

Report for 2001NV4182B: A Method to Determine the Effects of Fire, Restoration, and Invasive Species on Local and Regional Hydrology in the Great Basin by the Use of Environmental Tracers

There are no reported publications resulting from this project.

Report Follows:

Problem and Research Objectives:

A combination of periodic fire and the introduction of aggressive, non-native plant species has significantly altered the landscape of the Great Basin and may have affected significant changes in the soil moisture dynamics and hydrology of the region. Shallow-rooted annual grasses (cheatgrass) and deeper-rooted perennial grasses (crested wheatgrass) have replaced native plant communities dominated by deep-rooted perennial shrub and tree species. While the changes in plant community composition have received considerable attention, the accompanying alterations in hydrology in the Great Basin have not been thoroughly investigated. The demands placed on soil moisture and the timing of those demands by the introduced species may change (increase) the quantity of water available for recharge.

The clear delineation between burned and unburned areas at the edges of a fire offer excellent opportunity to evaluate the hydrologic effects of fire and plant succession. At fire lines, treatment (burned) and control (unburned) are in close proximity and can be clearly identified. We proposed a field effort that will use environmental tracer methods to evaluate changes in hydrology resulting from fire and subsequent (re-) establishment of a plant community. Environmental tracer analysis of soil samples from soil coring activities at burn areas of various ages will provide a longer-term view of changes in soil moisture status, especially recharge, associated with burned areas.

Methodology:

Characterization of historic burns will seek to identify differences in recharge between control sites with native vegetation and burned sites with introduced vegetation using soil moisture measurements and a variety of environmental tracers. Measurements will be made at adjacent locations on either side of fire lines at burns of various ages. Soil cores will be taken to depths below the root zone. Soil samples at various depths will be analyzed for chloride, stable isotopes of hydrogen and oxygen of water (deuterium and oxygen-18) tritium, and chlorine-36. The tracers will be used to quantify the long-term hydrologic differences between areas with native vegetation and burn areas with introduced vegetation. The primary intent of this field exercise will be to identify differences in recharge rates in control areas with native vegetation and burn areas with introduced vegetation.

Principal Findings and Significance:

Continuous cores were taken at two field sites in May of 2002. Analysis of soil moisture and bulk chemistry has begun.