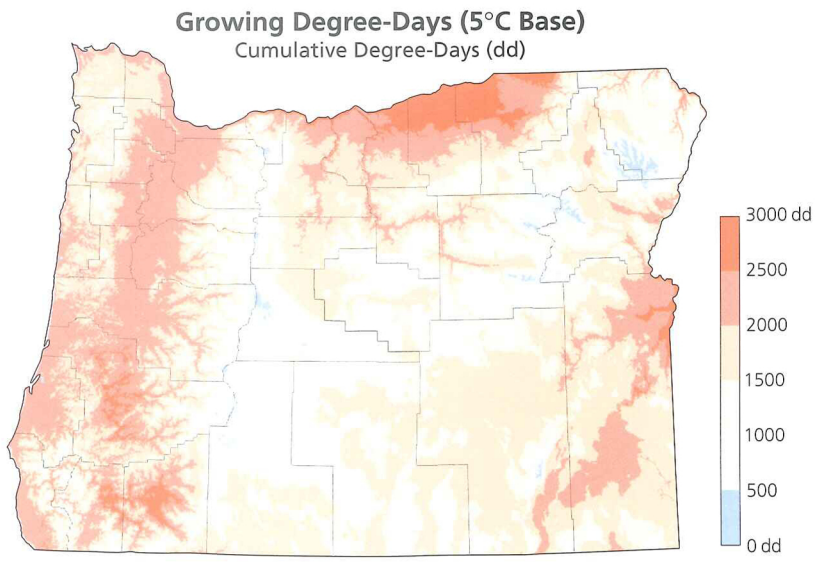
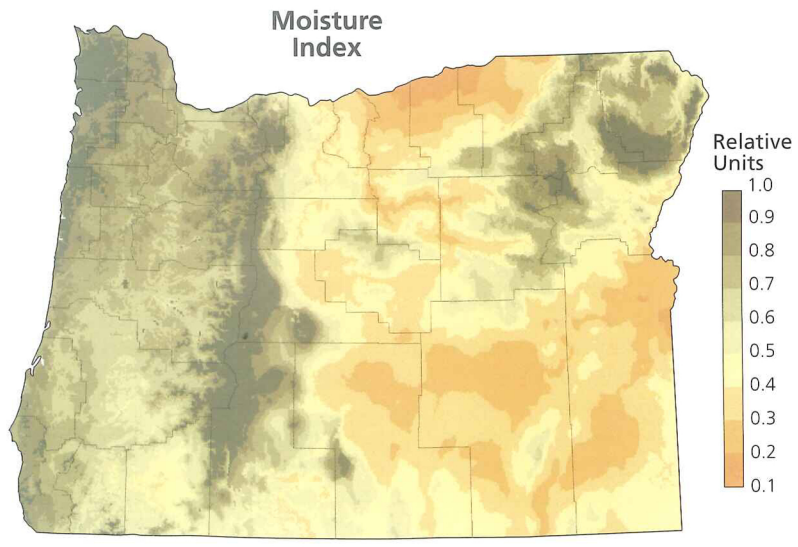
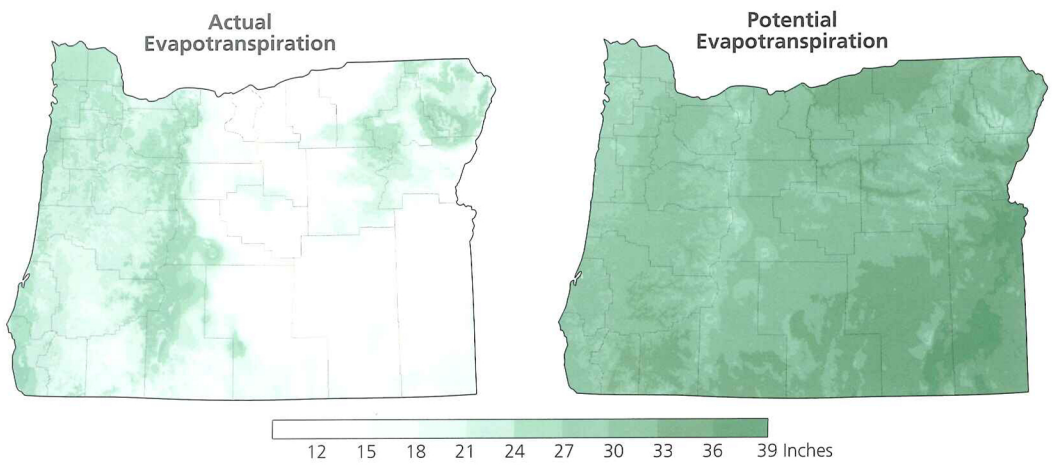
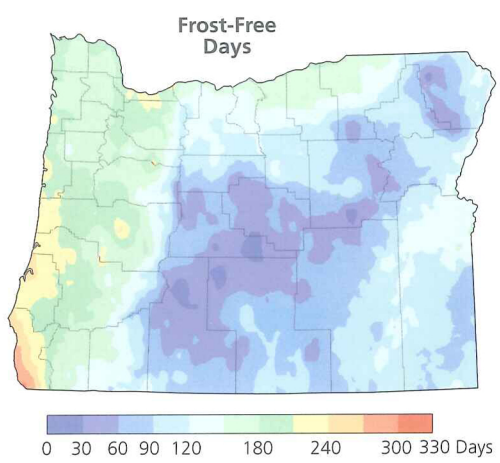
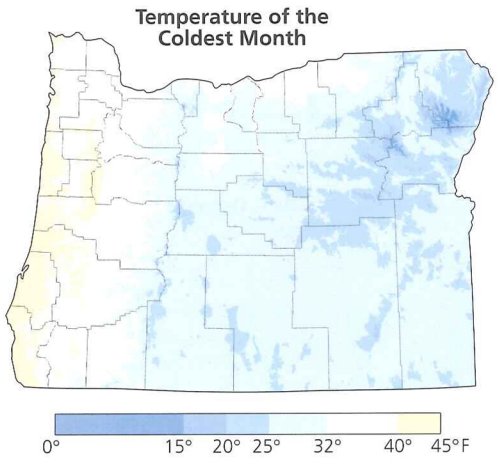
Climate Indicators and Change

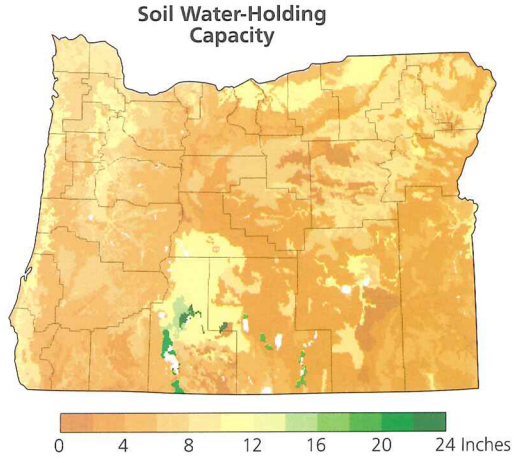












Climate strongly influences the plants that populate the natural, agricultural and urban landscapes of Oregon. This control is evident in the general pattern of vegetation across the state. Trees dominate in moist Western Oregon and in the mountains of Eastern Oregon, while grasslands and steppe dominate drier regions such as the Willamette and Rogue Valleys as well as the high desert of Eastern Oregon. Tundra plants prevail at the highest and coldest elevations of the Cascade Range and mountains of Eastern Oregon.

Climate determines which plants can survive in a particular area and which plants thrive. Warmth and moisture are the key controls. Three specific indicators highlight the relationship between vegetation and climate: (1) "growing degree-days," an overall measure of the length and warmth of the growing season, and of the energy potentially available to plants for photosynthesis and the production of new biomass, (2) winter temperature, which may exclude some plant species from a region and (3) moisture availability for photosynthesis.

Growing degree-days are the total number of degrees Celsius that average daily temperature exceeds some threshold (5°C in this case), accumulated over the year. Growing degree-days are highest along the central and southern Coast and in the Willamette and Rogue Valleys, where winters are mild and the growing season is long; and in the Columbia and Snake Valleys and in southeastern Oregon, where the growing season is shorter but hotter. Growing degree-days are lowest at high elevations along the crest of the Cascades and in the mountains of Eastern Oregon, where summers are cool and the growing season short.

Low winter temperatures may exclude frost-intolerant plants from a region, and are also important because some plants require a particular low temperature before leafing out (in order to avoid premature bud burst and subsequent frost damage). A common index of winter cold is the average temperature of the coldest month of the year. This index is above freezing over much of Western Oregon at elevations below 3,000–3,330 feet, and along the Columbia River east of the Cascades.

For gardeners and farmers, however, a more significant index may be an area's number of frost-free days. While the ability of crops or ornamentals to survive or reproduce over the long run is not an issue (because they are planted, sometimes each year), the occurrence of freezing temperatures in spring or autumn is of primary importance.

Moisture availability involves a trade-off between precipitation or snowmelt, which recharge soil moisture, and evapotranspiration which depletes it. Evapotranspiration is the conversion of water to water vapor, from the soil by evaporation and from plants by transpiration. Moisture availability can be represented by the moisture index, defined as the ratio of actual evapotranspiration to potential evapotranspiration (how much would occur if water were not limited). Potential evapotranspiration depends on energy availability; its map pattern resembles that of July temperature. Actual evapotranspiration is higher in the wetter parts of the state, or where the soil water-holding capacity is high, enabling the soils to carry over moisture from the wet season to the dry season. A moisture-index value of 0.65 provides a point above which an area is potentially wet enough for trees to dominate and below which it is not.