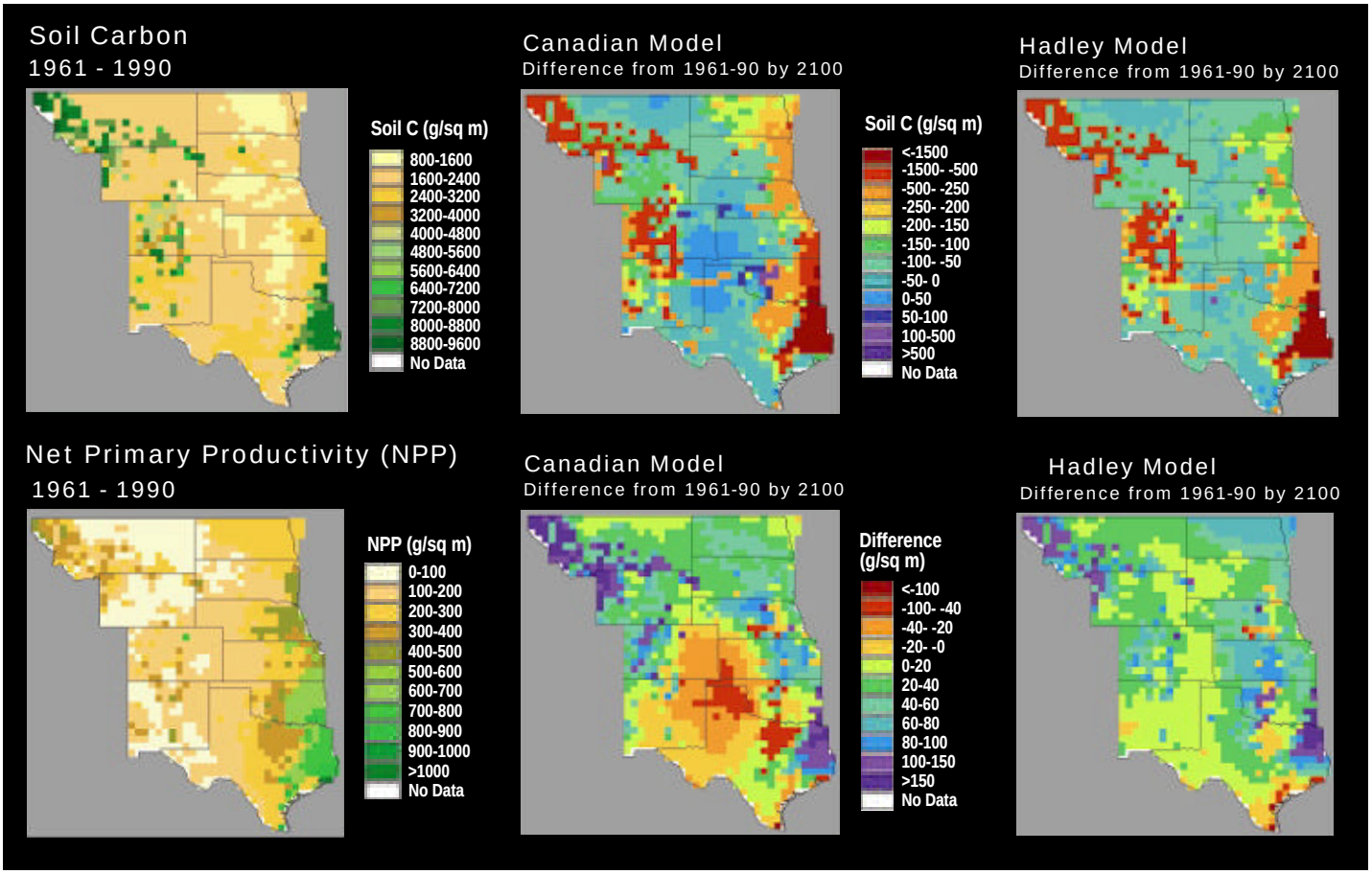

Figure 5. The productivity of the Great Plains increases from west to east and from north to south, following the precipitation and the temperature gradients. Land uses are strongly influenced by productivity. Both climate scenarios increase the moisture stress on the central parts of the Great Plains and productivity declines in this region. Soil organic matter in the Great Plains is an important reservoir of terrestrial carbon. The amount of carbon stored in the soil is strongly influenced by past and present land management practices and weather patterns. Where moisture levels and productivity decline, soil carbon may actually increase as decomposition processes become limiting. Where soil moisture levels increase from increased water use efficiency, soil carbon levels may decline. (CENTURYresults from VEMAP analysis, Natural Resource Ecology Lab, Colorado State University.)

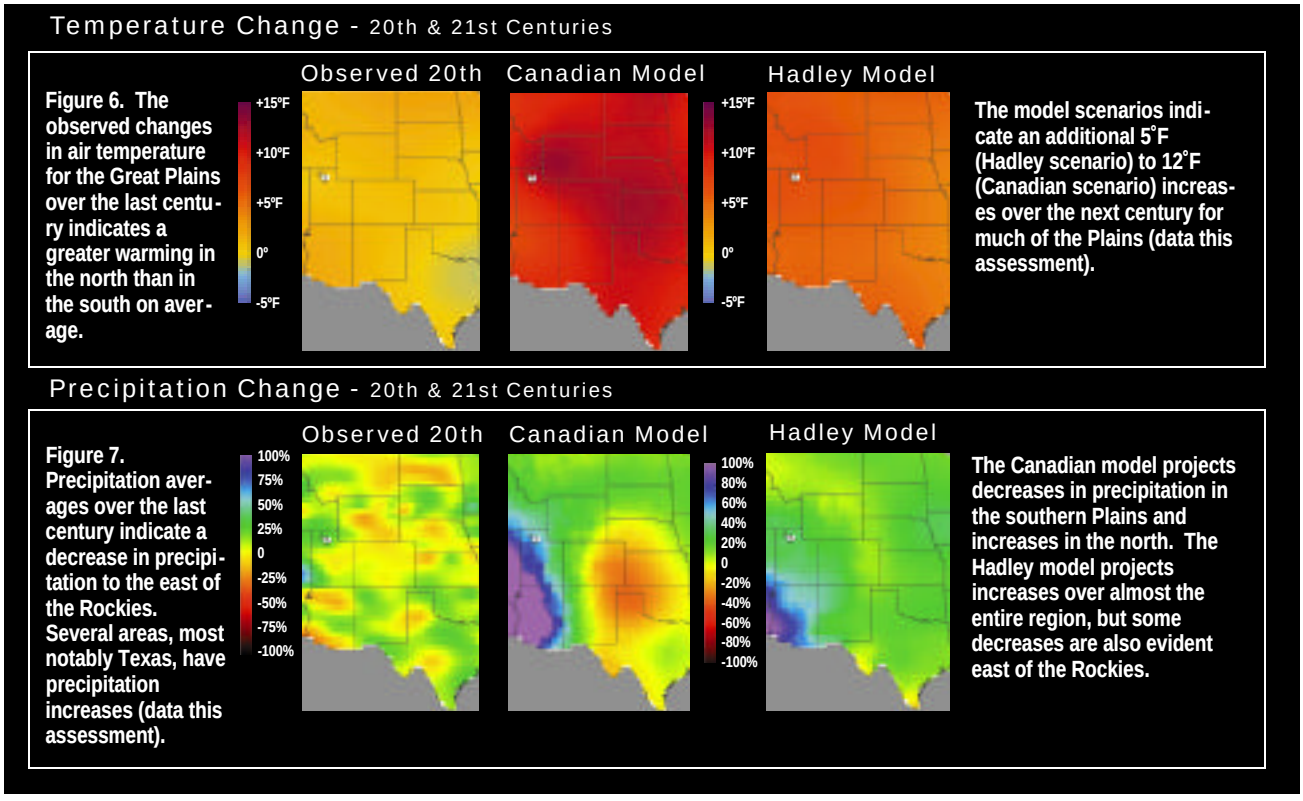

Figure 6. The observed changes in air temperature for the Great Plains over the last century indicates a greater warming in the north than in the south on average.

The model scenarios indicate an additional 5˚F (Hadley scenario) to 12˚F (Canadian scenario) increases over the next century for much of the Plains (data this assessment).

Figure 7. Precipitation averages over the last century indicate a decrease in precipitation to the east of the Rockies. Several areas, most notably Texas, have precipitation increases (data this assessment).

The Canadian model projects decreases in precipitation in the southern Plains and increases in the north. The Hadley model projects increases over almost the entire region, but some decreases are also evident east of the Rockies.

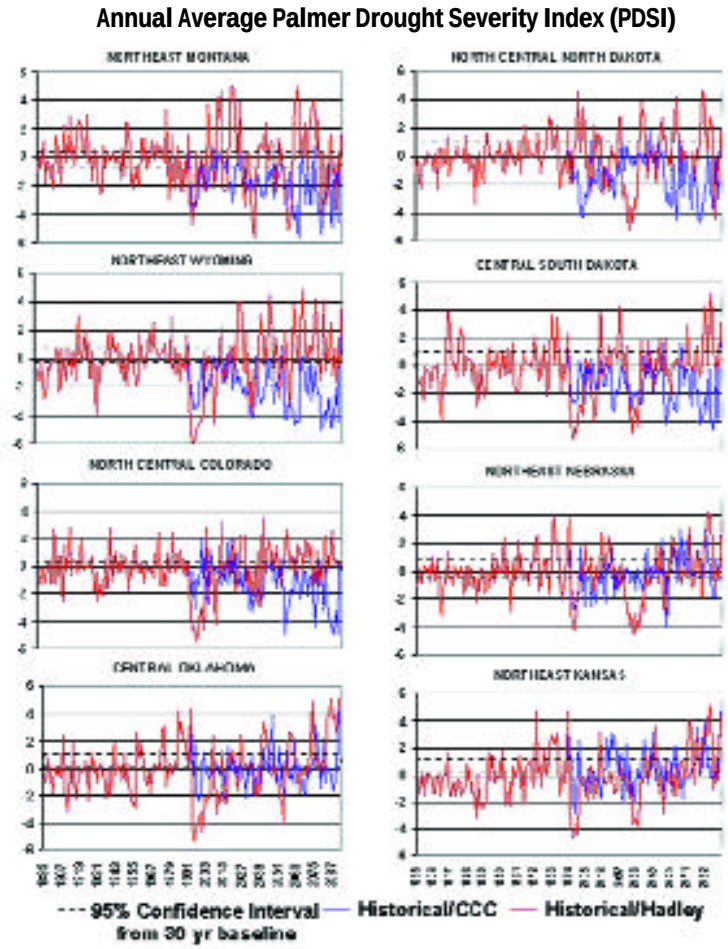

Figure 8. The droughts of the 1930s and 1950s are shown as years or periods where the Palmer Drought Severity Index (PDSI) was less then –2 and both climate scenarios (CCC = Canadian, Hadley) suggest future periods in each of these 8 climate divisions in the Great Plains where drought conditions appear likely. The 95% confidence interval for the historical period of 1960 to 1990 is shown as two dashed lines (VEMAP data, Natural Resource Ecology Lab, Colorado State University.)

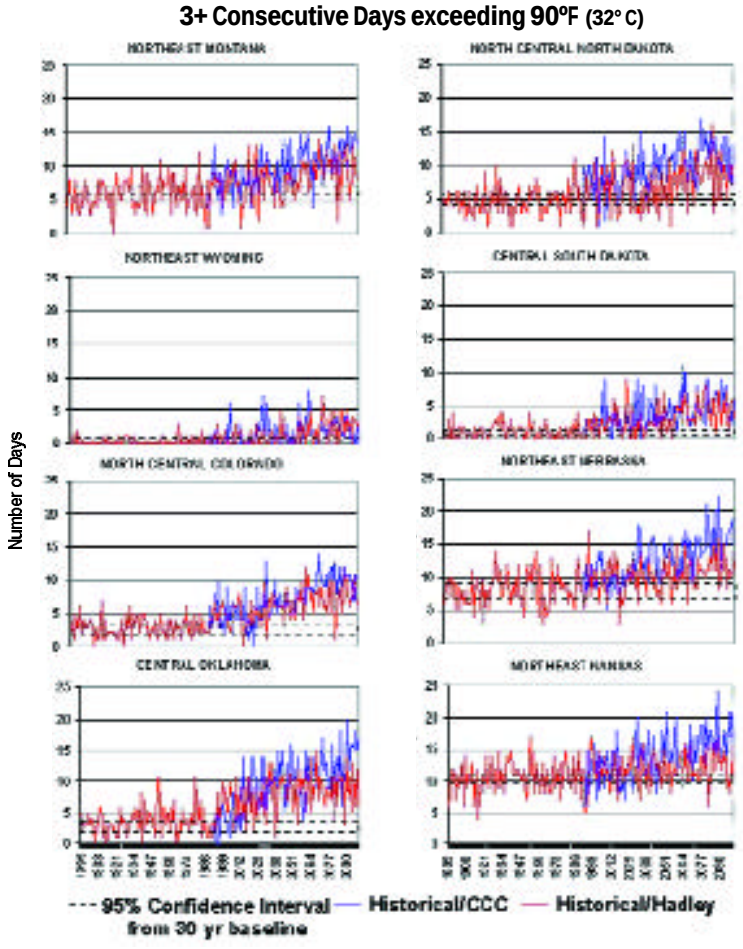

Figure 9. Heat stress events can be triggered for livestock and for humans when the temperature exceeds 90˚F (32˚C) for three or more consecutive days. The number of times that a climate division in each of the 8 Great Plains states experiences three consecutive days where temperatures exceed 90˚F (32˚C) increases in both scenarios. The 95% confidence interval for the historic period of 1960 to 1990 is shown as two dashed lines (VEMAP data, Natural Resource Ecology Lab, Colorado State University).

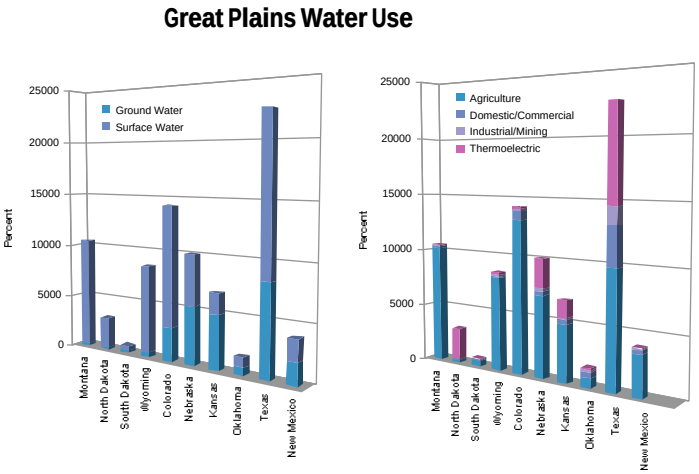

Figure 10. Surface waters are important sources for the western and northern Great Plains. Ground water, such as the Ogalalla aquifer, supplies large shares of the water for Nebraska, Kansas, and Oklahoma. Although the total amount of water withdrawal varies across the Great Plains, agriculture is the dominant consumptive use in all states (Solley, 1997).

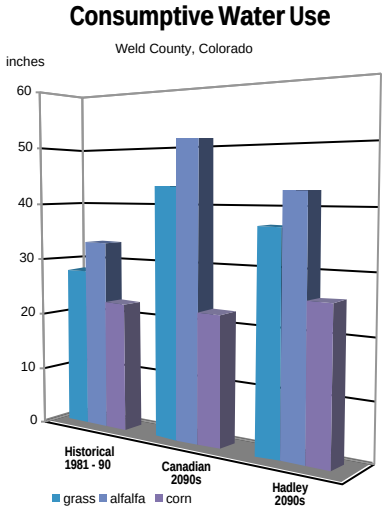

Figure 11. Lack of soil moisture can greatly reduce yield of crops and forage. Under both climate scenarios, the consumptive demand for water on grass pasture increases more than 50% while the water needs for irrigated corn change little. Perennial crops experience an increase in consumptive demand for water; the size of the increase depends on the climate scenario (Ojima et al., 1999).