

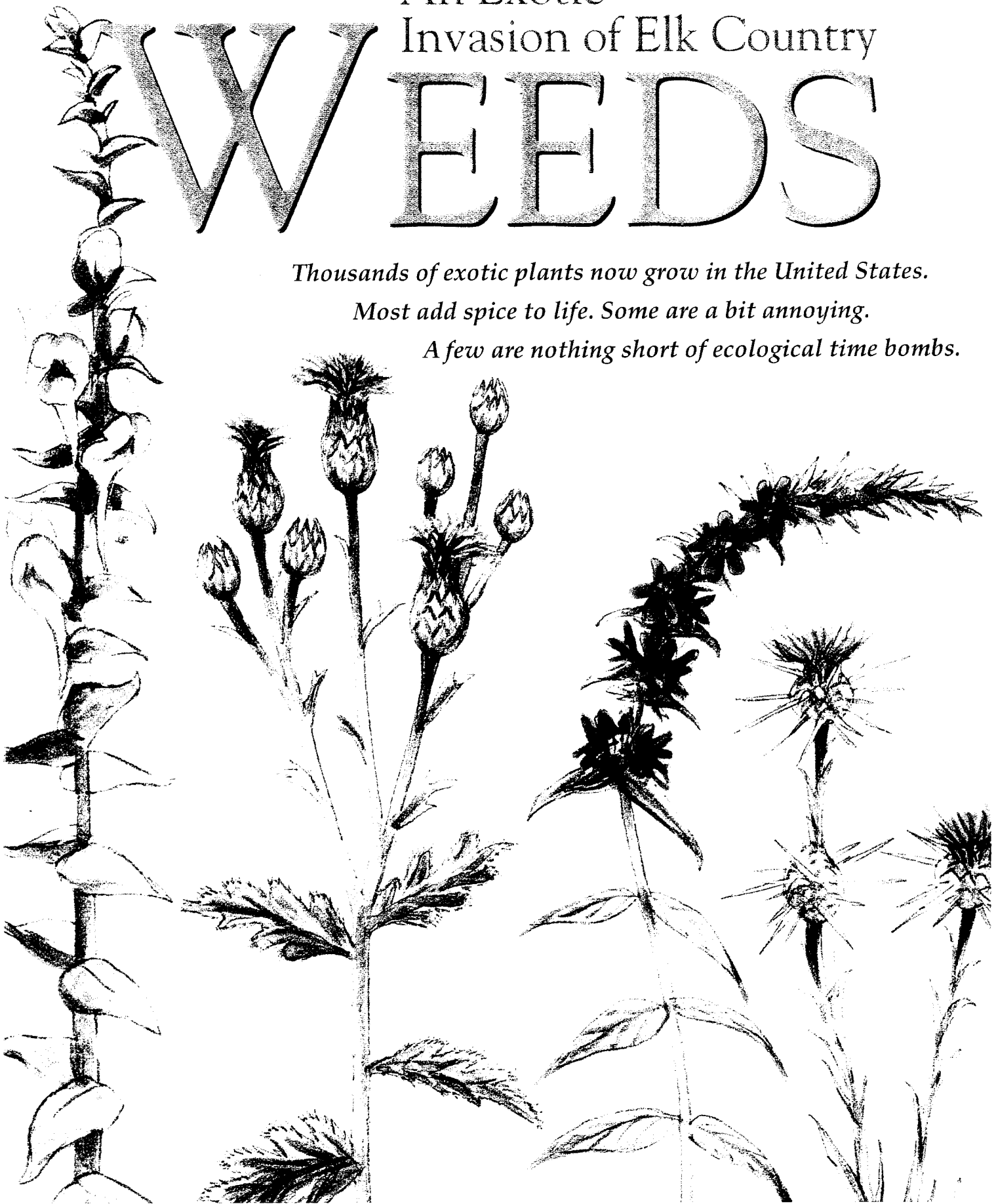
An Exotic  
Invasion of Elk Country

# WEEDS

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*A few are nothing short of ecological time bombs.*



# WEEDS

## An Exotic Invasion of Elk Country

by David Stalling

illustrations by Cynthia Fisher

Every now and then, elk get hooked on weed. It begins innocently enough. Say it's a dry spring. New green forage is scarce. A hungry young bull nibbles one of perhaps a dozen native plants known collectively as locoweed. Perhaps the effects feel good. Maybe the silky, grayish-white leaves are just tasty. The elk seeks more. And more. Soon he becomes weak and emaciated. Muscles trembling, senses jumbled, the "locoed" elk may panic and run, aimlessly crashing into trees and fences. Eventually, he'll die.

Luckily, locoed elk are rare. Certainly locoweed holds a grim fate for hapless individuals. But it poses no threat to the health of herds. The real threat to elk are the plants they *can't* eat. Aggressive exotics like leafy spurge, spotted knapweed, yellow starthistle, St. Johnswort, Canada thistle and purple loosestrife have invaded millions of acres of elk country, undermining plant diversity and leaving the cupboard bare for large herbivores.

### *Tumbling across the West*

"Noxious weed" is a legal term, used by state and federal agencies to denote plants that pose serious threats to agriculture and wildlife. Some came to America by accident. Others were deliberately imported. All wreak ecological and economic havoc. Even that most western icon, the tumbleweed, turns out to be a troublesome newcomer. Otherwise known as Russian thistle, this rambling exotic grows, dies and dislodges from its roots, blowing wherever the wind takes it, sowing seeds along the way.

Plants have traveled back and forth across oceans and continents



*Illustration by Cynthia Fisher*

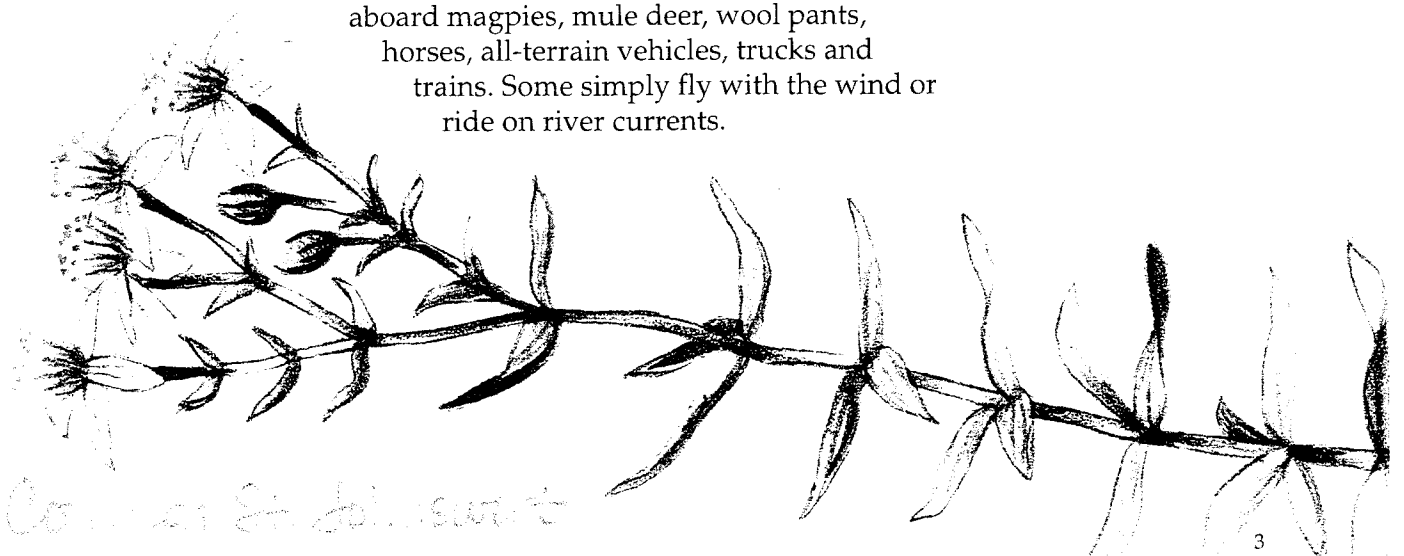
since long before Captain Bligh's crew mutinied on the Bounty in 1787 while carrying breadfruit trees from Tahiti to the British West Indies. Bligh's ill-fated journey was part of a scheme concocted by Sir Joseph Banks, a prominent English botanist, who launched what's been called the "antipodean exchange," blithely moving plants around the world to suit people's whims. The Americas gave Europe tomatoes, corn and chile peppers. In return came cheatgrass, knapweed and leafy spurge.

Of course, that's not quite fair. We fill our pantries and bellies with delectable, nonnative plants now grown locally. Who doesn't savor a good heffeweissen made from wheat and barley? And we can thank Johnny Applesed for spreading the crisp, tart flavor of McIntosh. Even okra, the plant that puts the gum in gumbo, was brought to the South by enslaved Ethiopians. Thousands of exotic plants now grow in the United States. Most add spice to life. Some are a bit annoying. A few are nothing short of ecological time bombs.

### *Botanical Barbarians*

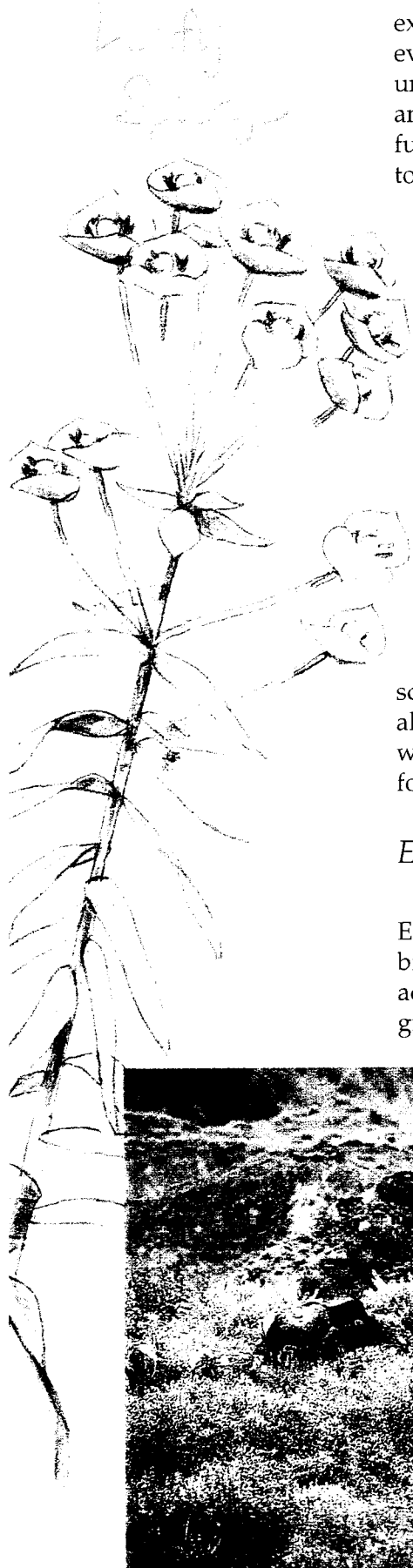
Many exotic plants arrive in North America as stowaways, seeds inadvertently secreted among shipments of grain. Others are brought over by well-meaning folks to grace gardens or help control erosion.

Once here, plants and their seeds hitch rides aboard magpies, mule deer, wool pants, horses, all-terrain vehicles, trucks and trains. Some simply fly with the wind or ride on river currents.



*Common St. Johnswort*

*Russian Knapweed*



But just as pineapples don't grow in Nebraska, most voyaging exotics never find a suitable new home. Some blend in harmlessly, even contributing, perhaps, to local diversity. But a few, like unscrupulous developers set loose in a lovely valley, take over, prosper and forever alter the habitat. Since the mammals, birds, insects and fungi that preyed on these plants in their homeland didn't follow them to North America, they have a distinct competitive edge. In the same way that elk and deer proliferate in the absence of predators—be they wolves, bears or humans—noxious weeds multiply in a land without enemies.

Four thousand exotic plants are recognized as "pests" by the U.S. government, 90 are federal noxious weeds, and dozens more are listed noxious by various states. The Bureau of Land Management (BLM) refers to exotic weeds as "A Growing Pain." The Forest Service calls them "Silent Invaders." The Nature Conservancy created "The Dirty Dozen" list of "America's Least Wanted: A rogues gallery of invasive plants and animals." In an article for *Sierra* magazine, writer Robert Devine coined the term, "botanical barbarians." Attempts to prevent, control and contain these plants are frequently portrayed as a "War on Weeds."

If such language seems hyperbolic, consider that noxious weeds infest about 100 million acres of North America. They conquer more than 3 million acres each year, invading an estimated 6 square miles of Forest Service and BLM lands every day. They've already claimed 7 million acres of national parks. And when noxious weeds invade elk country, they eliminate a diversity of grasses and forbs on which elk and other wildlife depend.

### *Eating up Habitat and Diversity*

Spotted knapweed emigrated to the United States from central Europe, mixed in with shipments of alfalfa and clover seeds. Now brittle knapweed stems have crowded out native plants on 4.5 million acres in Montana, thriving on soil that has been disturbed by logging, grazing, flooding or fire. By sending down stout taproots, knapweed



Dick Hancock

gets the jump on other plants with its early spring growth and snatches up most of the available space, sun, water and nutrients. Each plant produces more than a thousand seeds and can often be found in densities of up to 2 million plants per acre. Infestations frequently reduce native grasses and forbs by as much as 90 percent. In fact, botanists now suspect that the plant may actually release a chemical substance which inhibits the growth of surrounding vegetation.



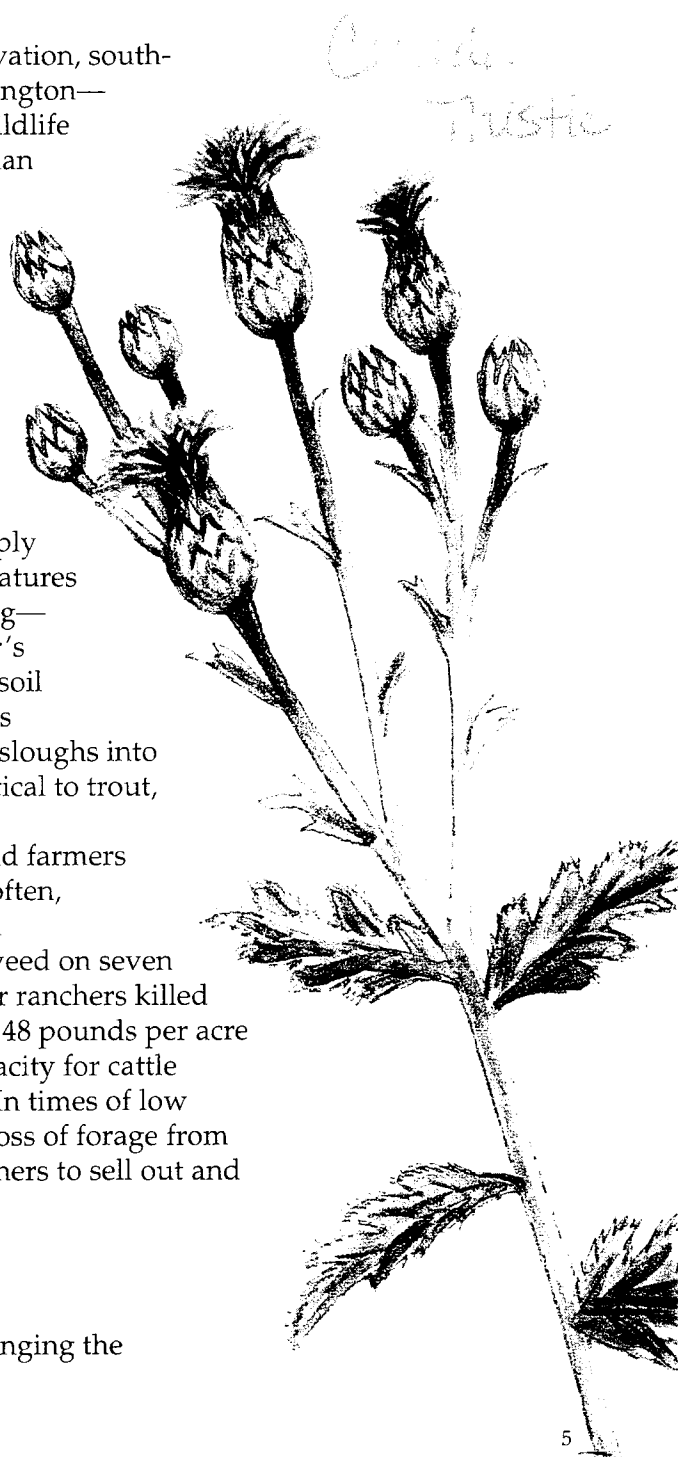
Spotted knapweed now blankets many low-elevation, south-facing slopes in Idaho, Montana, Oregon and Washington—the very sorts of places elk and deer winter. With wildlife habitat already succumbing to ever-expanding human developments, noxious weed invasions worsen an already bleak situation. A report of the Knapweed Action Committee in British Columbia concludes, “Protection from knapweed encroachment is absolutely essential to maintain the forage base for wild mammals . . . It can be expected that knapweed takeover of fall, winter and spring range would result in a significant decline in deer and elk numbers and a marked change in distribution patterns.”

And there’s more at risk than elk and deer. Simply put, loss of native grasses equates to a loss of all creatures which depend on grasses for food, cover and nesting—from voles and larkspurs to the coyotes and Cooper’s hawks that eat them. Since knapweed doesn’t hold soil nearly as well as native vegetation, erosion increases dramatically where knapweed dominates. So earth sloughs into streams and fouls spawning and rearing habitat critical to trout, salmon and other native fish.

Deteriorating habitat also threatens ranchers and farmers and the private lands that sustain cattle and, quite often, wintering elk herds. In 1987, University of Montana researchers examined the impacts of spotted knapweed on seven western Montana cattle ranches. On one ranch, after ranchers killed knapweed with herbicide, the grass increased from 48 pounds per acre to 1,620 pounds, improving the land’s carrying capacity for cattle twentyfold and boosting the value of the property. In times of low cattle prices and high demand for country homes, loss of forage from noxious weeds can be the impetus compelling ranchers to sell out and chop the land into 20-acre rectangles.

### *Altering Ecosystems*

Invasive weeds can alter entire ecosystems, changing the



temperature of soils and the way nutrients flow through the earth. Weeds can even be fire-breathing dragons.

Cheatgrass, thought to have come to North America amid a shipment of wheat in the mid-19th century, now sprawls across the Great Basin of Nevada, Idaho and Utah, displacing bunchgrass communities. Scattered bunchgrasses, surrounded by bare soil coated with what biologists call "cryptogamic lichens," once defined this arid basin. The lichens seal moisture, protect soil from erosion and prevent the rapid spread of fires started by frequent late-summer thunderstorms.

When trampling cattle hooves break up the cryptogamic coating, cheatgrass moves in and takes hold. It hits the ground running in spring, overshadowing native bunchgrasses and spreading in a continuous swath across the countryside. After growing and dispersing seed, the cheatgrass dies, leaving a sea of fuel. The plant has accelerated the occurrence of fire in the Great Basin from perhaps once per century to every 3 to 5 years. And the fires burn much hotter now, annihilating native bunchgrasses and forbs and creating ideal conditions for more cheatgrass. More than 4 million acres have fallen prey to this cycle of burning and rooting, reducing the land's ability to support wildlife and cattle.

Tamarisk, commonly called saltcedar, was introduced to the United States from Eurasia in the 1800s as a source of wood, shade and erosion control. The tree spread wildly out of control, muscling into more than a million acres of the arid Southwest. Crowding along streams, canals and reservoirs, tamarisk guzzles about 5 million acre-feet of water a year—enough to lower the Great Salt Lake by more than four feet—sucking dry an already parched land. As if that's not enough, tamarisk exudes salt, making soil inhospitable to native vegetation.

And so it goes, from kudzu in the southeast to gorse on the west coast, hundreds of aggressive exotics frustrate and discourage those concerned for the health of wild plants and the wildlife they sustain.

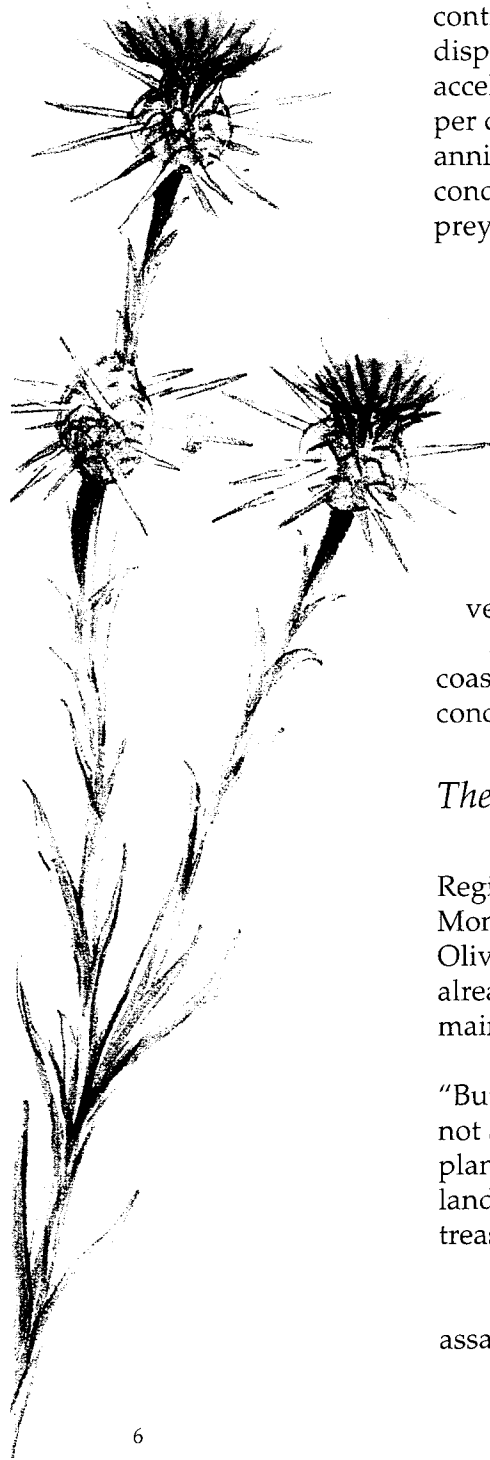
### *The Good News?*

As weed program manager for the Forest Service's Northern Region (encompassing more than 25 million acres of public lands in Montana, Idaho, Wyoming, North Dakota and South Dakota) Jim Olivarez grapples with a formidable exotic plant invasion that has already overrun more than 1 million acres of national forest. Yet he maintains a surprisingly hopeful attitude.

"It's easy to get depressed about noxious weeds," Olivarez says. "But I try to look at it this way: about 95 percent of our public lands are not affected by weeds, and we can keep it that way. I refuse to let these plants dominate the landscape. It changes our lives and it changes the land, and I don't want that to happen. These lands are national treasures, and we need to protect them."

But how?

Steven Dewey, a weed specialist at Utah State University, suggests assailing weed invasions with the same fervor, funding and tactics



yellow  
S. arida

applied to battling wildfires. He sees the long-term effect of weeds as a far greater threat to the ecosystem than fire. Though intense wildfires make great evening news footage, often damaging lives and property, they usually benefit the overall health of wildlife and wildlands.

Noxious weeds, on the other hand, never make front-page headlines, yet their damage is extensive and lasting. While Dewey hardly expects to see Smokey Bear-like campground signs warning, "Exotic Plant Danger HIGH Today," he does believe weed managers have a lot to learn from firefighters.

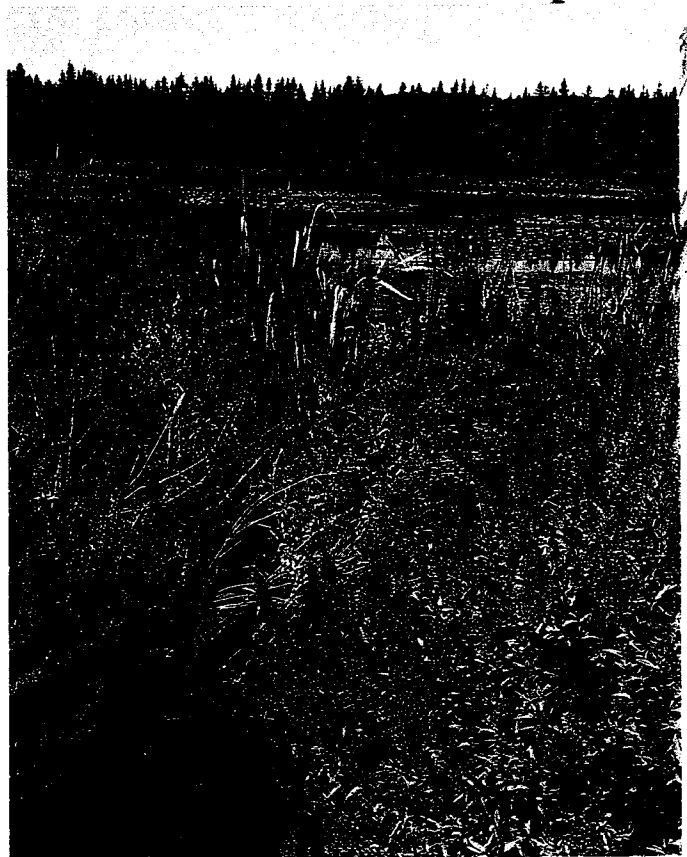
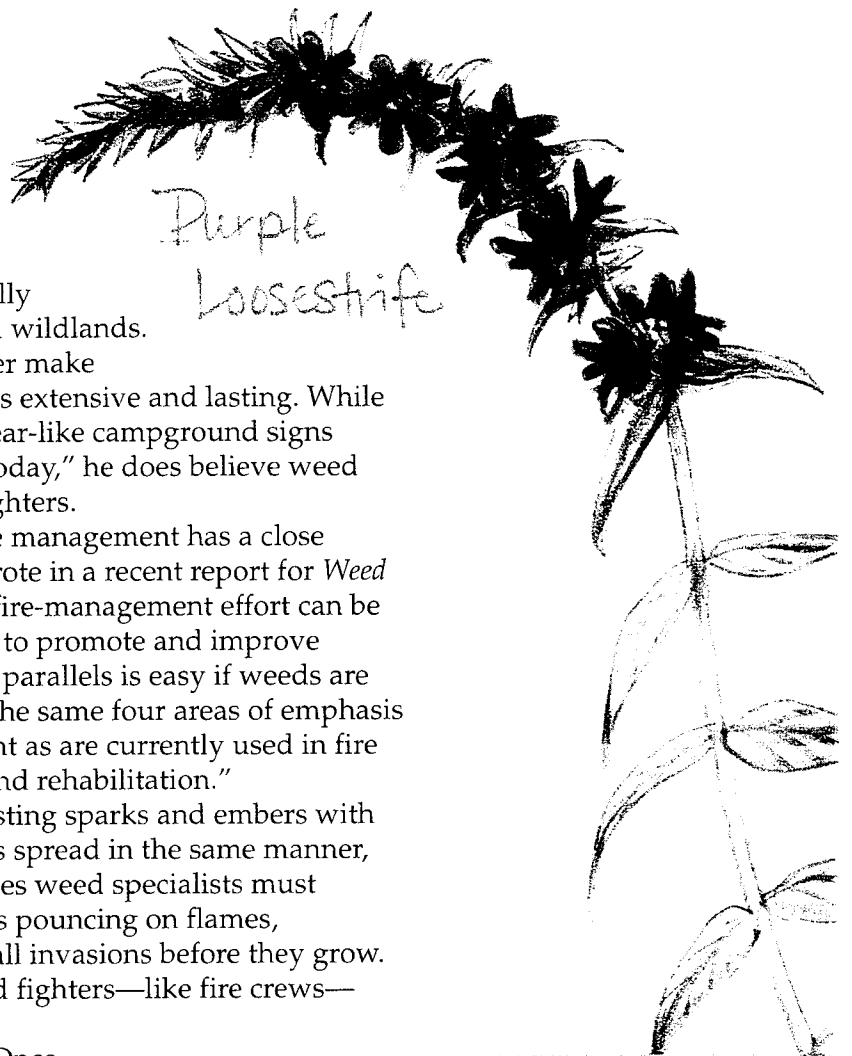
"Essentially every aspect of wildfire management has a close weed-management parallel," Dewey wrote in a recent report for *Weed Technology*. "The highly successful wildfire-management effort can be an excellent source of ideas and models to promote and improve control of noxious weeds. Applying the parallels is easy if weeds are thought of as a slow-moving wildfire. The same four areas of emphasis are recommended for weed management as are currently used in fire control: prevention, detection, control and rehabilitation."

Wildfires start small and spread, casting sparks and embers with the wind, igniting new spot fires. Weeds spread in the same manner, creating spot infestations. Dewey believes weed specialists must become the equivalent of smokejumpers pouncing on flames, rapidly detecting and stamping out small invasions before they grow. When weeds do get out of control, weed fighters—like fire crews—should contain infestations along their perimeters, preventing further spread. Once weeds are eliminated from an area, managers need to rehabilitate the land with native vegetation, being ever vigilant for new invasions.

Perhaps the most important parallel with fire management, Dewey says, is prevention—making people aware of the dangers, how weeds spread, and what they can do to help. As Smokey might say: *Only you can prevent the spread of noxious weeds.*

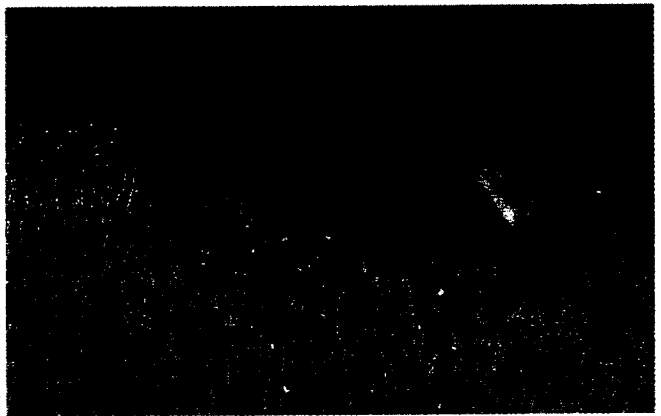
"People need to be knowledgeable and aware of what the problem plants are, and let us know when they spot these plants," Olivarez says. "If you're hunting in your favorite spot and you see a noxious weed, let us know. It will help. The biggest bang for our dollar is in prevention. Once weeds get out of control, they are difficult and expensive to contain."

The Forest Service spends \$1 million a year to fight weeds in the Northern Region alone. The state of North Dakota spent \$5 million last year trying to control leafy spurge. Farmers nationwide lose up to \$5



Erwin & Peggy Bauer

Gary R. Zahn



Bill Thomas



Jeff & Alexa Henry



Jeff & Alexa Henry



## Fighting WEEDS

The Rocky Mountain Elk Foundation has contributed more than \$380,000 toward 71 projects to control and eradicate noxious weeds in Colorado, Idaho, Montana, North Dakota, Oregon, Washington and Wyoming. Working with the Forest Service, Bureau of Land Management, National Park Service, state wildlife agencies, county governments, universities, conservation organizations, ranchers, chemical companies, ski resorts and the timber industry, the Elk Foundation has helped fund herbicide applications, biological control efforts, research, education and weed-pulling projects.

By helping raise people's awareness of the impacts of noxious weeds, and joining cooperative efforts to fight and contain exotic weed invasions, the Elk Foundation hopes to maintain and improve native grasses and forbs crucial to the future of elk, other wildlife and their habitat.

Tim Aman





billion in crops to weeds and spend about \$2 million on herbicides.

### Chemical Warfare

Chemicals that kill plants have long been around in one form or another. In 1899, Vermont researchers used several concoctions to eliminate unwanted plants. But their potions also damaged "good" plants and soils. The scientists concluded that their chemicals "offered no specific cure-all against weediness."

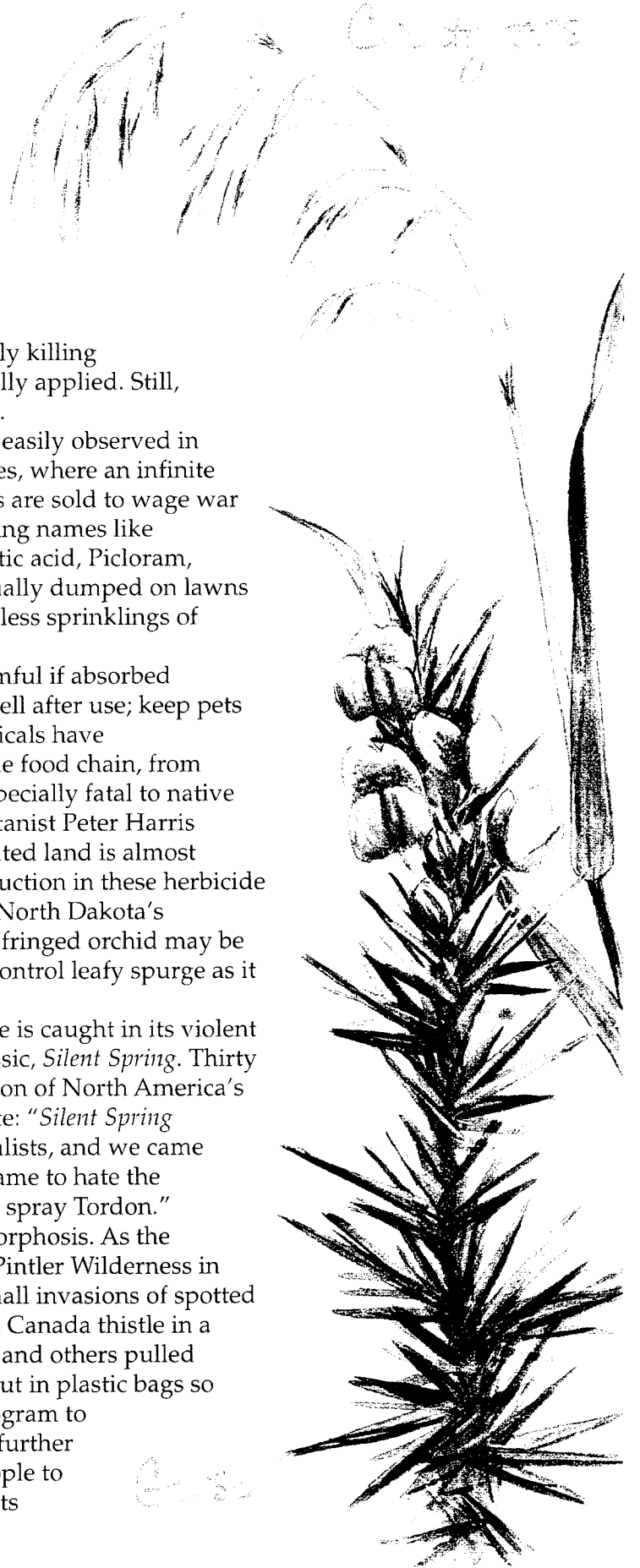
Herbicides have come a long way, selectively killing unwanted plants while sparing others, if carefully applied. Still, they offer no panacea. But not for lack of trying.

America's obsession with chemicals can be easily observed in nurseries, garden centers and farm-supply stores, where an infinite number of herbicides, fungicides and pesticides are sold to wage war on weeds, fungi and bugs. Toxins with perplexing names like Dimethulamine Salt of 2-4 dichlorophenoxyacetic acid, Picloram, Clopyralid and Dicamba are routinely and casually dumped on lawns and gardens as if they were no more than harmless sprinklings of water.

Yet the labels on these poisons warn: "Harmful if absorbed through skin; wear protective clothing; wash well after use; keep pets and children away; toxic to aquatic life." Chemicals have consequences. They can kill all up and down the food chain, from single-cell organisms to people. And they're especially fatal to native plants. In an article for *BioScience*, Canadian botanist Peter Harris notes, "Chemical control of weeds on uncultivated land is almost always detrimental to the native flora . . . A reduction in these herbicide programs would be ecologically desirable." In North Dakota's Sheyenne National Grasslands, the rare prairie fringed orchid may be as threatened by the use of herbicides used to control leafy spurge as it is by the spurge itself.

"The chemical war is never won, and all life is caught in its violent crossfire," wrote Rachel Carson in her 1965 classic, *Silent Spring*. Thirty years later in *Grasslands*, an excellent examination of North America's most altered ecosystem, Richard Manning wrote: "*Silent Spring* was the gospel to a generation of environmentalists, and we came to hate the chemical plague. Then some of us came to hate the plague of exotics even more, and we learned to spray Tordon."

Judith Fraser experienced a similar metamorphosis. As the Forest Service's coordinator for the Anaconda Pintler Wilderness in southwest Montana, Fraser has long battled small invasions of spotted knapweed, St. Johnswort, sulfur cinquefoil and Canada thistle in a relatively weed-free wilderness. Each year, she and others pulled weeds by hand, carrying the plants and roots out in plastic bags so as not to spread seeds. She helped launch a program to teach people about weeds and how to prevent further invasion. She created regulations requiring people to use certified weed-seed-free hay and feed pellets



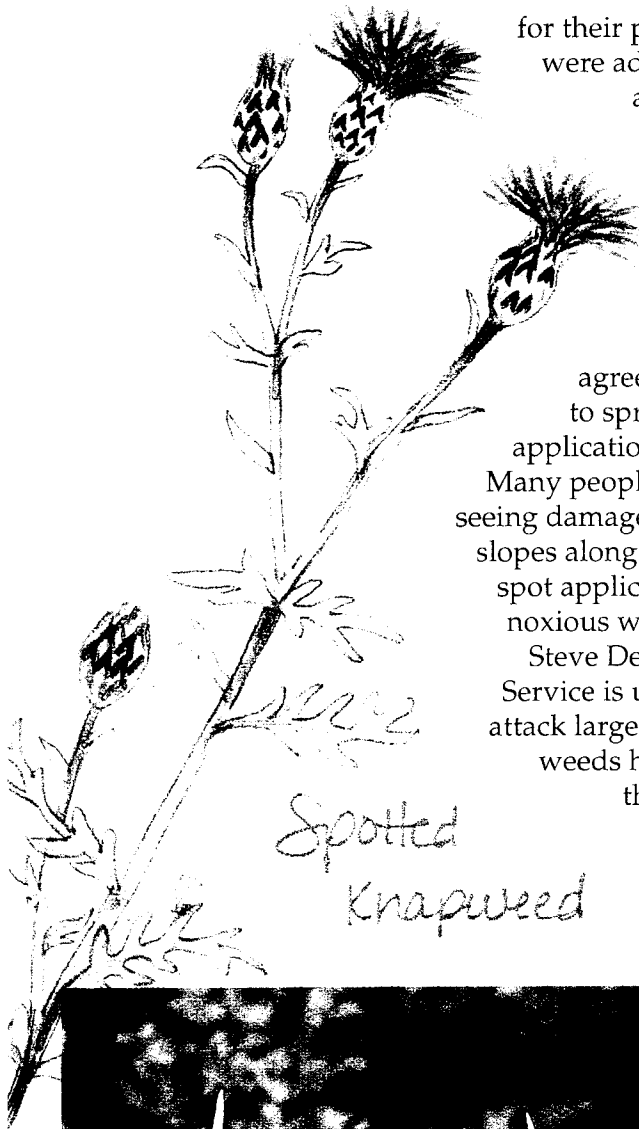
for their pack animals while traveling in the backcountry. These were admirable efforts. But the small patch of weeds persisted and even spread a little.

"I was hesitant to use chemicals," Fraser says. "But I decided to use herbicides to prevent the spread of weeds."

Before venturing into the wilderness, spray nozzle in tow, Fraser conducted an environmental assessment of the project, soliciting public comments. She says, "Local wilderness advocates agreed that the risk of doing nothing, and allowing weeds to spread, was greater than the risk of limited, spot application of herbicide on individual plants."

Many people are reaching similar conclusions, especially after seeing damage done by weeds in places like the invaded wilderness slopes along Idaho's Wild and Scenic Selway River, where small, spot applications of herbicide years ago might have eradicated noxious weeds before they galloped out of control.

Steve Dewey's firefighting analogy notwithstanding, the Forest Service is unlikely to dispatch slurry bombers of herbicide to attack large, backcountry infestations of weeds. And some noxious weeds have so much energy stored in the cellars of their roots that they keep bouncing back even after repeated herbicide dousings.



Spotted  
Knapweed

### *Bring on the Predators*

In 1856, insects were shipped from India to Sri Lanka to control the spread of a prickly-pear cactus introduced from India. The United States, for good reason, has been reluctant to introduce nonnative bugs to eat nonnative plants, for fear the bugs might develop a taste for native plants and valuable agricultural crops. Nevertheless, in 1944, three species of European beetles were released in California to control an invasion of Klamath weed, thought to be insurmountable. The beetles did their job, reducing Klamath weed to less than 1 percent of its infestation and allowing the return of native bunchgrasses and clover. A decade later, insects from Mexico were sent to Hawaii to control an invasive plant called lantana. Biological control, as it is called, soon caught on, and the United States developed research sites to test the use of exotic insects to fight exotic plants.

Jim Story, a research entomologist with Montana State University, oversees the Western Agricultural Research Center in Corvallis, Montana, where he and other researchers raise several species of beetles



Gary Kramer

that eat various parts of knapweed.

"Our objective is to get these things over here and established," Story says. "Then we can work on getting their numbers up and, hopefully, see some impacts on the weeds. A few, like the seed-head-attacking flies, have been here long enough that they are reducing knapweed seed production by more than 50 percent. Now we're building up a population of root feeders, and we're starting to see a reduction in weeds."

After seed-eating flies were set loose in 1970 near Kamloops, British Columbia, researchers measured up to a 95 percent reduction in knapweed seed production. But then they noticed plants began producing more seeds to compensate for the loss. So they, too, released root eaters with some success, and continue to seek other knapweed-eating bugs. The Canadian researchers predict it may take six or seven different insects eating various parts of the plant to effectively control noxious weeds. Even then, the best that can be hoped for is that the insects stress the exotics enough to put them on equal footing with native plants—allowing the natives to compete with the invaders.

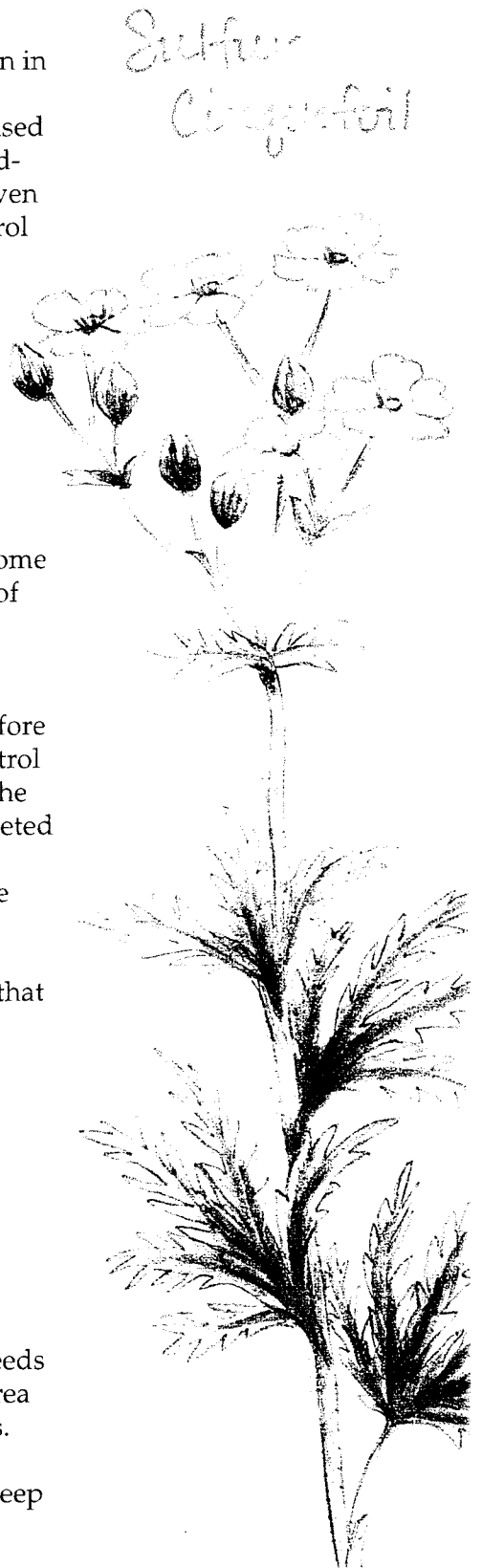
"When we talk about biological controls, we're talking about a natural phenomenon," Story says. "In nature, you don't see a predator or parasite eliminating its host. Typically what happens is, if you have a high population of pests and you introduce a predator, that predator will knock the pest population down. Then the predator population may drop, and there will be some cycling there, until an equilibrium is reached where a certain level of predator maintains a certain level of pest."

But what's to stop the predator from becoming a pest? Many botanists believe the risk is justified, since the insects inflict less damage to native flora than would herbicides or doing nothing. Before exotic insects can be released in the United States or Canada to control exotic weeds, they must pass what Story calls a "starvation test." The bugs are placed in enclosures with plants closely related to the targeted weed species, other plants associated with the weed, rare plants of special concern, and important agricultural crops. If the bugs starve before eating the test plants, they pass.

"There's no guarantee," Story says, "but generally speaking, if they pass these tests satisfactorily, it's safe. We only release insects that feed [exclusively] on the targeted pest."

### *Bill Grogan's Goat*

Elsewhere, introduced predators of a larger kind are helping control weeds. In a cooperative effort with the Montana Department of Fish, Wildlife and Parks, local ranchers let loose Spanish goats and domestic sheep to graze leafy spurge at a public access along the Stillwater River several times each year. Like Bill Grogan's goat, these animals seemingly devour anything—chomping the weeds before they have a chance to grow and cast seeds into the river, infecting downstream lands. Many ranchers in the area are also using goats and sheep to control weeds on their own lands. Since cattle eat grass and not spurge, grazing cows only encourage further expansion of the weed. Now, some ranchers are rotating sheep



and goats among their cows to cut back the spurge and give grass a chance.

### *Pulling and Grubbing*

Diffuse  
Knapweed

In a few places, persistent manual labor pays off. By hosting volunteer work parties—pulling and grubbing weeds—three times a year for eight years, The Nature Conservancy was able to reduce diffuse knapweed by 97 percent and eliminate two small patches of yellow starthistle on its Tom McCall Preserve along the Columbia River Gorge. In central Utah, the BLM and Forest Service have hosted “Scotch Thistle Days” every spring for six years, inviting junior-high and high-school students to dig and cut thistle in remote areas, effectively eliminating the weed.

But hand pulling is slow, tedious work that can be costly unless there is an abundance of volunteers. And any seeds or parts of plants left behind can start an invasion all over again.

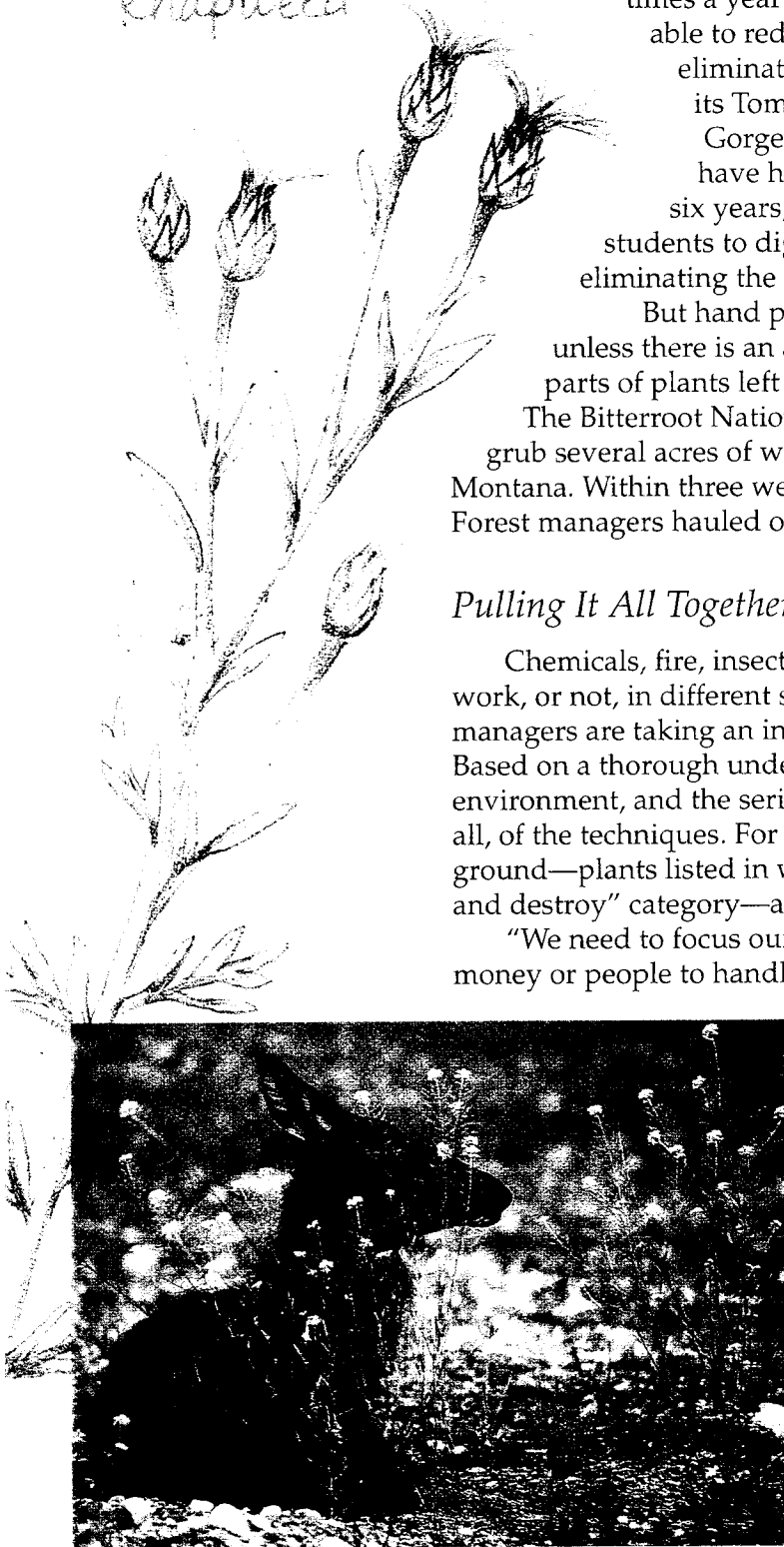
The Bitterroot National Forest recently spent \$200 an acre to hand grub several acres of weeds along backcountry trails in western Montana. Within three weeks, regrowth from roots was extensive. Forest managers hauled out the herbicide.

### *Pulling It All Together*

Chemicals, fire, insects, goats, sheep and human hands can all work, or not, in different situations. Which is why more and more managers are taking an integrated approach to weed management. Based on a thorough understanding of a weed’s biology and environment, and the seriousness of its threat, they employ a few, or all, of the techniques. For newly arrived weeds starting to gain ground—plants listed in what weed expert Olivarez calls the “search and destroy” category—aggressive eradication is the goal.

“We need to focus our efforts, because there isn’t enough time, money or people to handle everything,” Olivarez says. “We can’t fight this alone. It takes everybody, working together—state and federal agencies, ranchers, conservation groups. We need everybody.”

Noxious weeds can provoke diverse, and powerful, partnerships. Such is the case in North Dakota, where leafy spurge has reached epidemic proportions. A nefarious plant the likes of which Stephen King might have dreamed up, leafy spurge first found its way from Eurasia to Massachusetts in 1827. Hardly noticed, the plant crept west, reaching the Great Plains in the early 20th century. Here, in a climate and habitat similar to its native home, but free from predators, it thrived.



Duane Rosenkranz

With roots that burrow down 26 feet and spread horizontally 15 feet a year, the plant stores plenty of nourishment to survive repeated burning, grazing, drought and herbicide. Elk, deer, bison and cattle learn to avoid invaded areas, because the plant's toxic sap irritates their skin. The plant also grows a capsule-like seedhead that builds with pressure and explodes, casting seeds out to 15 feet, which bounce, roll and float through the countryside, converting grasslands of diversity to monocultures of spurge.

Spurge has invaded more than 3 million acres of plains and prairies, reducing the capacity for the land to sustain wildlife and cattle. In some parts of Theodore Roosevelt National Park, leafy spurge eliminated all native plants. In much of the park, spurge has reduced forage available for bison by 83 percent, and deer and elk forage by 70 percent.

"The bottom line," says Roger Andrascick, a resource management specialist for the National Park Service, "is that the environment, the ecosystem, is losing habitat for wildlife and livestock. And the weed invasion doubles every 10 years. You can try cutting it, burning it and spraying it. But unless you have an integrated program, you can't stop it."

In 1994 the National Park Service, Forest Service, DowElanco and the Rocky Mountain Elk Foundation sponsored a Leafy Spurge Strategic Planning Workshop at Theodore Roosevelt National Park. They drew together 90 state and federal resource managers, scientists, ranchers, hunters, environmentalists and others to develop an integrated plan to battle leafy spurge. The resulting strategy includes a detailed mapping effort, determining where weeds exist and documenting further expansion. The goal is to keep leafy spurge contained, using herbicide along perimeters to prevent spread, and quickly assailing spot infestations.

With help from the federal Agricultural Research Service and the North Dakota Department of Agriculture, the group is establishing "insectaries" to intensify the study and use of biological control. Researchers have already released an army of 3 million insects (8 different species) on more than 1,660 sites. And they're experimenting with sheep, goats, mowing and prescribed fire.

It's an imposing effort, involving a legion of people, costing bundles of money—a little like a massive assault of firefighters battling a slow-moving wildfire. Is it working? The botanical flames have yet to be contained. Only time will tell. In the clash against exotic weeds, people need to be as pugnacious and persistent as the invaders.



## What you can do to HELP FIGHT WEEDS

The best way to control noxious weeds is to stop them from spreading. It's not always possible to keep weed seeds from drifting down rivers, floating with the wind or hitching rides on wildlife. But we can avoid spreading weeds, and help snuff new invasions before they become epidemic. Here are a few suggestions on how each of us can help control, contain and eradicate invasive, exotic plants:

- Learn to identify plants common to your area and favorite hunting country, so you can recognize potential invaders and report them to land and wildlife managers.
- If you travel with pack animals, carry only certified weed-seed-free forage (pellets, hay, alfalfa) into the backcountry.
- Feed pack animals only weed-seed-free forage for several days before heading into the backcountry.
- Thoroughly clean vehicles and livestock before entering the backcountry, to ensure they are free of weed seeds.
- Avoid traveling through weed-infested areas so as not to pick up and spread seeds.
- Camp only in weed-free areas.
- Pull and pack out weeds, placing the plants in sealed containers.
- Do not pick and transport pretty flowers you can't identify—you may inadvertently spread seeds of an attractive noxious weed.
- Be aware of what you sow in your yard and gardens and avoid inadvertently planting invasive exotics. (Purple loosestrife, an invasive plant that is altering riparian habitat throughout the West, is still sold as an ornamental at many nurseries.)
- Support county, state and federal efforts to control and eradicate noxious weeds.
- Get involved in local weed-control projects.
- Spread the word about the dangers of noxious weeds and what people can do to help.

—D.S.

# Rescuing a weed-threatened winter range

A low-flying helicopter hovers above a steep, south-facing mountain slope of northwest Montana's Lolo National Forest. Its blades cut the still, early morning air. Its mission? To enhance critical winter forage for Rocky Mountain elk.

Bunchgrass winter range in the Lolo National Forest is very limited. Since the 1960s, the range has deteriorated due to logging, grazing, road building and fire suppression, leading to the invasion of noxious weeds and the steady encroachment of Douglas firs. In addition, residential development has eliminated critical private land winter habitat, leading to depredation problems on neighboring ranches.

The 900-acre Mormon Ridge area provides the only large bunchgrass winter range on national forest land along the lower Lolo Creek. Five hundred acres of this range have been deteriorated by noxious weed invasion, with the other 400 acres choked out by Douglas firs.

In 1996, the Lolo National Forest, with backing from the Rocky Mountain Elk Foundation and the Montana Department of Fish, Wildlife and Parks, implemented a fully

integrated approach to eliminating and controlling noxious weeds. This approach includes a complex combination of burning, slashing, weed treatment and planting.

"The project is our last hope for maintaining this winter range," says Mike Hillis, Lolo National Forest wildlife biologist. Loss of the range would permanently impair the elk carrying capacity of lower Lolo Creek.

Roads were treated with Tordon 22K to reduce the spread and transport of spotted knapweed and leafy spurge seeds within the restoration area. In April 1997, the forest burned the grasslands, helitorching 80 percent of the area to remove Knapweed skeletons, recycle soil nutrients and increase the vigor of grasses. Timbered areas were slashed to prepare for a spring 1998 burn.

On June 2 and 3, 1997, the forest dropped herbicide by helicopter to eliminate noxious weeds in the 500-acre area. They closely monitored every step of the spraying project, waiting for the calmest day to avoid wind spread of the chemical, and taking ground and water samples both before and after the spraying.

## Elk Winter Range Fidelity

The Mormon Ridge winter range is not large; the elk herd utilizing the area averages 80 animals. But this herd has no alternative winter range. Subdivisions dot the bottom of the drainage and private timber and ranch property also border the winter range. The 2.1 million acres of the Lolo National Forest support 12,000 to 15,000 elk. However, only 375,000 acres are winter range. Of this forage acreage, only 70,000 acres are bunchgrass habitat. Thus, only 15% of the Lolo Forest is forage-producing winter range. On the Mormon Ridge winter range, forage is limited primarily to bunchgrasses.

"Bunchgrass is a critical component of elk winter range, so if you assume loss of this grass, you must assume loss of elk," biologist Mike

Hillis says. Further compounding the impacts of weeds is that once winter range forage production is lost, elk will not simply move elsewhere. Hillis says that the 1985-1990 Lower Clark Fork Elk Study and other research indicate that elk, especially cows, have a high fidelity to their original maternal winter range. Because of this home range fidelity, loss of a winter range usually means the loss of the elk.



— courtesy of *TechLine* and the Lolo National Forest

**WEEDING THE WINTER RANGE — A helicopter helps spray herbicide in a weed-control project near Lolo, Mont.**

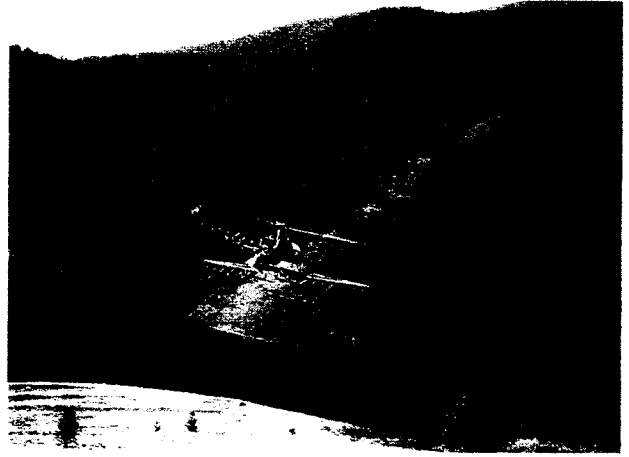
“Mormon Creek water samples were completely clean. If we couldn’t guarantee that the herbicide would not end up in the streams, we wouldn’t use it,” Hillis says.

The project resulted in the accurate and effective killing of knapweed. Weed production declined 98 percent, from 1,075 pounds-per-acre to 25 pounds-per-acre. Weed biomass declined from 56 percent to 3 percent. Most importantly, grass production increased 714 percent, from 350 pounds-per-acre to 2,850 pounds-per-acre. In May 1998, eight species of native grassland wildflowers were spotted in the treatment area.

Besides providing new forage for elk and deer, the regrowth of bunchgrass may offer natural protection to ground-nesting birds and rodents. The shape of the grasses provides better hiding cover from flying predators and mountain lions.

Lolo National Forest personnel will continue monitoring the treatment area over the next few years through two methods:

1. Clip plots — clipping vegetation in a .96-square-foot area to determine pounds-per-acre



of forage production.

2. Species response — analysis of kinds and composition of grasses and forbs that come back after treatment.

The Forest Service will also evaluate whether reseeding should be implemented or not. Montana Fish, Wildlife and Parks managers will provide aerial analysis of the elk herd in the future.

The forest also plans to convert the adjacent 400-acre Carlton Ridge area — which is overrun with dense Douglas fir growth — through prescribed fire, planting seedlings and weed control to continue creating a more stable environment for wintering elk.



# Mormon Ridge Vegetation Production

|                         | 9/18/96                        | 9/10/97                      | 7/15/98                        | Change                      |
|-------------------------|--------------------------------|------------------------------|--------------------------------|-----------------------------|
| <b>Weed Production</b>  | 1,075 lb/acre<br>(56% biomass) | 25 lb/acre<br>(3% biomass)   | 55 lb/acre<br>(2% biomass)     | -1,020 lb<br>(95% decrease) |
| <b>Forb Production</b>  | 495 lb/acre<br>(25% biomass)   | 99 lb/acre<br>(9% biomass)   | 70 lb/acre<br>(2% biomass)     | -425 lb<br>86% decrease     |
| <b>Grass Production</b> | 350 lb/acre<br>(18% biomass)   | 928 lb/acre<br>(88% biomass) | 2,850 lb/acre<br>(96% biomass) | +2,500 lb<br>714% increase  |
| <b>Total Biomass</b>    | 1,920 lb/acre                  | 1,052 lb/acre                | 2,975 lb/acre                  | +1,055 lb<br>155% increase  |

— courtesy of *TechLine* and the Lolo National Forest

## Mormon Ridge Project Criteria

Andy Kulla, Lolo National Forest weed specialist and Missoula Ranger District resource staff officer, says several key factors led them to decide Mormon Ridge would make a viable project:

1. The forest had a clear, pre-1961 historical record of the area before logging and road building.
2. They had changed or stopped the management practices that allowed weeds to establish.
3. It was a drainage-scale project.
4. They had good support from neighboring landowners.
5. A similar site on Lolo Creek went to leafy spurge after a burn in 1988. Spurge on the eastern end of the Mormon Ridge project area threatened a similar invasion.

— courtesy of *TechLine* and the Lolo National Forest



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