NASA Earth Observations Assist in Invasive Species Forecasting
NASA Goddard Space Flight Center
Earthzine/DEVELOP Virtual Poster Session, Summer 2011
Video Transcript

Slide 1
"In 1997, an invasive grass known as wavyleaf basketgrass was discovered in Patapsco Valley State Park in Howard County, Maryland. This invasive has now spread to locations throughout Maryland and into Virginia."

Slide 2
"Wavyleaf basketgrass is a stoloniferous (uses horizontal stems that grow along the soil surface to propagate) grass that covers the forest floor, crowds out native herbaceous plants, and negatively alters the habitats of plants and animals in that ecosystem. Nothing in this region appears to consume it, meaning the grass is free to spread, which it does so by means of using a sticky substance that adheres to creatures such as deer. Small infestations can be easily hand pulled while large infestations require a costly special herbicide."

Slide 3
"In studying the problem of wavyleaf basketgrass, the question arose, 'Can satellite observational data be used to assess the ecological preferences of an invasive grass?' The NASA DEVELOP team from Goddard Space Flight Center, Chad Hawkins and Christine Suss, sought to address this question by partnering with the Maryland Department of Natural Resources Wildlife and Heritage Service. We have developed an approach to model the habitats suitable for wavyleaf basketgrass in the Maryland region in order to guide resource managers in mitigating its spread."

Slide 4
"To begin addressing this question, we first needed to acquire satellite data to include in our model. The TERRA satellite, carrying the MODIS instrument, was a source for land cover measures."

Slide 5
"The Shuttle Radar Topography Mission was a source for topographic measures including elevation, slope, and aspect."

Slide 6
"Landsat 5 was a source used by the National Landcover Dataset, which was used in our model for land cover classifications."

Slide 7
"The National Landcover Dataset supplemented their Landsat 5 data with data from the newer Landsat 7 satellite."

Slide 8
"The data from these satellites were used to generate environmental predictor layers that would aid us in the process of finding habitats suitable for wavyleaf basketgrass. In addition to satellite data, we used temperature data, precipitation data, and soil classifications derived from ground measures."

Slide 9
"The next step in our approach was the maximum entropy method, also known as MaxEnt. MaxEnt is useful for land managers because it works with presence points only and enables the generation of predictive habitat suitability maps without changing methods used for field data collection."

Slide 10
"MaxEnt begins with *in situ* presence points and environmental predictor layers as input. It then relates the presence records with values in each mapped environmental predictor layer. This allows MaxEnt to generate a probability distribution that takes into consideration the variation in the known habitat of wavyleaf basketgrass."

Slide 11
"This probability distribution curve is then used to generate a habitat suitability map."

Slide 12
"The map created by MaxEnt is overlaid in Google Earth resulting in the image seen here. White markers represent the set of input points used to create the model and the purple markers represent the set of input points used to test the model. Red indicates high probability of a suitable condition for the species, shades of green denote conditions typical of those where the species is found and blue colors correspond to low predicted probability of suitable conditions. It was found that the top contributors to our model were soil classification, annual mean temperature, and elevation. According to MaxEnt, there are suitable areas for the grass to spread near and beyond the current sites."

Slide 13
"In conclusion, our results have expanded the understanding of wavyleaf basketgrass and will be used to guide mitigation efforts."

Slide 14
"This methodology will be incorporated into a web-based tool allowing resource managers to perform similar analyses for other invasive species."

Slide 15
"We would like to acknowledge our science advisor, Dr. John L. Schnase, Kerrie Kyde of the Maryland Department of Natural Resources Wildlife and Heritage Service, and Roger Gill of Innovim."