



TechLine

Information About Invasive/Exotic Plant Management

Winter 2003- 2004

Integration, Perseverance Key Successful Vegetation Management Programs

Welcome to the 15th Anniversary Edition of *TechLine*TM newsletter. There is no central theme in this issue, however, these articles represent how invasive vegetation management has evolved into the many successful programs in existence today.

If there is a single key to success in containing or controlling noxious and exotic vegetation, it is that there is no single key. Success results after careful analysis determines which method or combination of integrated methods fit each situation. The vegetation management programs in this issue represent this very well.

You will find in this issue programs that use hand-pulling, burning, herbicides, biological agents, public involvement, specially-designed equipment, cultural controls, and mechanical controls all successfully. Each has found what works best for their target species and environmental conditions.

However, there are some common

threads running through each of these programs and they are the common elements found in most successful vegetation management programs. Each of these programs contain the following:

1. Awareness, education, and training components.
2. Adequate funding and program justification.
3. An ongoing inventory.
4. Prevention & Early Detection components.
5. An annual and long-range plan in place.
6. Monitoring and evaluation techniques in place.
7. Record-keeping that documents management methods, progress and success.

And the individuals in this issue have one other quality in common

—perseverance. They have the desire to protect and enhance our natural resources year in and year out through vegetation management. This is not glamorous work. No one really wants to do it. But like fighting a wildfire, it must be done.

This issue is dedicated to all those who manage this detrimental vegetation on a daily basis. Keep up the fight and thank you.

“When one tugs at a single thing in nature, one finds it attached to the rest of the world.”

... John Muir

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Native Species Respond When Sagebrush Is Thinned or Controlled

By Charles Henry
TechLine Editor

Twenty years ago certain herbicide use on federal lands was restricted by the Ninth Circuit Court. Federal vegetation managers in the restricted region turned to prescribed burns and other mechanical methods to control sagebrush (*Artemisia tridentata*) to improve range condition, wildlife habitat and watershed values. However, in the Arizona Strip region of Arizona north of the Grand Canyon, burning was just not getting the job done.

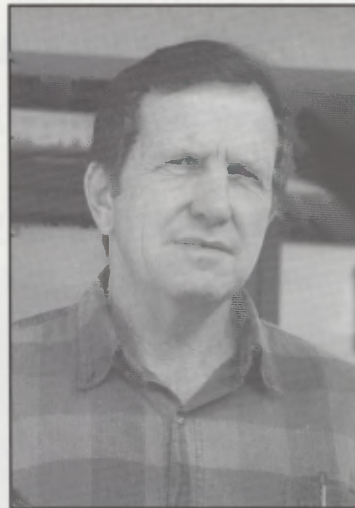
"We don't have enough understory in many areas to carry a fire and we couldn't get fire into the Pinyon juniper canopy without starting an uncontrollable fire," explains Bob Sandberg. Sandberg is the Range Team Lead for the BLM's Arizona Strip Field Office in St. George, UT. "We are trying to re-establish native species as much as possible and burning was thought to be the cheapest way to do that. In 1992, when certain herbicides were allowed again on public lands, we conducted several comparisons between burning and sagebrush control with herbicides."

L.D. Walker, state BLM weed coordinator for Arizona, says fires also denude the burned area and cause some understory species' mortality. In addition, cheatgrass and noxious weeds are more prevalent after burning. This resulted in the need to re-seed, but the only seed available at that time which was within budget and proven to establish was for non-native species. In the herbicide-treated areas we left old sagebrush skeletons which captured more snow and slowed wind speed."

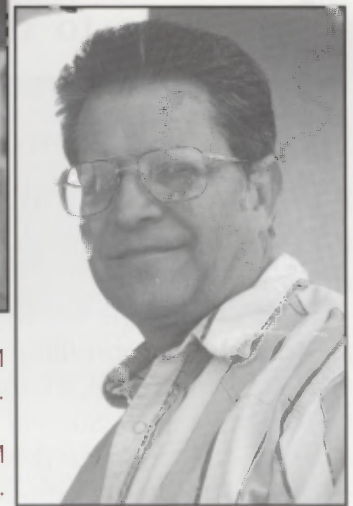
Sandberg says they normally treat in late September or early October using fixed-wing aircraft to apply Spike* 20P herbicide at a rate of 2 lb. per acre. At this rate, they achieved 90% control of the sagebrush.

"We achieve terrific native species response in both amount and diversity after these treatments. Blue grama, Galleta, Sand Dropseed, squirrel tail, needle and thread, Indian rice grass, and forbs such as phlox, globe mallow, and the vetches also come right back. Before these treatments, we had a blue grama/sagebrush monoculture," Sandberg explains.

Sandberg says that some rubber rabbit brush and



Top: Bob Sandberg, BLM Range Team Leader in St. George, UT.



Right: L.D. Walker, state BLM weed coordinator for Arizona.

snakeweed do return in areas where they have used Spike 20P to control sagebrush. However, the more desirable natives more than make up the difference. Comparing costs, he says the aerial application of herbicide totals \$15 to \$18 per acre including product compared to prescribed burns that cost \$50 to \$75 per acre. "In addition, we cannot perform burns in areas where there are archeological structures (see sidebar)."

"Wildlife benefits of thinning sagebrush with a herbicide have also been very positive," Walker explains. "In the Wolfhole Valley there are antelope fawning where there never were before. Mule deer habitat is also improved since we achieve early season herbaceous production, which is what the deer need most. Controlling sagebrush also increases spring succulents for lactating does."


The BLM land managers also list watershed improvement as another benefit from their sagebrush



Top: Dense sagebrush stands in the Black Canyon area before thinning. Right: The same site two years after sagebrush control. Wildlife benefits of thinning sagebrush have been very positive, according to Sandberg and Walker. In the Wolfhole Valley there are antelope fawning where there never were before. Mule deer habitat is also improved since we achieve early season herbaceous production, which is what the deer need most. Controlling sagebrush also increases spring succulents for lactating does.



reduction work. Overland water flows are slowed dramatically as herbaceous species expand after treatment. In addition, controlling sagebrush reduces hazardous fire fuels. "At the request of the Game & Fish Department, we avoid treating areas containing Cliffrose which is a desirable woody species for big game that is susceptible to Spike 20P," Sandberg concludes.

"Otherwise, our sagebrush work has been a complete success all the way around. Sagebrush recruitment has not yet begun in areas treated 10 years ago. After two to three years, they observe some small sagebrush sprouting, but these usually die out." 

Herbicide Use Found Not to Impede Carbon Dating

In one area in which the BLM desired to control sagebrush there were several ground archaeological sites dating from ancient pueblo populations. When the Bureau proposed the use of Spike 20P herbicide, their Environmental Assessment was protested on the grounds that herbicide use, while safer in protecting these structures of archaeological value than prescribed burning, would impede carbon dating, according to Sandberg.

This issue was resolved in the BLM appeal process after the Bureau provided studies that showed herbicide use did not upset carbon dating nor impact artifacts or ancient structures in any way.

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Cooperative Weed Management Area for 2.3 Million Acres

By Charles Henry
TechLine Editor



(Left) Howard Lyman, noxious weed program coordinator for the Frank Church-River of No Return Wilderness Area (FC-RONRA), headquartered in the Nez Perce National Forest at Slate Creek Ranger Station in Idaho. (Top) The Forest Service takes Sierra Club groups, locals, volunteers, and other groups on 6-8 day Salmon River float trips. The rafters float for much of the day, then stop and pull spotted knapweed for several hours each day.

How do you successfully manage noxious and invasive vegetation in the largest wilderness area in the lower 48 states and one that receives tremendous use and attention from the general public? One method among many in a fully integrated control program is to capitalize on the popularity of river rafting. Forest Service managers take the public on weed management float trips. Howard Lyman, noxious weed program coordinator for the Frank Church-River of No Return Wilderness Area (FC-RONRA), headquartered in the Nez Perce National Forest at Slate Creek Ranger Station in Idaho, says his challenge is to build on the success of the program initiated by his predecessor, Bruce Anderson. (Anderson has moved to the Boundary Waters Wilderness in northern Minnesota).

"We certainly don't have all the answers yet, but we have created a program that is working well and seeks to fully engage the public. We are still ahead of the curve. The things that the public values most about

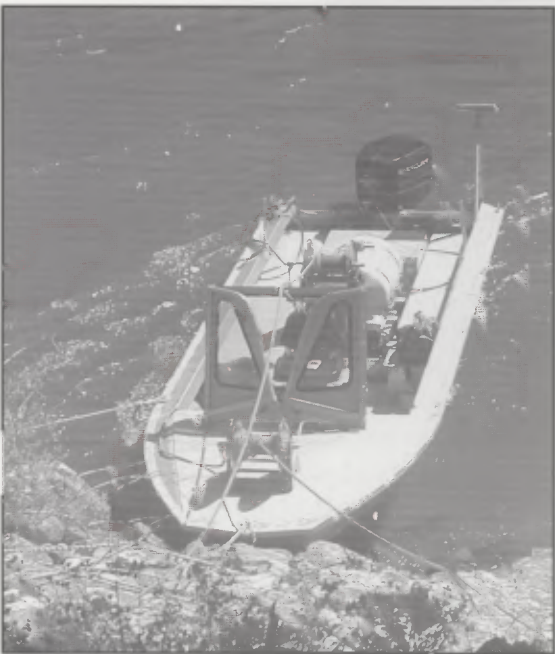
wilderness—native plants and animals, wildlife habitat, watershed health, and recreation access—are the values most impacted by invasive vegetation. Our program builds awareness with the recreating public, but also involves them in hands-on control efforts whenever possible. These programs also enable us to explain (and gain their endorsement of) our integrated management practices."

Lyman says they completed an area Environmental Impact Statement (EIS) for noxious weed treatments in 1999 and are currently updating this analysis with a Supplemental EIS. Completing an EIS of this magnitude demonstrates tremendous progress in and of itself. In addition, they have organized a cooperative weed management area (CWMA) that involves a vast network of landowners and public agencies and brings diverse knowledge and extensive expertise to bear on the invasive vegetation problem in the wilderness," Lyman explains. (**See sidebar – Weed Management Area**).

"Even though each national forest, government entity, and private landowner is responsible for their own individual weed work, we now manage 2.3 million acres from the same set of strategies and priorities. A



Linda Hagedorn, Slate Creek Ranger District's river ranger, began their river rafting weed-pulling program nearly ten years ago. The pulled knapweed is piled and monitored for several years.



Forest Service technicians have outfitted a jet boat to serve as a sprayer nurse station for those sections of the Salmon River that allow jet boat access. The boat carries a 55-gal tank with two 300-ft hose reels. The spray tank containing the mixed herbicide sits inside a larger containment structure and the containers of herbicide concentrate are triple-wrapped and carried in water tight boxes. They mix a herbicide batch that can be sprayed at each stop. One person stays in the boat to operate the pump, while 2-person crews manage each hose. They never spray from the boat, but simply use it to supply the crews working on land.

central steering committee, formed in March of this year, meets regularly to maintain consistency and cohesiveness. This is the key to our progress," Lyman states.

Lyman says they have completed inventories of areas with known weed infestations and compiled a list of 11 species of concern, although they are focused on species that pose the greatest threats. Spotted knapweed, *Centaurea maculosa*, in the river corridors, Rush skeletonweed, *Chondrilla juncea*, and sulfur cinquefoil, *Potentilla recta*, are some of their top priority weeds.

"Rush skeletonweed has markedly increased in the past five years. Its wind-borne seed enables it to spread deep into the most rugged country. Sulfur cinquefoil is not listed on the state noxious weed list, but we have found more than 800 infested acres," Lyman explains. "We have only small sightings of yellow starthistle in the area and we control it immediately whenever we find new infestations."

Biological Methods:

"Biological control agents have been distributed for rush skeletonweed and spotted knapweed on large and remote sites within the wilderness. Lyman says (*see sidebar "Biological Releases"*). Forest Service biologists have observed biological insects working on some St. Johnswort infestations.

The issues associated with using biological control agents in the wilderness were addressed in the 1999 EIS.

See "Wilderness" on page 9

Weed Management Area

• The Frank Church-River of No Return Wilderness cooperative weed management area is comprised of the following agencies and cooperators:

Salmon Challis, Bitterroot, Payette, and Nez Perce National Forests

Idaho, Custer, Lemhi, and Valley Counties

Idaho Fish & Game Department

Idaho Department of Lands

Idaho DOT, Division of Aeronautics

University of Idaho

Nez Perce and Shoshone Bannock Tribes

Private Landowners

• Serving on the steering committee are representatives from these organizations plus representatives from the following interest groups:

Idaho Outfitters' Assn.

Student Conservation Association

Western Whitewater Assn.

• Organizations providing funding or labor sponsorship include:

Rocky Mountain Elk Foundation

Foundation for North American Wild Sheep (ID and MN/WI Chapters)

Wildlife Forever

Idaho Department of Agriculture

Sierra Club

Hand-Pulling Project Gains Public Involvement in Weed Control

In 1994, a Noxious Weed Control in a Fire Recovery Area Environmental Assessment was appealed by a local group of citizens because they objected to the use of herbicides for the control of diffuse knapweed along several forest access roads near their homes and the community of Leavenworth, WA. According to Joan Frazee, forest service botanist on the Lake Wenatchee and Leavenworth Ranger Districts of the Okanogan and Wenatchee National Forests, this action ultimately resulted in positive public awareness

By Charles Henry
TechLine Editor



Joan Frazee, Forest Service botanist on the Lake Wenatchee and Leavenworth Ranger Districts of the Okanogan and Wenatchee National Forests. (Left) Icicle Rd.



Icicle Road Hand-Pulling Timed Study

Management Cost Assumptions:

- GS-5 Seasonal employee (volunteer coordinator) earning \$10-\$11/hr
- 1 month @ 40 hr/week
- GS-9 Permanent management employee
- 1 week per season to oversee program

Timing Study Results:

Hand Pull 1 (May)

- 5-8 person crews
- 40-280 minutes per plot
- Average 175 min./plot (.037 acre)

Labor Cost @ \$5.15 per hour minimum wage
\$93-\$650 per acre
\$405 per acre average

Labor Cost @ \$10.09 per hour actual local rate wage
\$801 per acre

Hand Pull 2 (June)

- 5-8 person crews
- 64-240 minutes per plot
- 133 min./plot (.037 acre)

Labor Cost @ \$5.15 per hour minimum wage
\$149-\$557 per acre
\$309 per acre average

Labor Cost @ \$10.09 per hour actual local rate wage
\$610 per acre

of the impacts of noxious weeds and an opportunity to determine the long-term effectiveness of hand pulling noxious weeds.


"The local group, Leavenworth AdoptAForest (LEAF), requested that no herbicides be used on Icicle Road, a heavily used, partially paved forest access road that runs from Leavenworth into the forest for approximately 18 miles as well as Mountain Home Road (about two miles) and Eightmile Road (about three miles). In return, they agreed to organize and conduct hand pulling along these rights-of-way," she says.

The first year, LEAF organized 18 groups and each was given ½ mile of road to pull on both sides. Miles not covered by these volunteers would be pulled by LEAF members. In 1998, 15 groups organized to pull; in 1999, eight groups conducted hand pulling, but participation in each group declined. Monitoring began in 1998. The 22 plots described below were established in 1998. Landslides closed the road in 1999 during the critical pre-seed set pulling period, so the Forest Service proposed supplemental herbicide spraying of exposed ground from the slides on Icicle Road. All cooperating groups except LEAF agreed to allow spraying, according to Frazee. In 1999, herbicide was only used in the first two miles of areas proximal to slide activity. First the weeds were mowed and then herbicide was applied. Forest Service technicians established monitoring plots along the road to check effectiveness before and after

pulling. If one flowering stalk remained after pulling, the cooperating groups agreed to allow the Forest Service to spray. A new Forest Service volunteer coordinator came on board in 2000. Twenty-two 3 x 50 meter (.037 acre) monitoring plots were established along Icicle Road. Utilizing work release crews from the Chelan County jail, two timed pulls were conducted in May 1998 and again in June. Knapweed was counted before the pulls and counted twice after the second pull. There was a 29% to 90% reduction at that time in knapweed plants in the control plots at that time (*see charts below*).

Fraze says the LEAF group repeated pulls with inmates in 2002 and 2003. Plots received more attention than other sections of the road due to the timing data collection and other weed species were not pulled, so

they continued to seed and increase. An extensive survey by a Forest Service Lab (FSL) team in 2002 determined that hand pulling was effective, but required careful coordination and was most effective if utilized with other methods (*see Hand-Pulling Evaluation Summary on page 8*). The wildfires of 2001 occurred in August after the knapweed had already bloomed and set seed. Concern over weed spread into burned areas resulted in a mass weed pulling and bagging effort by fire fighting crews.

“We have established good working relationships with many local interest groups that have proven invaluable on other topics. And we have good hand-pulling data that we would not have had without these groups becoming involved,” she concludes. 

Knapweed numbers in plots before and after pulling

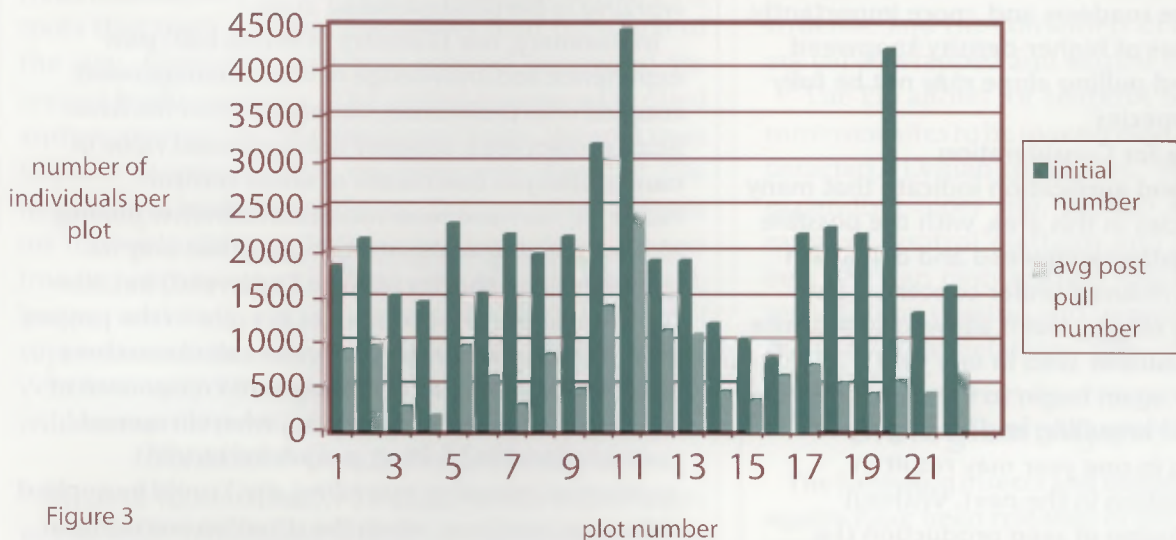
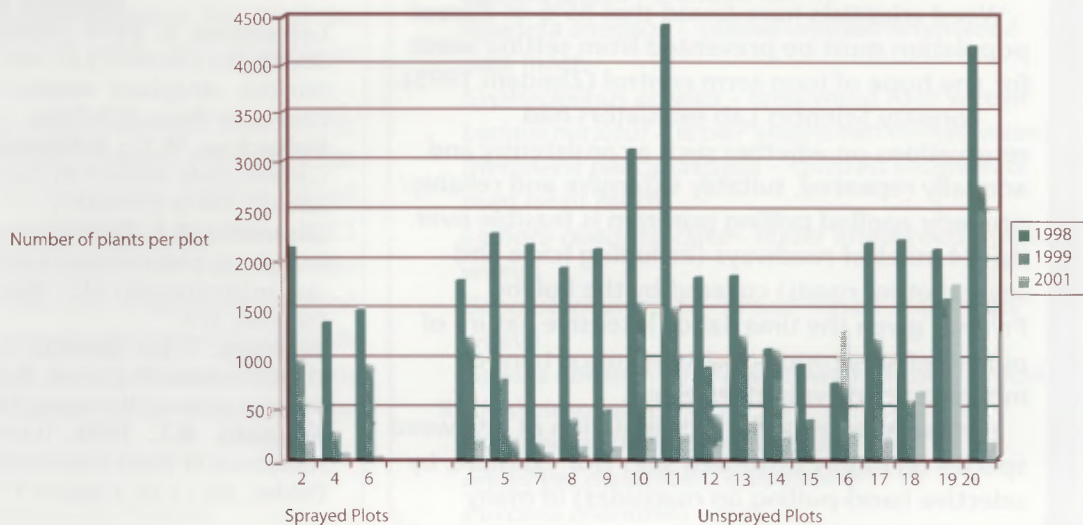


Figure 3

Comparisons between Knapweed Densities in Icicle Canyon Plots for Monitoring Years: 1998, 1999, and 2001



Hand-Pulling Evaluation Summary

By Ed DePuit, and Bonnie Shanafelt
Wenatchee Forestry Sciences Lab
USDA Forest Service, Wenatchee, WA, June 2002

Monitoring data suggested that hand-pulling of knapweed had substantially reduced densities of this species on 20 test plots through 2001, although there was some question on how representative this data was in light of the concentrated pulling attention the test plots received in 1998. It was learned that 2001 volunteer knapweed pulling had been augmented by extensive supplemental weed pulling (and bagging/removal) by fire crews in August, 2001, in an effort to reduce risks of post-wildfire weed spread from the infestations remaining.

The residual presence of reduced populations along most of the roadway and, more importantly, occasional patches of higher-density knapweed suggest that hand pulling alone may not be fully controlling this species.

Suggested Points for Consideration

Past research and application indicate that many of the weed species in this area, with the possible exceptions of spotted knapweed and dalmatian toadflax, can be reduced under concerted and repeated pulling efforts, but if allowed to produce even a small amount of seed in one year infestations may again begin to increase. Less energy expended in pulling and/or improper timing of pulling in one year may result in increased populations in the next. Without substantial preclusion of seed production (i.e. pulling the plants before they set seed), weed infestations could continue indefinitely.

Weed scientists have found that 85% of a weed population must be prevented from setting seeds for any hope of long-term control (Zimdahl 1995).

Forestry Sciences Lab evaluators had reservations on whether such a consistently and annually repeated, suitably extensive and reliably/properly applied pulling program is feasible over the 24 miles of roadways (including Icicle and several other roads) covered by the Pulling Project, given the time/labor-intensive nature of pulling efforts coupled with the uncertainties inherent to any volunteer effort.

Furthermore, reducing a population of one weed species on highly disturbed sites (for example, by selective hand-pulling on roadsides) in many

instances may simply result in invasion by another weed species - unless more desirable vegetation is rapidly established.

The chances of success in most large-scale weed control efforts may be enhanced by taking *integrated* approaches to weed management, and wherein a combination of control practices are applied to address all facets of the problem. For example, recent work by Shanafelt (2000) noted that a combination of hand-pulling and herbicidal application proved more effective in reducing diffuse knapweed infestations than either treatment applied alone. It is certainly recognized that close and proper coordination and timing of any joint application of herbicides with hand-pulling will be necessary, not only to increase combined treatment effectiveness but also to allay any concerns that personnel hand-pulling weeds may have about working in herbicide-treated areas.

In summary, our (Forestry Sciences Lab) past experience and knowledge of weed management, coupled with preliminary observations of the Icicle Road project area, support the continued value of hand pulling as one means of weed control. However, we have reservations on whether pulling alone is proving adequate to control not only its primary target species (diffuse knapweed) but also the array of other weed species present in the project area. Rather, the Forestry Sciences Lab researchers would view pulling as one important component of an integrated weed control plan, wherein several control measures (pulling, proper herbicidal application, mowing, reseeding, etc.) could be applied either separately or, when the situation warrants, in combination to sites along roadways as dictated by site-specific concerns.

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“Wilderness”

Continued from page 5

Cultural Methods and Awareness Building:

Manual and cultural practices such as hand pulling are an important part of the FC-RONR Wilderness integrated weed management program. Coupled with selected hand spraying with herbicides, many river corridors are nearly weed-free. Campsites with sandy beaches popular with river rafters, weed infestations near sensitive plant populations, and other sensitive sites are the main targets of the hand-pulling efforts. Linda Hagedorn, Slate Creek Ranger District's river ranger, began their river rafting weed-pulling program nearly ten years ago, Lyman explains.

“Linda takes Sierra Club groups, locals, volunteers, and other groups on 6-8 day float trips. A Forest Service weed technician floats ahead of the main group, flagging spots that need pulling. The rafters float for much of the day, then stop and pull spotted knapweed for several hours each day. The pulled knapweed is piled and we monitor the piles for several years. We spot treat skips or re-sprouts from the piles with Tordon* 22K herbicide in backpack sprayers. This is a pilot program on the main Salmon River to see how much we can involve conservation groups. We provide the food, boats, and rely on volunteer boatmen for raft supervision. If successes continue, similar hand-pulling ventures may be expanded to other areas of the wilderness.

Chemical Control Methods:


In 2002 more than 3,745 acres of the three target weeds were inventoried and 3,216 of these acres were sprayed with herbicides. Because it is wilderness and no motorized vehicles are allowed, Lyman says they are using all backpack or horse pack sprayers. Much of the treatment work is contracted with the remainder handled by Forest Service crews.

Spotted knapweed, rush skeletonweed and sulfur cinquefoil are often treated with Tordon 22K herbicide at a rate of 1 pt./acre. Early in the season, 2,4-D is mixed with the Tordon 22K at a rate of 2 pt./acre. R-11 surfactant and blue dye are added to increase the effectiveness of the herbicide and to identify sprayed vegetation. These rates require about 10 backpack loads to treat one full acre. They were restricted by their previous EIS to less than labeled rates. However, the

Supplemental EIS may allow spraying with recommended labeled rates. Weeds growing under conifers or shrubs are treated with Transline* herbicide using the same procedures. In riparian buffers Weedar 64 herbicide is used.

The extremely steep terrain and distances from roads coupled with the inherent restrictions dictated by the Wilderness Act have led Lyman and his crews to develop some innovative weed control techniques. In one very steep area, they pumped water from a location outside the wilderness boundary to nearly one half mile into the wilderness to pre-positioned portable tanks. Backpack crews can then refill at these tanks without having to climb down to the river to refill.

And they have outfitted a jet boat to serve as a sprayer nurse station for those sections of the Salmon River that allow jet boat access. The boat carries a 55-gal tank with two 300-ft hose reels. The spray tank containing the mixed herbicide sits inside a larger containment structure and the containers of herbicide concentrate are triple-wrapped and carried in water tight boxes.

“The EIS allows for adaptive management enabling most new sites to be inventoried and treated as they are detected,” Lyman concludes. “When we find a new or expanding older site, we can evaluate from a wide range of control methods and pick the one that fits best. We can demonstrate that we are protecting the resources by slowing and in many instances, stopping the invasive vegetation.” 

Biological Agent Releases

The following insects and biological control agents have been released in the FC-RONR Wilderness Area weed management area:

Spotted knapweed –

Uphora affinis – banded fall fly

Agapeta zoegana – yellow-winged knapweed root moth

Cyphocleonus achates – knapweed root weevil

Larinus minutus – lesser knapweed flower weevil

Metzneria paucipunctella – spotted knapweed seed head moth

Uphora quadrifasciata – lesser knapweed flower weevil

Bangasternus fausti – broad-nosed seed head weevil

Larinus obtusus – blunt knapweed flower weevil

Rush skeletonweed –

Cystiphora schmidtii – gall midge

Eriophyes chodrilla – gall mite

Puccinia chondrilla – rust

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Tordon 22K is a federally Restricted Use Product
Always read and follow label directions.

Invasives Threaten Watershed and Wildlife Habitat

The Green River Watershed east of Tacoma, WA provides water for 300,000 residents; it also creates an invaluable wildlife resource preserved for

future generations. Tacoma Water owns 16,000 acres in the 148,000 acre watershed. The remainder is owned or managed by Plum Creek Timber, Giustina Resources, Hancock Timber, Washington Dept. of Natural Resources, the U.S. Forest Service and the Muckleshoot Indian Tribe. The Bonneville Power Administration (BPA) also maintains a large electrical transmission line corridor easement through the watershed.

The Green River drainage is a municipal watershed providing water for human consumption; therefore the area is closed to the public (except for the U.S. Forest Service acres on the eastern side of the watershed). Only landowners and their employees have access to this acreage. Because most of the watershed is closed, it has evolved into a tremendous wildlife resource over the past two decades (*see Green River Watershed Resources on page 12*). However, scotch broom (*Cytisus scoparius*) and other exotic and invasive vegetation moved into the watershed and nearly destroyed this diverse habitat.

Nearly 90 years ago, 40 head of elk were introduced near the base of Grass Mountain as part of a shipment of 80 elk from Yellowstone National Park. Roosevelt Elk already existed in the area in this first "augmentation" and the consequent timber harvest helped to increase those numbers over time this area. This herd would winter at lower elevations in the power line corridors and open spaces created from historic ranching that occurred for a time in the area. Beginning in 1984, limited elk hunts were allowed in the area as a means of controlling herd numbers and maintaining animal health.

"In 1997, we stopped issuing elk permits because the herd had declined from 600+ to 200 animals," says Lee Kantar, WA Dept. of Fish & Wildlife District Biologist for the area. When scotch broom and other exotics invaded the power line corridors, elk nutrition dropped dramatically and so did calving rates. (While this low

*By Charles Henry
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calf survival and poor nutrition had affected elk numbers, past antlerless elk harvests, predation, and an old age structure have also been implicated.) "But by far the invasion of scotch broom is a major factor reducing the quality and quantity of elk forage especially on winter range and significantly adds to the loss of critical elk habitat," says Kantar.

"The BPA was concerned about the habitat loss, certainly, but we also watched as the broom reduced four service access roadways down to one within the 600-ft right-of-way," Clint Bostwick with BPA explains. "Everything was losing ground to scotch broom including the elk, Tacoma Water, and the BPA." With a funding grant from the Rocky Mountain Elk Foundation and working with Bryan King at Tacoma Power, Bostwick, and Kantar's supervisor, Rocky Spencer, former WDFW District Biologist, began putting out scotch broom control plots in the Watershed. The Muckleshoot Tribe agreed to contribute two test plots and \$5,000 to the effort. The one-half acre plots were divided into chemical treatments, mowing treatments, hand-pulling plots and chain saw cutting removal methods.

"The hand-pulling plots required 240 man-hours per one-half acre, the chain sawing plots required 80 man-hours, the mowing plots about one hour, and the chemical treatments approximately 20 minutes per one-half acre plot. After cutting, backpack crews applied Garlon* 4 herbicide using cut stump and basal applications," explains King. "We also experimented with foliar application of Garlon* 4 or Transline* herbicide and this turned out to be our preferred method."

Bostwick says the Environmental Assessment for their power line corridors dictated spot-treating rather

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(Top Left) The Green River flows through the center of the watershed supplying 300,000 residents. (Above, left to right) Clint Bostwick, BPA, Bryan King, Tacoma Water, and Lee Kantar, WA Dept. of Fish & Wildlife District Biologist. (Above Right) Elk habitat is being restored on the power line corridor as the scotch broom is controlled. (Right) Scotch broom seed pods contain thousands of easily dispersed seeds, one reason the plant is such a terrific competitor with native species.

than aerial or ground broadcast spraying. Since the area is a watershed, they wanted to introduce the least amount of herbicide as possible that would achieve the desired results and Garlon 4 and Transline herbicides accomplished this goal.

To date they have treated nearly 200 acres with Garlon 4 herbicide mixed as a 3-4% solution with water in backpack sprayers. They treat when the broom is in full bloom. When they find broom under tree canopies, they switch to Transline herbicide. "Initially, our control

See "Scotch Broom Controlled" on page 12

“Scotch Broom Controlled”

Continued from page 11

rate was about 70%, but that has increased dramatically the second year as the contract crew's application skills have improved,” King says. “The only re-treating required has been for skips, not for broom plants that were treated and re-sprouted.


“What really pleases us is that the grasses that were being shaded by the scotch broom have flourished, which means we are regaining the elk habitat,” King concludes. “It is a total watershed benefit – we are successfully managing the land for everything, not just water production.”

Green River Watershed Resources

Tacoma Water manages the 231 square mile Green River Watershed that is comprised primarily of forest. There is a 40-mile, 600-ft wide BPA power transmission line corridor through the watershed in addition to several historic ranches with open fields, and active

timber harvesting by several private companies.

The area ranges in elevation from 900 to 5,700 ft. and receives 90 inches of annual precipitation. Built originally for flood control, the Howard Hanson Dam impounds the river in the middle of the watershed. This dam is currently being raised and Tacoma Water will begin storage of municipal water behind the dam in 2006 or 2007, which will raise the summer high pool by 20 ft.. A new pipeline will increase their delivery capability from 70 million gallons per day to 120 million gallons. One side benefit of this expansion will be 42 restoration sites that will replace some of the current open areas that will become flooded. These new sites will create more open spaces for elk than currently exist.

The watershed, which is closed to the public, is an important habit for elk, blacktail deer, blackbear, cougar, bobcats, coyotes, and other small mammals. The area is home to a diversified bird population including bald eagles, ospreys, songbirds, and the common loon, that is rare in Washington. 

Need More Information?

Call **TechLine** at 1-800-554-WEED (9333)

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