

Root of all evil? Park rangers drench invasive weeds with blue herbicide.



# SHOOT TO KILL

The US government has adopted a tough approach to battling harmful exotic plants: specialist strike teams. But can they prevail? **Emma Marris** finds out it's not all black and white.

**C**hesapeake bay in Virginia played host to some of the first British colonists. And along the banks of the York River, crumpled beer cans and someone's soggy hunting cap bear witness to their success. Another colonial type has also put down roots by the river: a few feet above the high-tide line sit some feathery reeds. They are *Phragmites australis* — and they are the enemy.

This strain, thought by some to have been introduced from Europe a century or so ago, is now classified as an invasive species — one which aggressively steals habitat from native flora. Today, the reeds will come under attack from an invasive-species strike team.

Armed with high-tech gear, these specialists travel from park to park — all-terrain vehicle in tow for the off-road areas — ready to pull, poison or burn anything that is out of place. Since their inception in 2000, the National Park Service's strike teams have treated some 270,000 hectares. But success depends on the yardstick one uses: plant seeds can survive for

decades and most invasives return sooner or later, often within a few years of treatment. Some ecologists even question the rationale behind the entire approach.

Dressed in a pale khaki uniform and thigh-high waders, Kate Jensen is carefully recording the exact location of the *Phragmites* using a hand-held global positioning device, which chirps merrily when it reaches enough satellites. Half an hour later, her teammates — Dale Meyerhoeffer and Matthew Overstreet — arrive with a 200-gallon tank of a herbicide called Habitat. The team mixed the chemical early in the morning and added a fluorescent blue dye that will make it obvious which plants have been hit.

The aim, Jensen says, is to make the area liveable for native plants. She points to a handful of cattails behind the *Phragmites*. "That's what we want here. We like those."

The Park Service's 16 exotic-plant management teams were conceived as a way to spread scant resources over hundreds of US national parks. Each team covers a wide area — this one

handles the mid-Atlantic region, which stretches 550 kilometres from Pennsylvania to Virginia. The teams are made up of park employees, contractors, conservation students and volunteers, whose shared goal is to wrestle the parks back into something like their pre-colonial condition.

To this end, the mid-Atlantic team goes after tree-of-heaven (*Ailanthus altissima*) from China and autumn olive (*Elaeagnus umbellata*), an east Asian import once planted to fatten game birds. They also tackle privets (*Ligustrum* spp.) — hedgerow plants that form dense thickets and compete with natives — and mile-a-minute weed (*Polygonum perfoliatum*), whose name betrays its bad habit.

## Cutting costs

The introduction of such alien plants is a growing concern worldwide, as international travel and shipping accelerate the spread of seeds and cuttings around the globe. Among the most damaging additions to the United States are leafy spurge (*Euphorbia esula*), which has rendered great swathes of western prairie useless for grazing, and salt cedar (*Tamarix* spp.), which depletes groundwater and moves salt to the soil surface. Crews cutting the cedars back with chainsaws report a

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salty taste on their tongues as they work. The cost of the damage is estimated to run into tens of billions of dollars each year.

And these figures do not take into account intangibles such as loss of fresh water or recreation opportunities, says Mike Ielmini, invasive-species coordinator for the US Forest Service, based in Washington DC. "Until we get some definitive studies, it is going to be very hard to say how much it costs the United States," he says.

In the face of such economic damage, the US government's response has been increasingly aggressive. In 1999, President Bill Clinton signed an executive order that crystallized the approach to invasive species: all agencies were to avoid spreading them and to stamp them out, wherever possible. Today, the federal government spends more than \$1 billion annually controlling invasive species<sup>1</sup>.

But is such large expenditure necessary? Although many thousands of plant species have accompanied human migrations to new lands, most manage to coexist in one way or another with what is already there. Only a small percentage are truly invasive, pushing out the native flora and altering the local ecology. And although the prevailing ethos says that all invasives should be eliminated, not all ecologists agree.

### Required weeding?

Removing invasives is more a human preference than a scientifically grounded prerogative, argues Mark Davis, an ecologist at Macalester College in St Paul, Minnesota. "There is a huge amount of arbitrariness here," he says. "Can't we just forget about where they came from, identify species that are causing us problems according to our values, and then deal with them?"

Although invasives have been called the second most serious threat to endangered species after habitat loss<sup>2</sup>, a recent review of the literature suggests that there are few solid data to support this idea<sup>3</sup>. Many ecologists now agree that invasive plants, in particular, seldom drive other plants extinct by competing with them directly for resources. The view that ecosystems are stable places in which every niche is filled until some disruption occurs has given way to something else. "I think that the natural world out there is more like a swirling and boiling cauldron," Davis says, where change and challenge are the order of the day.

Perhaps the fears about invasive plants are overblown? Not according to Peter Vitousek, an ecologist at Stanford University in California, who says interloping plants more often cause local extinctions by changing something fundamental about the area. "They don't just compete with or consume native species, they change the rules of the game," he says, by changing the composition of the soil, the availability of water or the frequency of fire. "It is often a subtle and long-term phenomenon."

The truly problematic invasives tend to share several characteristics that turn them

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from, say, a charming ornamental shrub into a rampaging monopolizer of wild land. They reproduce quickly and explosively, either by prodigious production of seeds or by fast-growing rhizomes — horizontally growing roots that sprout new plants. Often, invasives are plants that in their native regions colonize areas after a fire. They do not attract local insects or diseases. And some, including tree-of-heaven and leafy spurge, exude noxious substances that knock out competing plants.

*Phragmites* spreads both by seeds and rhizomes to produce thick stands with up to 200 stems per square metre. Its aggressive tactics are the reason for Overstreet's herbicidal attack. He leans back, balancing the weight of the hose. On the weekends, he rides broncos competitively. He is also a veteran of park management, apt to say things like "I did that hunting from a bear" or "That was when I was hunting hogs in the Smokies".

Meyerhoeffer pays out more hose so Overstreet can work his way behind a ghostly stand of dead *Phragmites* from last year, which still shelters some persistent shoots. "I'm getting a few back here," he calls. "I'm leaving the rest

*Phragmites australis*  
stands tall among  
the locals.

IMAGE  
UNAVAILABLE  
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for job security." After a pause, he adds: "That was a joke."

The strike-team approach is winning converts among managers of public lands. The US Fish and Wildlife Service set up five of its own strike teams in 2003 to attack invasive species within National Wildlife Refuges. These are parcels of land set aside to conserve flora and fauna. Although the word 'native' does not appear in the teams' official remit, it is presupposed, says Michael Lusk, invasive-species coordinator for the refuges. The Forest Service, which manages land for public and commercial use, spends more than any of the other services on managing invasive species; it says it is planning to set up strike teams of its own.

### Bush administration

For its part, the Park Service is charged with preserving places of cultural importance to the United States, such as Alcatraz and the Grand Canyon. So are the reeds around York River being killed for their historical inaccuracy? Rita Beard, who runs the plant management teams, says no. "It is not just a matter of aesthetics. It is not just a matter of saving the plant communities that have been here historically," she says. "It is also about maintaining ecosystems that can withstand the ecological changes that will inevitably occur."

The idea is that an ecosystem with lots of co-evolved species will be more resilient to changes, such as the spread of a disease or a change in climate, than a smaller group of introduced species. The assumption is that aggressive invasive species will reduce the biodiversity in an area and that this will make the area less stable. Ecologists such as Davis are not ready to sign on to this intuitive premise, however.

Davis, who sees invasive plants as less of a menace than many, worries that resources are being spent on fighting exotics that could be used for other conservation processes. "More and more people are now questioning — with data — what was originally presented as a kind of simple idea: that invasive species are inevitably a huge threat," he says.

Whether they are or not, culling these plants is not easy. For the mid-Atlantic team, the long, hard hours battling plants can feel a bit sisyphian. "This is a never-ending process. You can get a handle on it, but the invasives are always creeping in," admits Jensen. Still, she says, the job is important, and it is clear that it colours her world view. She reaches through some reeds and snaps a bent twig off a tree. "This is native cherry. We like that." ■

Emma Marris is a reporter for *Nature* in Washington DC.

1. National Invasive Species Council [www.invasivespeciesinfo.gov/council/FY06budget.pdf](http://www.invasivespeciesinfo.gov/council/FY06budget.pdf)
2. Wilcove, D.S., Rothstein, D., Dubow, J., Phillips, A. & Losos, E. *Bioscience* 48, 607–615 (1998).
3. Gurevitch, J. & Padilla, D.K. *Trends Ecol. Evol.* 19, 470–474 (2004).