

Killer weed no match For PNNL technology

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Even the world's most powerful army can be brought down by a killer weed. Scotch Broom — a prolific, noxious weed — has invaded the Fort Lewis military base near Tacoma and is inhibiting effective troop training.

Researchers at Pacific Northwest National Laboratory recently completed a project in which remote-sensing and target-detection techniques, aided by satellite data, were applied to build a map of the locations of noxious weeds at the base.

Fort Lewis encompasses 86,000 acres of forest, prairies and wetlands and houses more than 25,000 soldiers and civilian workers. The installation has abundant high-quality training areas, including 115 live-fire ranges. Also abundant is Scotch Broom, a plant that spreads quickly and grows to 10 feet tall and higher. The weed has become an ecological problem at Fort Lewis, competing with other plants and making military training, such as field maneuvers, difficult.



Jerry Tagestad of PNNL stands next to a Scotch Broom at Fort Lewis. The plant, an import from Europe and North Africa, can grow to 10 feet tall and higher.

“If left unchecked, Scotch Broom can bring training to a standstill, especially for ground troops,” said Jerry Tagestad, PNNL technical lead for the project. “The weed can grow so tall that the troop movement is severely restricted.” Fort Lewis personnel have implemented measures to control the weed with mowing, burning and using biological methods, but the fast-spreading Scotch Broom bounces back quickly.

Fort Lewis officials contacted PNNL to help create an installation-wide map using satellite images to identify the location and density of the weed over the entire 135-square-mile installation. The map will be used to help guide field crews in eradicating the weeds. “Our remote-sensing staff has the breadth and depth of expertise to ‘tease’ out more information from images from multiple types and combinations of sensors,” Tagestad said.

In creating the map, PNNL staff members used images of Fort Lewis taken from a commercial satellite. The satellite is a multispectral sensor that collects energy from the visible and near-infrared regions. The staff then performed multispectral classification of the data based on the differences in the colors of the objects in the images. “We were able to sort out the Scotch Broom from other objects in the images using our expertise in data fusion, analysis and interpretation,” Tagestad said. “Our accuracy assessment, consisting of a field visit as well as a quantitative analysis using PNNL ground truth data and Fort Lewis land condition mapping data, was above 90 percent.”

Using the map PNNL created, field crews at Fort Lewis are starting to target wide areas of Scotch Broom for eradication. “The project also has opened the door for Fort Lewis staff to create an annual Scotch Broom density map for the entire installation so that they have a continuous geographic information system at their disposal,” Tagestad said. ■