



Climate Change at Whitman Mission

A primary management goal for this 138-acre national historic site (WHMI) is to restore it to its appearance when the mission founded by Marcus and Narcissa Whitman was active among the Cayuse, from 1836 to 1847. However, the mission developed an irrigation system, planted crops, grazed livestock, and removed riparian vegetation for wood—activities that over the long term and throughout a larger geographic area have changed the site's ecology by spreading non-native plants and altering stream flow and aquatic habitats. Efforts to minimize and reverse those unwanted alterations may be hampered by the impacts of long-term climate change.

Invasive Plants

When the mission was established, the Walla Walla River flowed through the site during high water, creating floodplains for riparian vegetation while perennial bunch grasses, shrubs and native forbs grew at higher, drier elevations. Since 1985, when a major initiative was launched to control non-native plants, nearly 80 acres have been revegetated with grasses that were present during the Whitmans' era or are of similar appearance and can gradually be replaced with native species. However, climate change is expected to further the spread of invasive species such as yellow starthistle (*Centaurea solstitialis*) that have wide temperature tolerance and resilient means of dispersal that help them adapt to changing conditions and out-compete native plants.

Wildland Fire

Although fire is a natural part of Columbia Basin ecosystems, unplanned ignitions are put out as quickly as possible at WHMI because of the proximity of private property and the need to preserve the park's cultural resources. However, warmer temperatures in the western U.S. in the last three decades have been associated with reduced fuel moisture during the summer, promoting easier ignition and faster spread of fires regardless



PHOTO BY ERIC STARKEY

Potential steelhead habitat in Mill Creek, August 2008.



NPS PHOTO

Evidence of the Oregon Trail in the Whitman Mission.

of efforts to extinguish them. Working with Umatilla National Forest personnel, WHMI staff plans to burn 10 to 20 acres of the park each year to remove hazardous fuels and non-native plants, and partially replicate fire's natural role in recycling nutrients. However, fire is not effective in eliminating all of the non-native plant species in the park, and it can increase their presence by leaving bare ground conducive to the growth of some invasive species if not soon restored with native vegetation.

Water Quality

Withdrawals for irrigation reduce the quantity and quality of water in the park's streams. The warmer water that results from low summer flows, the loss of shading within and upstream from the park, or higher air temperatures can promote the growth of fecal coliform bacteria and reduce the productivity of bull trout (*Salvelinus confluentus*) and steelhead (*Oncorhynchus mykiss*), which have experienced drastic population declines throughout the Pacific Northwest. In some recent years, Doan Creek and Mill Creek have exceeded the state Department of Environmental Quality's criteria for water temperature. Since 2006, the straight irrigation ditch at Doan Creek has been replaced with a meandering channel and the reed canary grass (*Phalaris aurundenacia*) has been replaced with native willows, wild rye (*Leymus cinereus*), and other bunchgrasses that will promote bank stability, shade the water, and provide wildlife habitat and food for the benthic invertebrates that are forage for fish. However, this restoration will be jeopardized if climate change exacerbates the problem of low summer stream flows.

For More Information

Upper Columbia Basin Inventory and Monitoring Network
<http://science.nature.nps.gov/im/units/ucbn/>