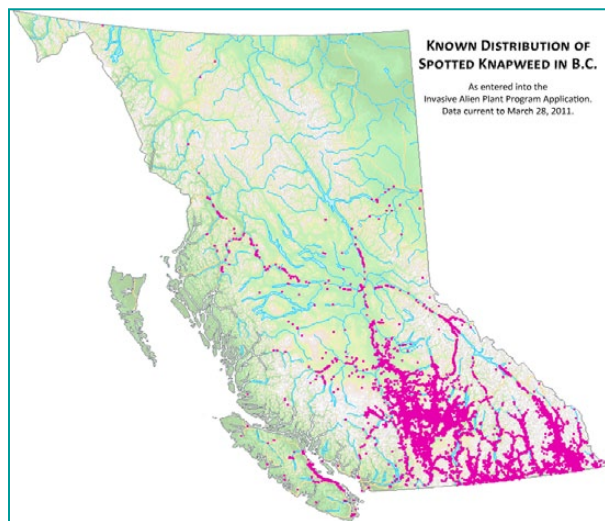


A David and Goliath story

Don Gayton

Little guys don't often triumph over giants, but I am pleased to report on one such success story. The giant in this case was a massive infestation of the two nasty cousins, diffuse and spotted knapweed, throughout the valleys of the Southern Interior. And the triumphant Davids are a series of tiny weevils and flies, which go by cumbersome names like *Larinus minutus* and *Urophora quadrifasciata*. To give you an idea of their size, the *Urophora* fly is considerably smaller than the "U" its name starts with, yet this group of introduced biological control insects is on the verge of decimating the core of British Columbia's knapweed population, which spans the province from Fernie to Falkland to Fort St. John.

The theory of biological control is elegantly simple. Spotted and diffuse knapweed (*Centaurea stoebe* and *C. diffusa*), like many other introduced alien plant species, are invasive here but not invasive in their home area of origin (Eastern Europe, in this case). Invasiveness often results when a plant arrives in North America free of the insects and diseases that normally limit its spread in the home country. So the trick is to go to those home regions and collect the predatory insects, but there is a catch—we can't purposely introduce insects that might also attack native North American plants.



Spotted knapweed is widespread throughout British Columbia.



A tiny knapweed nemesis: *Larinus minutus*.

Therefore, the first stop for these candidate insects is a lengthy stay at the controlled greenhouses and plots of the Centre for Agriculture Biosciences International (CABI) in Switzerland. Supported by various donor countries including Canada, CABI meticulously tests the insects by withdrawing the host plant and offering a multitude of other plants in an enclosed environment. Only those insects that starve in the absence of their host plant will make it through to eventual release in places like the British Columbia Interior.

Our giant-killer story starts four decades ago, with the first releases of knapweed biocontrol insects by Agriculture Canada and the B.C. Ministry of Forests. From 1970 to 1997, 12 different species of insects were released; some were seed feeders, others fed on the fleshy knapweed taproot. Years and years of monitoring, collecting, and insect re-releasing followed. Val Miller, the Ministry's Provincial Invasive Plant Officer and veteran of the knapweed wars, recalls that era: "There were times when we thought it was hopeless. Often we'd put our precious insects out on some promising site, and never see them again. But gradually we learned the preferred microsites for each insect species, and saw their populations start to grow."

It is certainly an achievement to successfully introduce a new weed biocontrol agent, but the real

test is their impact on the weed itself. I was privileged to be able to work with Val on a retrospective study of knapweed population trends. We selected 19 existing sites around the Southern Interior that counted knapweed as part of the plant community in previous samplings. My job was to track these sites down, re-monitor them, and determine knapweed population trends, based on the previous data. The sites ranged from Kamloops to Cranbrook, with a concentration of sites in the Grand Forks–Midway area, and the time period of sampling ranged from 1983 to 2010.

Val had been getting a steady trickle of recent reports of knapweed declines here and there, but the results of our study were startling: in 16 of the 19 sites, knapweed cover had declined, in most cases precipitously. In a few sites, my monitoring did not turn up a single plant.

Many talented folks have contributed over the years to the knapweed campaign, including Ministry of Forests, Lands and Natural Resource Operations current and retired staff **Dwaine Brooke, Rob Dinwoodie, Werner Baliko, Bob Drinkwater, Chris Easthope, Phil Youwe, Allen Sturko, Susan Turner, and Dr. Brian Wikeem**; Drs. **Rob Bouchier, Rose De-Clerck-Floate, and Peter Harris** of Agriculture and Agri-food Canada; the Regional Weed Committees; and a host of others.

The knapweed war is far from over, and more battles lie ahead for our little entomological warriors, but it is encouraging to know we are on the right track. The introduced alien St. John's-wort (*Hypericum perforatum*) was our first fledgling success with biocontrol. Houndstongue (*Cynoglossum officinale*)



Spotted knapweed, a noxious Eurasian invasive.

and Dalmatian toadflax (*Linaria genistifolia*) are currently under severe attack by their own respective David insects. We are now cautiously optimistic that the knapweeds may follow suit.

A technical paper on the knapweed project will be forthcoming in the *BC Journal of Ecosystems and Management*.

Contact Information

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