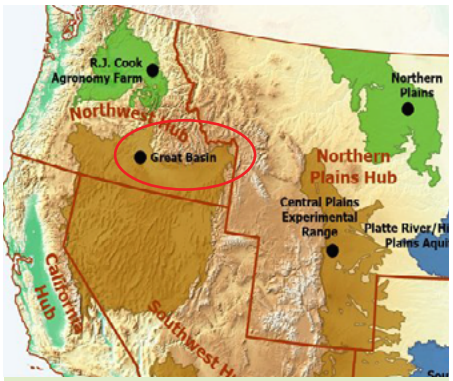
GREAT BASIN

REYNOLD CREEK EXPERIMENTAL WATERSHED



Location and Climate

The Reynolds Creek Experimental Watershed (RCEW) lies in the northern Great Basin (GB) floristic province and is within the USDA Northwest Climate Hub region. The climate is generally arid or semi-arid but varies significantly over space, primarily as a function of elevation.

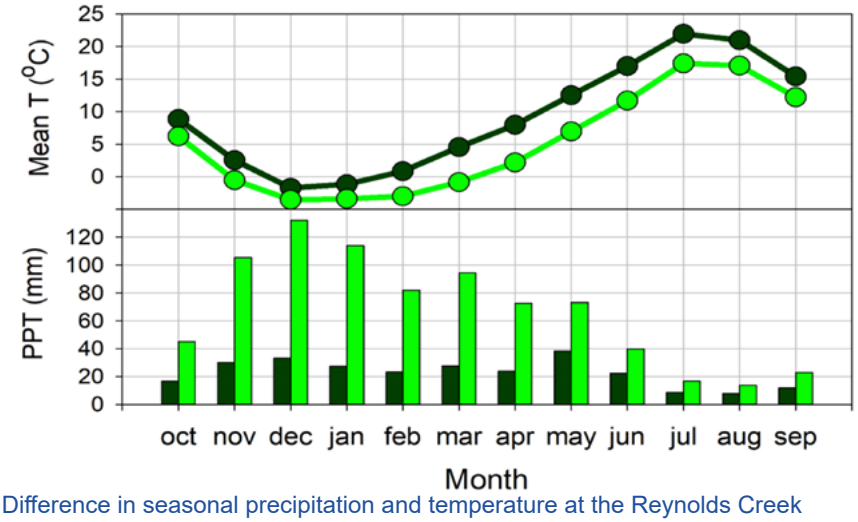
Historic Temperature

Higher elevations at RCEW (2240m) may receive 1270 mm while lower elevations (1100m) may only receive 100 mm of precipitation. Mean annual temperatures in the watershed are typical of this region and range from 4ºC to 9ºC depending on elevation.

Hydrologic Year / Seasonal Weather

Precipitation in this region falls primarily in the late fall, winter and early spring and at higher elevations falls primarily as snow. Spring temperatures rise sufficiently to support crop and forage growth at lower elevations in early April but rise in the spring as precipitation declines, and crop water stress in non-irrigated areas can begin as early as mid-June. The entire GB region is, however, characterized by extreme annual and seasonal variability in both temperature and precipitation.

LTAR Network and USDA Climate Hubs are working to develop knowledge and technology for sound resource management **via research with partners.** The goal is to ensure **sustained crop and livestock production and ecosystem services** from agroecosystems, and to forecast and verify the effects of environmental changes, public policies, and emerging technologies.



Difference in seasonal precipitation and temperature at the Reynolds Creek Experimental Watershed at a high elevation mountain sagebrush site (Reynolds Mountain) and a lower elevation Wyoming big sagebrush site (Quonset)

Measuring Weather and Climate

USDA-ARS established RCEW in 1959, primarily to characterize Intermountain weather and hydrologic response in snow-fed watersheds. Initial instrumentation focused on measurement of precipitation and water-flow but the network has since been expanded to include air temperature, relative humidity, wind speed and direction, solar radiation, water and carbon flux and water quality parameters at 9 weirs distributed throughout the watershed.

Impacts to Agriculture

The RCEW LTAR site supports hydrologic research to develop models for predicting water supply to dams that provide irrigation water to agriculture and serve as water sources for urban use across the entire western US. More recently (>1980) RCEW has also supported research in erosion and water quality, forage production for livestock and wildlife populations, grazing animal distribution, landscape disturbance and mitigation of annual and woody invasive species.

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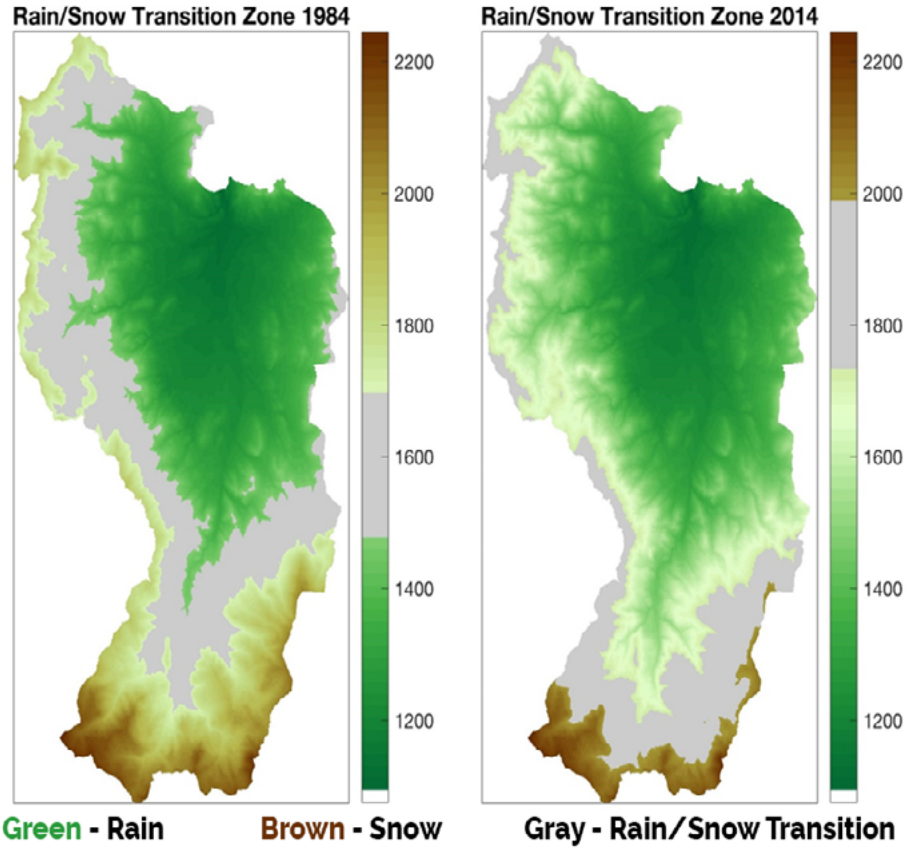

Climate Change

The Great Basin is currently undergoing warming throughout the entire region and precipitation appears to be shifting to more late-fall, winter and spring, and less summer rainfall. Research at RCEW has also documented a major shift toward less snowfall and earlier snow-melt over the last 30 years that has already significantly affected the timing and availability of irrigation water downstream, and the potential for flooding during more intense winter rainfall events.

To manage land sustainably, consider weather and climate.

Vegetation

- The GB region is currently undergoing type conversion over millions of hectares of lower-elevation sagebrush/bunchgrass rangeland due to the expansion of introduced annual grasses that proliferate after wildfire. At higher elevations, native juniper species are encroaching on grass and shrublands due to fire suppression activities.

- Traditional agriculture in the GB is restricted to a relatively small percentage of the total land area that either has access to irrigation or is at high enough elevation to sustain non-irrigated cereal crops. Principal crops in this region include potatoes, hay, cereal crops, and a variety of vegetable, fruit and specialty crops. A combination of lower summer precipitation and higher temperatures is expected to increase stress on traditional crop species and increase the need for irrigation water to sustain current levels of agricultural productivity.

Water Resources

- Future climate predictions indicate no changes in overall precipitation in this region but probably a shift in seasonality of precipitation amounts to more winter and less summer rainfall. This shift will increase overall water stress in both agricultural and rangeland systems. Reservoir storage, however, may become problematic with less water available in late summer.

Livestock

- Wildfire and disturbance from invasive plants are causing rapid changes in the seasonality and biomass of forage availability for both wildlife and livestock. Fire rehabilitation and restoration in these rangeland systems is very difficult due to general and persistent drought, high annual and seasonal variability in weather, and generally low ecological resilience and resistance to weed invasion. Predicted changes in climate will exacerbate type conversion as these changes are occurring at a faster rate than these plant communities can either adapt or migrate.

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