TechLine

Information About Invasive/Exotic Plant Management — Spring 2010

Integrated Program Preserves Habitat

Elk Refuge Manages Invasive Plants

By Celestine Duncan
TechLine coEditor

The National Elk Refuge managed by the U.S. Fish and Wildlife Service is located on the edge of Jackson, Wyoming. Established as an elk sanctuary in 1912, it is home to the world's largest concentration of wintering elk and is one of the most visible wildlife refuges in the United States. Visitors can observe the refuge's thousands of wintering elk from their cars or along walking paths just outside the refuge. One of the most popular methods to view and photograph the elk is by taking horse-drawn sleigh or wagon rides among the elk herd. This winter adventure is available to visitors usually from mid-December through early April.

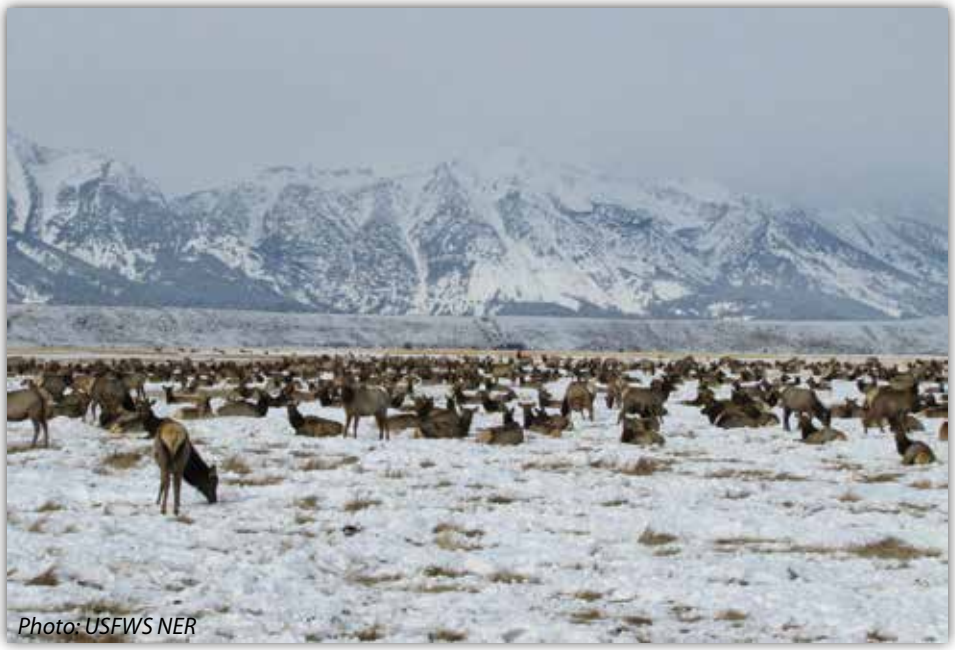

Photo: USFWS NER

Elk feeding in winter range on National Elk Refuge.

Excellent photographic opportunities and high visibility makes the Jackson Hole elk herd one of the most popular attractions in the area. "People in Jackson love wildlife and the Refuge is a great place to see a variety of different species," says Erika Edmiston. Edmiston and Aaron Foster with the Teton County Weed and Pest District, help manage invasive plants on the wildlife refuge in a unique partnership with the U.S. Fish and Wildlife Service.

The National Elk Refuge has a

"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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rich history of wildlife conservation and habitat management. "We view managing invasive plants such as spotted knapweed (*Centaurea stoebe*) and Canada thistle (*Cirsium arvense*) important to protect and preserve wildlife habitat," says refuge manager Steve Kallin. "I'm pleased with the level of management of invasive plants on the refuge, and consistent and accurate record keeping in our partnership with Teton County Weed and Pest District." Kallin has been the refuge manager since 2007 when he transferred from the National Bison Range in Moise, Montana.

The Gros Ventre River corridor forms the northern boundary of the refuge and both the Grand Teton National Park and the Bridger-Teton National Forest. "Although we have some relatively large infestations of spotted knapweed along the Gros Ventre River, the level of invasive plants in most of the rest of the refuge is relatively low," says Kallin. "Our goal is to contain the knapweed to the river corridor and protect our upland sites and meadows from further invasion of this weed and newly invading species."

Each year local Boy Scouts collect elk antlers from the refuge for sale at an annual auction held in May. A percentage of the money generated by the sale goes back to the refuge for habitat management including invasive plant control. The U.S. Fish and Wildlife Service then contracts with Teton County Weed and Pest District to hire, train, and supervise summer employees to manage weeds on the refuge. This arrangement allows refuge employees to concentrate on other aspects of wildlife and habitat management and ensures that invasive plants have consistent, long-term attention. "The people we hire and supervise through our partnership with the refuge spend the entire summer managing invasive plants to meet refuge goals and objectives," says Foster.

The refuge consists of diverse vegetation including grassy meadows and marshes spread across the valley floor, timbered areas bordering the Gros Ventre River, and sagebrush and rock outcroppings along the foothills. This habitat diversity provides a variety of food, water, and shelter that supports the rich mixture of wildlife species found at the refuge. Maintaining and protecting this diversity is an important consideration in managing invasive plants. "We use an integrated approach to manage invasive plants on the refuge," says Foster. "Volunteers hand pull and chop some of the weeds especially in sensitive areas. The trained summer crew uses backpack and ATV equipment to spot treat newly invading weed species, and we have an extensive release program for biological control agents on spotted knapweed, Canada thistle, and musk thistle (*Carduus nutans*) to reduce seed production and impact plant vigor. We hope that the insects in combination with our herbicide treatments will improve overall control. Inventory and mapping is also an important component of the integrated program and helps measure effectiveness of various control methods and develop management strategies."

The highest priority of the program is early detection and complete containment and control of new invaders such as diffuse knapweed (*Centaurea diffusa*) and Russian knapweed (*Acroptilon repens*), and containment of spotted knapweed and Canada thistle. "We have been using Milestone® herbicide to control knapweed and thistle on the refuge since 2006 and are really pleased with the results," agree Edmiston and Foster. "Since Milestone can be used in riparian areas and up to the water edge, the herbicide gave us the flexibility to contain spotted knapweed along the river floodplain and completely control new infestations of Russian, diffuse, and spotted knapweed. We have also been able to protect elk feeding grounds and meadows from Canada thistle invasion by using Milestone." The district is applying Milestone at the label rate of 5 or 7 fl oz/acre and is achieving greater than 90% control on treated sites.

Elk sparing in a meadow.

"Milestone along with our other management efforts helps us reach our invasive plant management goals on the refuge," says Foster.

Each year members of the Jackson Hole Weed Management Association including Teton County Weed and Pest District, Teton Conservation District, U.S. Forest Service, National Elk Refuge, Bureau of Land Management, Jackson Hole Land Trust, National Park Service, private applicators and volunteers partner in a three day invasive plant control effort along the Gros Ventre River. There are up to 30 volunteers that work with federal agencies and local landowners to manage invasive plants along 10 to 15 miles of the Gros Ventre River from the U.S. Forest Service boundary on the north end of the refuge to the Snake River on the southern boundary. Edmiston believes that use of Milestone® herbicide has been a key factor in allowing the refuge to contain knapweed infestations along the river corridor and keep the weed from spreading to upland sites.

The National Elk Refuge works to provide, preserve, restore, and manage winter habitat for the nationally significant Jackson elk herd and habitat for endangered species, birds, fish, and other big game animals, and provide compatible human uses associated with the wildlife and wildlands. Some interesting facts about the National Elk Refuge include:

- The Jackson elk herd was used as a nucleus herd to replenish other elk herds and elk re-introductions across the country.
- The migration of Jackson Hole elk is the longest herd migration of elk in the lower United States.
- It is winter range for the largest bison herd (more than 800) in the National Wildlife Refuge System.
- It is the world's largest wintering concentration of elk with national and international significance.

When settlers arrived in Jackson Hole in the late 1800s, there may have been as many as 25,000 elk in the entire valley. The town of Jackson was built in a large portion of elk winter range. Establishment of farms and ranches further forced elk from their traditional wintering areas. Livestock competed for winter food, and hungry elk raided haystacks. These conflicts between humans and elk diminished the Jackson elk population. In the early 1900s, severe winters with deep, crusted snow also took a serious toll on the wintering elk. The refuge was created in 1912 as a result of public interest in the survival of the Jackson elk herd.

Today the refuge consists of 24,700 acres and provides winter range for 5,000 to 8,000 elk along with habitat and food for wildlife such as bison, wolves, coyotes, big horn sheep and migratory birds. This represents approximately one-quarter of the original Jackson Hole elk winter range. Elk stay on the refuge for approximately six months each winter. Refuge grasslands are managed to produce natural forage for elk through extensive irrigation, seeding, prescribed burning, and other practices. These management practices enhance elk winter habitat, increase resistance of grasslands to weed invasion, and reduce the need for supplemental feeding.

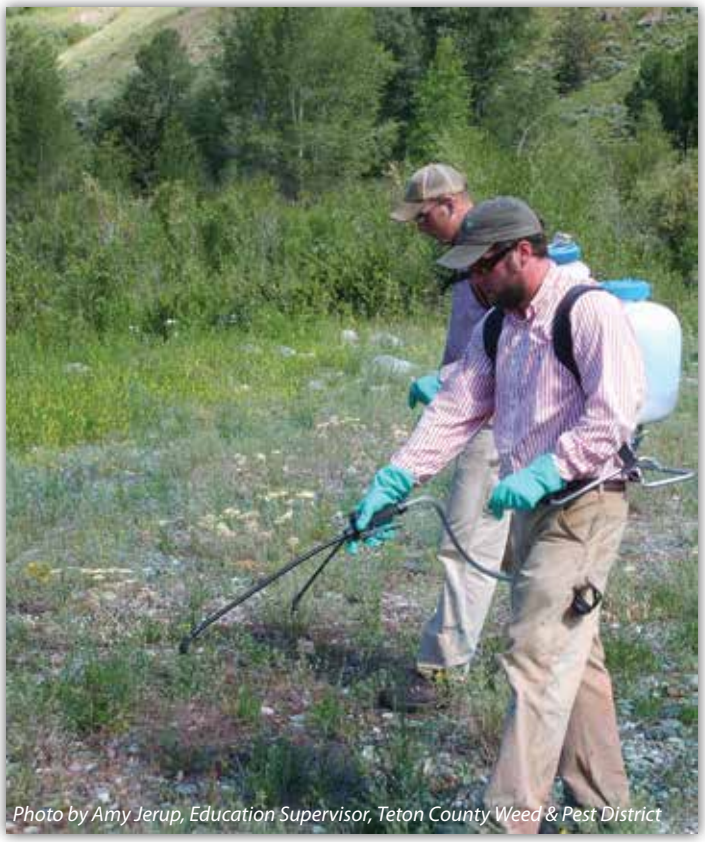


Photo by Amy Jerup, Education Supervisor, Teton County Weed & Pest District

Teton County Weed and Pest District employees treat knapweed in the Gros Ventre River corridor.

Editor's note: This article contains material previously written by Charles Henry, *TechLine* 2007.

Collaboration and Outreach Creates Successful Invasive Plant Program

By Celestine Duncan
***TechLine* coEditor**

Larimer County in Colorado is typical of counties along the front range of the Rocky Mountains. Public lands comprise over 50% of the county, most of which lie within Roosevelt National Forest and Rocky Mountain National Park. Elevations range from about 4,800 feet in river valleys to almost 14,000 feet on mountain peaks.

Added to this geography is a rapidly growing population of about 300,000 residents who are concerned for the environment, but may lack knowledge about natural resource management. Mix in infestations of the knapweeds (*Centaurea* spp.) such as spotted and diffuse, leafy spurge (*Euphorbia esula*), Dalmatian toadflax (*Linaria dalmatica, L. genistifolia*), and Canada thistle (*Cirsium arvense*) along with nine other priority weeds, and management becomes challenging. Add newly invading species such as yellow starthistle (*Centaurea solstitialis*), purple loosestrife (*Lythrum salicaria*), and Mediterranean sage (*Salvia aethiopis*) that are targeted for eradication, and Tim D'Amato's days become pretty lengthy.

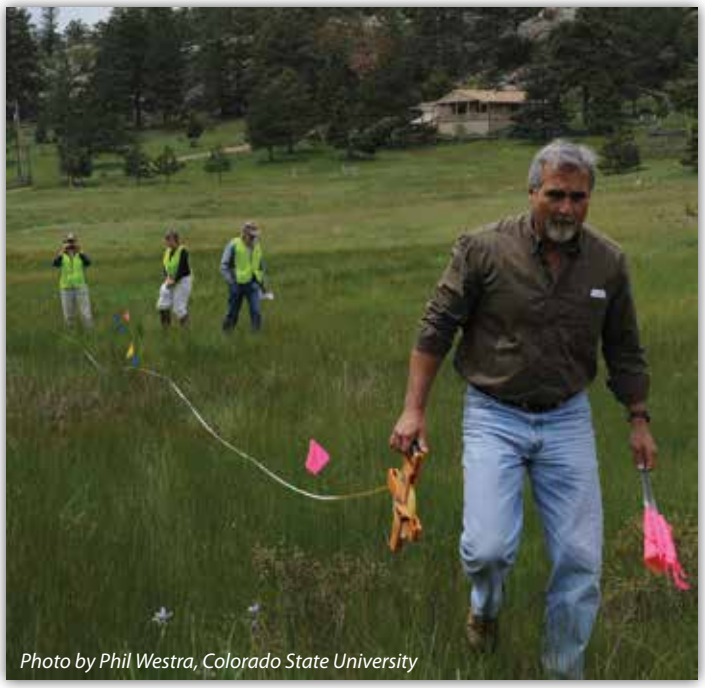
D'Amato has managed the Larimer County Noxious Weed Control Program based in Fort Collins, Colorado for the past three years. Prior to accepting his current position, D'Amato worked for more than 16 years as a research associate in the weed science research programs of Drs. Ed Schweitzer and Phil Westra at Colorado State University.

"Larimer County is one of the largest counties in the state encompassing 2,640 square miles that include some of the finest irrigated farmland in the state as well as vast stretches of scenic ranch lands, forests, and high mountain peaks," says D'Amato. "The southeastern corner is populated by the growing cities of Fort Collins and Loveland, but there are still a lot of open rangeland and wildland areas where noxious weeds can establish and thrive. Larimer County also serves as a gateway to Rocky Mountain National Park with about 3 million visitors a year, so it's important we do our part to protect the Park from invasive plants."

A powerful tool used by D'Amato to build local and state-wide support for his program was to develop a partnership with weed scientists at Colorado State University (CSU). "We are very fortunate to have CSU in our county and can use their expertise and guidance to develop the most accurate management recommendations for invasive plants," says D'Amato. Weed Scientists at CSU share D'Amato's enthusiasm for the collaborative effort. "Tim has a unique professional background that provides him with special insights into long-term weed management strategies required for successful weed management. He is one of the most talented, hard working, creative, and people-oriented people ever to work in my program," says Westra. "Tim always looks to discover and use new weed management tools that will benefit land managers in their efforts to control noxious weeds. His leadership on locating research sites and setting up well conducted field research continues to be a great asset to the weed science program at Colorado State University."

Personal contacts help glue together unique research and outreach partnerships in Colorado.

Larimer County Weed District has cooperative projects on biological control of invasive plants, herbicide field trials and research on degraded site rehabilitation. With reduced funding for some university



Tim D'Amato staking plots with Dr. Phil Westra and local project cooperators in Larimer County, Colorado

Demonstration/research plot showing Canada thistle control with Milestone at 7 fl oz (left) compared to non-treated (right).

and county extension activities, the weed district has filled the void by providing literature and field tours for land managers. "Land owners and managers really enjoy tours of our research and demonstration areas, where they can compare side-by-side treatments on invasive plants," says D'Amato. It also allows D'Amato, his staff, and research partners to stay updated on current technology for managing invasive plants.

Canada thistle is one of the most pervasive weeds in Larimer County, and field trials conducted in cooperation with CSU showed that Milestone® herbicide provided excellent control of the weed. The weed district applies Milestone at the labeled rate of 7 fl oz/acre to control Canada thistle and has achieved excellent control. "Milestone is a good choice for a lot of land managers in our county and they are happy with the results. We have found that we are getting better and more consistent, long term control of Canada thistle compared to treatments we made in the past with dicamba and 2,4-D," says D'Amato. "We are also working on demonstration and research projects to restore degraded sites once invasive plants such as knapweeds and Canada thistle are controlled. Restoring a desirable plant community on degraded lands is a real challenge, but important to stop reinvasion of noxious weeds."

The highest weed management priority in the county is newly invading noxious weeds. The Larimer County Noxious Weed Management Plan requires eradication of all "List A" species—weeds that are not well established in the state. The county receives federal funding through the Interstate Pest Control Compact (IPCC) to support two seasonal employees for six months. These seasonal employees spend half of their time controlling yellow starthistle and half their time controlling other List A species. "We refer to this as our A Team since they target new invaders," explains D'Amato. The seasonal employees are trained and licensed to apply herbicides and spend the summer controlling invasive plants. Most of the control work is with backpack sprayers or physical removal of small infestations. "The majority of infestations are on private lands and we've had a positive response and support from private landowners for this program." There is no charge to landowners for controlling A-Listed weeds.

When they aren't treating weeds, the A Team is working with the public on outreach and education on invasive plants. Crews also monitor high risk areas for invasion such as recreational trailheads and other access sites. "There was a yellow starthistle plant found at a trailhead to Rocky Mountain National Park a few years ago. Luckily it was found and removed before producing seed," says D'Amato.

D'Amato's personal contacts with key landowners, agency leaders, Cooperative Extension, and regional noxious weed researchers helps glue together unique research and outreach partnerships in Colorado. "Tim is able to bring together people of diverse weed management philosophies in a way that creates collaboration rather than division. Tim's warm people management style ensures that the Larimer County A Team actually functions as a team and is highly effective in the ongoing process of weed management in Larimer County," says Westra.

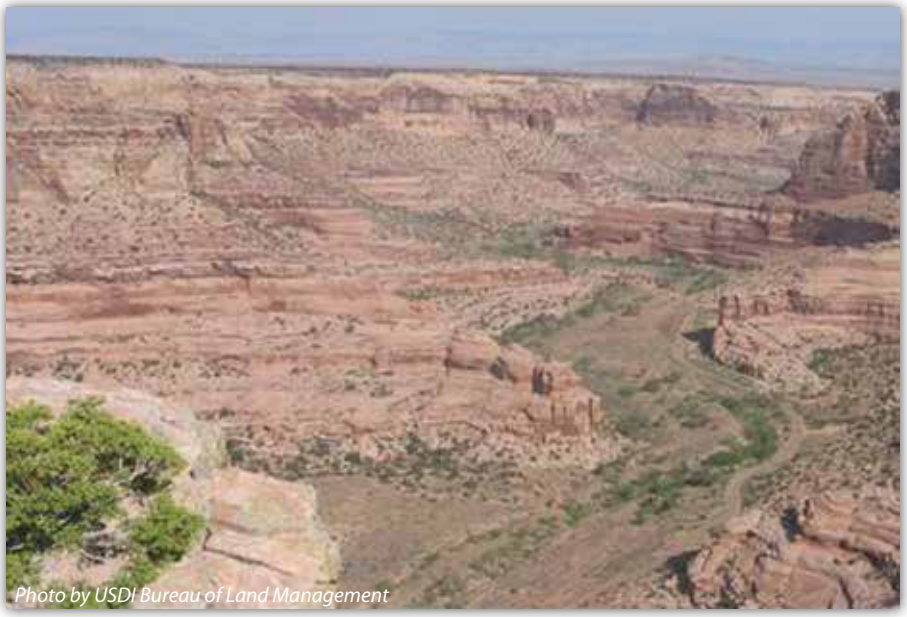
"Our goal in Larimer County is to educate and engage as many people as possible to help prevent introduction and spread of invasive plants in the county," says D'Amato. "The emphasis in our county is to support research, education and outreach rather than enforcement and I believe it is paying big dividends in our program. We still have weeds, but by engaging the public and using science-based results to select the best control option we are containing our larger infestations and stopping newly invading weeds."

Collaboration and Organization is the Key to Success in Managing Tamarisk in Utah Canyons

Scouts Team-up Against Tamarisk

By Celestine Duncan
***TechLine* coEditor**

Once a refuge for outlaws and fugitives, Buckhorn Wash, a long, steep-walled canyon is renowned for its spectacular scenery and extensive Native American rock art. Located in Centra Utah, the canyon serves as the main northern gate-way to the San Raphael Swell, one of the state's fastest growing tourist destinations. The area's canyons, mesas, and buttes also provide critical habitat for rare plant species, desert big horn sheep and other wildlife.



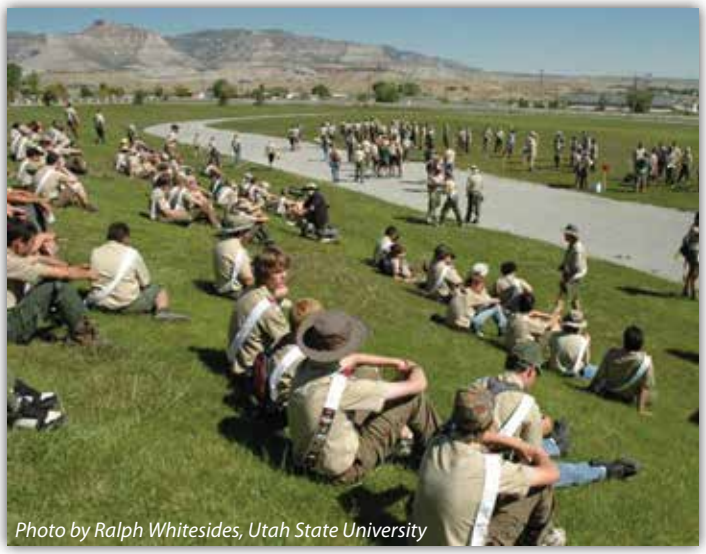
Buckhorn Wash in Emery County, Utah.

The easy access and abundance of scenic, historical, archeological, and recreational resources makes Buckhorn Wash unique. "It is a beautiful area that is rich in history. It contains dinosaur foot prints, pictographs from the Native Americans who once lived there, and is notable for its use by Butch Cassidy and the Wild Bunch in the days of the Wild West," says Dr. Ralph Whitesides, Weed Extension Specialist at Utah State University. "Invasion of tamarisk (*Tamarix ramossisima,* aka saltcedar) in this and other scenic canyons is a real concern to land managers wanting to protect the visual, cultural, and wildlife resources of the area."

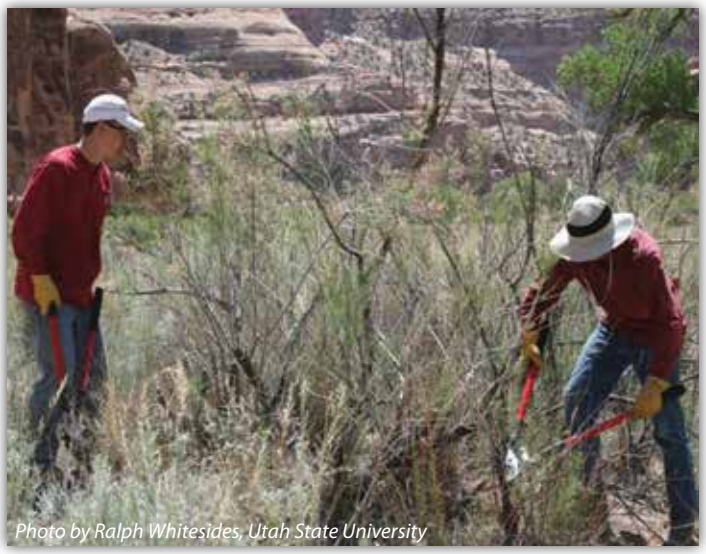
In 2004, land managers with the Manti-LaSal National Forest (USFS) initiated "Push Back the Tammies" a project to control tamarisk in the canyons of Central Utah. They enlisted the aid of the Boy Scouts of America's leadership corps, the Order of the Arrow. To mark their Centennial Celebration, the Scouts accepted the challenge as one of five nationwide service projects, dubbed the ArrowCorps5. "Once the Scouts accepted the project, the USFS contacted us to join the effort," says Karl Ivory, Rangeland Management Specialist with the Bureau of Land Management (BLM) Price Field Office. "There is a lot of tamarisk in our canyons in Central Utah, but we knew that with enough resources we could impact infestations in priority areas like Buckhorn Wash."

Release of the *Diorhabda* beetle for biological control of tamarisk is not allowed on federal lands in Utah, thus mechanical treatments and herbicides are used for controlling the plant. Three canyons were identified for the tamarisk control effort, two on USFS land and Buckhorn Wash on BLM land. "We knew we had a lot of planning to do before the Scouts came to help with the control program scheduled for 2008," explained Ivory. "We worked closely with other city, county, state and federal agencies, and the Skyline Cooperative Weed Management Area (CWMA) to organize the project. One of our first field objectives was to map the infestation using GPS technology so we would know location and distribution of tamarisk and how many acres we needed to treat. We mapped the side drainages of Buckhorn Wash in 2007, and Utah State University mapped the main-stem canyon in 2008. Once we had this information it made it easier to organize resources and materials to implement the control effort." Detailed mapping also allowed agencies to closely monitor results.

The cooperative group tested various herbicides and application methods. "I worked with ArrowCorps5



Scouts were provided training on the first day of the project.



Boy Scouts used pruning sheers to remove limbs from tamarisk plants.

Crews applied Garlon® 4 Ultra in basal oil to the cut stumps. An agricultural dye was added to help crews monitor their progress.

leaders and BLM in Buckhorn Wash in the summer of 2006 and 2007 to determine what herbicide treatments and application methods would be the most effective on tamarisk," says Whitesides. "Our treatments included glyphosate, Habitat™, and triclopyr as Garlon® 4 Ultra (also sold as Remedy® Ultra in some states). Although there was activity on tamarisk from all herbicides, we had the best results with Garlon 4 Ultra which is what we ultimately used in the control program in 2008."

In June 2008 about 400 ArrowCorps5 Scouts from across the United States came to central Utah to join forces with other volunteers. An Incident Command System was established to organize the nearly 560 individuals involved with the control project. Canyon View Junior High School in Huntington, Utah serving as the command center. It also served as the campground for Scouts during the five-day project. Utah State University and agency staff trained Scouts on plant identification and safety in using clippers to cut, remove and scatter tamarisk branches above the high water mark prior to herbicide treatment. Experienced sawyers with USFS and BLM were used to remove larger diameter tamarisk with chainsaws. Licensed herbicide applicators with various agencies and licensed volunteers received training in herbicide application. Since sawyers were leaving 12 to 16 inches of stem above the ground line for treatment, the method they used was a modified cut stump application (similar to a low-volume basal bark application except that the above ground stems are removed) with 25% v/v Garlon® 4 Ultra in basal oil.

In the end, over 46 linear miles of tamarisk was controlled within the three project areas. "What an effort!" says Whitesides. "The commitment of these people was amazing, and they all took home lessons they learned from the project including the value of partnerships, GPS mapping techniques, tamarisk management methods, and a deep appreciation for protecting a resource from invasive non-native plants. This control program would not have been possible if it had not been for the volunteer Scouts. They did a great job, we didn't have any on-site accidents, and we had very successful tamarisk control."

When the control project concluded, tamarisk plants within 13,850 acres of U.S. Forest Service and Bureau of Land Management land had been treated and controlled. "We knew it was critical to follow-up our efforts to see how successful the treatment program was using our volunteers," says Ivory. Utah State University conducted evaluations 60 and 90 days after treatment in Buckhorn Wash and measurements showed 95 to 99%

Tamarisk in Buckhorn Wash prior to treatment in 2008 (left), and one year after herbicide treatment in 2009 (right).

control of tamarisk. The area was remapped in 2009 12 months after treatment to measure changes in acres infested. The 2009 survey found a reduction in total canopy of 97.5%. Re-growth on remaining tamarisk was treated late in the season (mid-October) in 2009 by members of the Skyline CWMA (which includes local, state, and federal partners) using foliar treatments of a 1% v/v solution of Garlon 4 Ultra in water. Treatment of tamarisk re-growth in Buckhorn Wash involved 230 hours in 2009 compared to 9,440 hours in 2008. In September 2009, the Skyline CWMA received the BLM National Rangeland Stewardship Award for their collaborative efforts on the tamarisk control program.

"The BLM is committed to maintaining and expanding the tamarisk control effort in Buckhorn Wash. We have funding for the next four years to continue monitoring and treating re-growth which combined with the excellent control we have now, should ensure long-term success of the project," says Ivory. "We also have interest from the local Boy Scouts to continue this project, and we are expanding our initial control efforts upstream and in high use recreational sites along the canyon. It's a lot easier to expand on this initial project than it is to start in a heavily infested area."

"The greatest benefit from the project was partnerships formed among 22 different state, city, county, and federal agencies that collaborated with the project, and the new and improved relationships that we developed with other people in Utah who are concerned about weeds." Ivory and Whitesides agree. "There was a tremendous educational benefit for everyone that worked on the project. The secondary benefit is that we covered a large area and now we can keep tamarisk in check with a local crew," says Ivory.

Statistics for the 2008 Tamarisk Project

Project Support	Statistic
Supporting city, county, state and federal agencies	22 agencies
Supporting agency hours	6200 hours
Number of supporting agency personnel	110 staff
Total hours of service	17,793 hours

Field Supplies and Materials	
Gallons of herbicide solution applied (premix of Garlon® 4 Ultra and basal oil)	600 gallons
Number of Hudson-type and backpack sprayers	50
Number of neoprene gloves	500 pair
Number of chainsaws	30
Number of chainsaws sharpened (75 per day)	375
Number of chainsaws cleaned (30 per day)	150
Feet of saw chain used	150 feet
Number of chainsaw hours	480 hours

Project Value	
Relative value of service	$ 347,141
Agency funding and grants received for the project	$ 157,000

Tamarisk (salt cedar) and Russian olive foliar control recommendations:

Controlling re-sprouting on tamarisk and Russian olive is important for long-term control. Preliminary research has shown that a tank-mix of Milestone® herbicide with Garlon® 4 Ultra or Remedy® Ultra specialty herbicides will control tamarisk and Russian olive without damage to grasses. Additionally, the tank-mix provides residual control of broadleaf weeds and allows desirable grasses to flourish decreasing potential of tamarisk and Russian olive seedling re-invasion.

Foliar Treatment to Individual Trees or Re-sprouting Plants after Mowing or Cutting

Treatments can be made to small plants or to plants that have re-sprouted. After cutting, mowing, or shredding operations, tamarisk and Russian olive will re-sprout. Wait at least 6 months after cutting to allow time for the plants to regrow and develop adequate leaf area for more herbicide uptake from a foliar application. Apply Milestone at 7 fluid ounces per acre plus Garlon 4 Ultra or Remedy Ultra at 3 quarts per acre with a non-ionic surfactant at 0.25% v/v or 1 quart/acre of methylated seed oil (MSO). When treating individual trees and applying 100 gallons per acre (GPA), mix 7 fluid ounces (0.055% v/v) of Milestone and 3 quarts (0.75% v/v) of Garlon 4 Ultra or Remedy Ultra in 100 gallons of water with 1 quart (0.25% v/v) of surfactant.

This treatment will also control broadleaf weeds such as Canada thistle, musk thistle, Russian knapweed, and many others that may invade the area after cutting. Tamarisk and Russian olive control may not be complete with just a single application. Treated sites will need to be monitored in subsequent years and re-sprouts treated for complete control.

Field tour of Buckhorn Wash: June 3, 2010

Castle Dale, Utah - The tour will provide a great opportunity to review the 2008 cooperative project on tamarisk and results of the 2009 re-treatments. If you are interested in attending the tour please email us at techlinenews@gmail.com to reserve your slot!

2010 Summer TechTours

Tours will include cooperative University research results on invasive plant management with Milestone® herbicide. Email techlinenews@gmail.com if you have questions about the tours or need more information.

June 1 | Tintic Junction, UT. *Squarrose knapweed control will be the focus of this tour. Sites where operational applications have been made will be reviewed along with research trials by Utah State Univ., Jerry Caldwell , Tooele County Weed Dept. and Squarrose CWMA.*

June 3 | Castle Dale, UT. *This tamarisk (salt cedar) control project is an excellent example of a cooperative volunteer project that controlled tamarisk along 46 miles of scenic canyons. The project involved 22 city, state, county and federal agencies partnering with the Order of the Arrow, Boy Scouts of America. Leaders: Dr. Ralph Whitesides, Utah State Univ.; James Nielsen, Emery Co. Weed Dept.; and Mike Johnson, Skyline CWMA.*

June 22 | Missoula, MT. *The tour will focus on field research including: forb tolerance to herbicide applications with Peter Rice, Univ. of Montana; controlling spotted knapweed and cheatgrass with various herbicide mixes, and revegetating degraded sites, with Dr. Jane Mangold, Montana State Univ.*

June 24 | Denver International Airport area, CO. *Field research trials by Drs. Scott Nissen, George Beck and Phil Westra, Colorado State Univ., on Russian knapweed control and revegetation following herbicide applications are focus of the tour. Plus a review of field studies by Dr. George Beck on effects of herbicides on native forbs.*

June 25 | Fort Collins, CO. *Field research trials by Drs. Scott Nissen, George Beck and Phil Westra, Colorado State Univ., on Canada thistle control and revegetation are the focus of the tour. Sites include results of grass tolerance to herbicides at various planting times.*

July 12 (pm) & 13 | Buffalo, WY. **12th:** *Evening BBQ and discussion.* **13th:** *Field tour on tamarisk (salt cedar) and Russian olive management, cheatgrass control, and revegetation of degraded sites with Drs. Tom Whitson, consultant, and Brian Mealor, Univ. of Wyoming.*

July 15 | Scottsbluff, NE. *Russian olive and salt cedar management, revegetation of invaded sites, integrating herbicides and prescribed fire for Canada thistle control, restoration for wildlife use and other weed management topics are the tour focus. Join Dr. Bob Wilson, Univ. of Nebraska and Steve Knode, Platte River Basin Environment and others.*

July 22 | Big Stone City, SD and Ortonville, MN. *Canada thistle control and prairie restoration including forb tolerance to herbicide treatments are the tour focus. Research by Drs. Roger Becker, Univ. of Minnesota and Mike Moechnig, South Dakota State Univ.*

Answers to Frequently Asked Questions about Milestone® Herbicide

CANADA THISTLE

What is the best time to control Canada Thistle?

Spring applications:
For best results it is important that all plants have emerged and basal leaves are expanded. It is too early to apply Milestone herbicide if the thistle is not actively growing or if leaf area is not developed.

It is better to ***wait*** until some of the plants are budding to be sure that all plants are emerged before applying Milestone. Use the labeled rate 7 fl oz/A at later growth stages.

Canada thistle blooms at different times around the Western U.S., mainly due to elevation and moisture differences, so it is more important to plan applications based on the weed growth stage than the calendar.

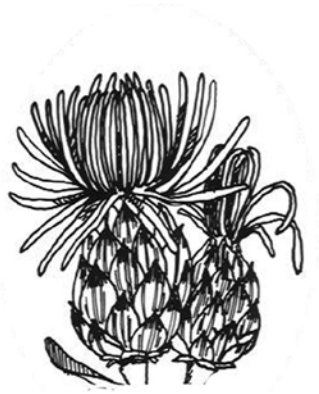
What is the best time to control knapweeds?

Spotted and Diffuse Knapweed:
The application window for treating spotted and diffuse knapweed with Milestone is wider than many herbicide options. In one study Milestone applied at the labeled rate of 5.0 fl oz/acre on spotted knapweed at rosette, bolt, flower (July 26) and fall timings all yielded 100% control when measured one year after treatment. Treatments can begin as soon as the plant is actively growing in the spring. This can be the first weed on your spray list this spring.

Russian Knapweed:
Applications should be ***delayed*** until this weed has bolted and is in the ***early bud to flower stage through the fall*** even after foliage has died from frost. After Milestone® herbicide application to Russian knapweed, the plant does not always show symptoms of efficacy the season the treatment is made. The treated plants are dying and excellent control is achieved by the next growing season.

Do I need to add 2,4-D?

The only time 2,4-D should to be added to Milestone is to broaden the weed control spectrum of weeds not listed on the Milestone label. Adding 2,4-D reduces selectivity of Milestone on non-target forbs.



SPOTTED KNAPWEED

What is the rainfast period?

Foliar absorption of Milestone applied post emergence is relatively rapid. Milestone® herbicide appears to be rainfast within two hours after application when applied at recommended label rates.

How close to water can I spray?

Due to the lack of a groundwater advisory on the Milestone label, applications can be made right up to the water's edge with the following guidelines:

- Do not spray on inner banks of ditches or canals used to transport irrigation water.
- It is permissible to treat non-irrigation ditch banks, seasonally dry wetlands (such as flood plains, deltas, marshes, swamps, or bogs) and transitional areas between upland and lowland sites.

Can Milestone be used in riparian areas?

Yes, with the following guidelines:

- The label restricts applications directly to water (ponds, lakes, rivers, streams and irrigation canals).
- Avoid applications that may result in movement of Milestone into water used to irrigate crops.
- The non-target plant community should be considered.

Adios Amigos... It has been a great ride.

By Charles Henry
Retired *TechLine* Editor

Editing *TechLine* has been a rewarding project for me for the past 20 plus years. It has taken me to interesting places (like Wolf Point and Ekalaka, Montana), but more importantly, I have had the privilege of working with and interviewing hundreds of wonderful people. Put simply, weed folks are the best. I would like to thank everyone for their help, cooperation, and time in making *TechLine* a success.

Photo by Charles Henry
Charles Henry, Ag West Communications

One thing that stands out to me is that even though there will always be work to do, I think the people involved in weed management in the Western states should stand up and take a bow. With their perseverance and talents our Western landscapes, habitats, riparian areas, natural areas, forests, pastures, and ranges are relatively weed-free. With the exception of yellow toadflax and few other persistent species, I think we have implemented successful integrated management on many of our most troublesome weeds.

So in addition to working with all you great people, I would have to say that another reward I have gleaned from *TechLine* is seeing our natural world better off today that it was 30 years ago before we knew what "all the tools in the toolbox" even meant.

Keep up the good work and thanks again.

Editor's Note:

Charles Henry, owner of Ag West Communications and editor of *TechLine* since 1989, decided to retire as editor of the newsletter in December 2009. Charles launched his career in technical journalism as editor of *The Dakota Farmer* shortly after receiving his degree from Colorado State University in 1970. He was a self-employed farmer in Goodland, Kansas for a couple of years, and then moved on as Northwest editor of *Western Hay and Grain Grower* Magazine. He started his private business Ag West Communications in 1978.

All of us that have worked with Charles since 1989 have enjoyed his positive attitude, great work ethic, sense of humor, and appreciate his ability to keep us informed about new ideas and concepts in managing invasive plants. It will be a challenge to fill his shoes as editor of the *TechLine* newsletter. We wish him the best and hope our paths cross in the future.

Techline Editors,
Celestine Duncan and Melissa Brown

Forb and Shrub Tolerance to Milestone Herbicide: Summary Available

A summary of the long-term response of native forbs and shrubs to Milestone is available. Individual rankings of tolerance to Milestone® herbicide were established for 98 native forb species and 19 shrubs. If you would like a summary of the data email techlinenews@gmail.com with "FORB AND SHRUB TOLERANCE" in the subject line.

TechLine
c/o Weed Management Services
PO Box 1385
Helena, MT 59624

Invasive Plant Management Tips by Email?

Sign up for TechNotes

To receive helpful and timely tips for invasive plant management, send an email to techlinenews@gmail.com with "SUBSCRIBE TO TECHNOTES" in the subject line. You will begin receiving TechNotes periodically.

TechLine *by Email?*

Give us some feedback: complete a survey

We are considering changing to an electronic version of *TechLine* newsletter and would like your input and advice. Hardopy? Email? Don't care? Be sure to let us know your preference by returning the enclosed survey card.

Need More Information? | **email techlinenews@gmail.com**

The goal of *TechLine*™ newsletter is to share new, innovative and proven invasive exotic vegetation management research and successes between federal, state, county, private, and conservation organization weed managers. *TechLine* is published and distributed free of charge to both public and private land managers and interested publics in the United States and Canada.

The complete texts of abridged versions of articles in *TechLine* are available in their entirety on request. Comments, suggestions, and articles are welcome and should be emailed to techlinenews@gmail.com.

TechLine is sponsored by Dow AgroSciences, LLC in hopes of providing an objective communication tool for on-the-ground vegetation managers who face common management challenges so they may share the successes of their programs, techniques, and methods and learn from one another.

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