Integrating Remote Sensing and Observations into Decision Support Systems for Invasive Weeds

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Remote sensing can be used to cover large areas inexpensively, but there needs to be some spectral difference between the invasive weeds and the co-occurring native vegetation. The spectral differences could result from greening up earlier, senescing later, or having distinctive flowers. Geospatial models, such as the Weed Invasion Susceptibility Prediction (WISP) model, are used within geographic information systems to map out potential habitat. The problem is that these models can be over-tuned to the observation data, so that the model predicts all areas to be potential habitat, making the model useless for its purpose. The solution is to determine the errors of commission (rate of false positives), which are difficult to determine for potential habitat predictions. With very large numbers of pixels, classification of remote sensing data have the statistical power to detect small but significant associations of invasive weed presence with landscape features, that can be used to improve geospatial models. Leafy spurge (*Euphorbia esula*) is a noxious invasive weed that has bright yellow-green flower bracts that can be detected with high accuracy by hyperspectral remote sensing. The WISP model was tested with data acquired at Devils Tower National Monument, Wyoming. The improved model has reasonably good accuracy for the Fishlake National Forest in Utah and Theodore Roosevelt National Park in North Dakota. Because many invasive weed species cannot be detected by remote sensing, geospatial models tested using detectable species would help improve these models for decision support systems.