



Satellite remote sensing data is being used to track the expansion of the invasive plant cheatgrass (*Bromus tectorum*). Across the western United States, this grass has displaced native plants and increased the incidence of wildland fire. The image above shows that in 1993, cheatgrass was found in small infestations in Canyonlands National Park. The adjacent image shows that by 2001, it had expanded greatly. We are using these images of cheatgrass coupled with field studies of soil nutrients and geologic substrate to understand what areas are susceptible to invasion with the goal of predicting where it might expand in the future.

We detect cheatgrass using a change in the normalized difference vegetation index (NDVI) calculated from the red and near-infrared bands of the Landsat ETM

sensor. This index is sensitive to plant "greenness." Cheatgrass greens up earlier than most native plants on the Colorado Plateau in the spring. By mid-summer, cheatgrass has reached a state of senescence, in which its leaves are brown and dry.

To produce these maps of cheatgrass infestation NDVI calculated from Landsat data in July was subtracted from the April NDVI value:

$$dNDVI = NDVI_{\text{April}} - NDVI_{\text{July}}$$

As a result, high dNDVI values indicate areas that are covered by plants that were green in April and non-green in July (i.e., areas with a vegetation growth cycle like that of cheatgrass). The accuracy of the dNDVI maps in detecting cheatgrass was quantified at 80% using 24 field plots measured in 2001.