



FALL 2013

TechLine

INVASIVE PLANT NEWS

INNOVATIVE RESEARCH, SUCCESS STORIES, AND TIPS FOR INVASIVE PLANT MANAGERS

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ONLINE EXCLUSIVES

at techlinenews.com

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NEW! Selecting ATV or UTV Herbicide Spray Platforms for Wildland and Natural Area Management
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ABOUT TECHLINE

TechLine Invasive Plant News aims to provide an objective communication tool for on-the-ground natural resource managers who face common management challenges so they may share the successes of their programs and learn from one another.

Print newsletters are published twice per year and delivered free of charge. This and past issues can be downloaded from www.techlinenews.com.

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COVER PHOTO

60 MILES OF PRISTINE BEACHES surround Santa Catalina Island of southern California.

CATALINA ISLAND CONSERVANCY

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RITA RETIRES



Rita Beard, Invasive Plant Coordinator for the National Park Service, Washington

office, retired the end of August 2013. Rita received her undergraduate degree in Ecology and Biosystematics at University of California at Berkley, and a Master's of Science (MS) in Range and Wildlife Science from Montana State University (MSU), followed by a second MS in Forest and Public Policy from Oregon State University. Rita began her career in invasive plant management with the U.S. Forest Service on the Townsend Ranger District in western Montana. While there she wrote the first Environmental Impact Statement on invasive plants in the United States which allowed use of herbicides to control weeds in wilderness areas. She was the Invasive Plant Specialist for the US Forest Service Washington office before transferring to the National Park Service. Rita's creative ideas, passion and commitment to invasive plant management will be greatly missed! We wish her the best in retirement.



Incorporating Nature's Value and Business

In 2011, The Dow Chemical Company and The Nature Conservancy embarked on a novel collaboration to help Dow and the business community recognize and incorporate nature into business decisions, strategies and goals.

"Large companies need to be able to value the benefits from nature that they depend on — and conversely, conservation needs to understand how to integrate the values of those benefits into business planning," says Michelle Lapinski, director of corporate practices for The Nature Conservancy. For example, investing in natural infrastructure — such as restoring a marsh—could be an innovative approach to sustaining water resources.

Nature provides benefits, often called ecosystem services, which we all depend on. However, our activities can impact nature in ways that limit our ability to rely on them. The collaboration embraces a theory of change that the inclusion of ecosystem service and biodiversity assessment models in business decisions has the potential to produce stronger business performance and improved conservation outcomes.

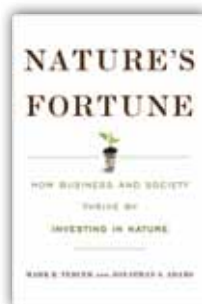
Scientists with The Nature Conservancy and Dow selected Dow's Texas operations in Freeport, Texas and Santa Vitoria, Brazil to serve as "living laboratories". Their objective is to implement and refine models that support corporate decision-making related to the value and resources nature provides. Results will be used to make informed sustainable business decisions at The Dow Chemical Company and hopefully influence the decision-making and business practices of other companies.

This collaboration is an example of how companies and organizations from different sectors can work together to make real change happen.

For additional information regarding the partnership between The Dow Chemical Company and The Nature Conservancy go to:

<http://www.nature.org/about-us/working-with-companies/companies-we-work-with/dow/corporate-partners-dow-intro.xml>

<http://www.nature.org/newsfeatures/pressreleases/the-nature-conservancy-and-dow-announce-collaboration-pilot-site-in-brazil.xml>



Nature's Fortune: How Business and Society Thrive by Investing in Nature, is a "critically important" book from Mark R. Tercek, President and CEO of The Nature Conservancy and science writer and conservation biologist Jonathan S. Adams. Go to www.naturesfortunebook.com for more information.



A DEEPER UNDERSTANDING.
Students tackling complex issues in rangeland management at the 2013 North American Envirothon in Bozeman, MT.



2013 North American ENVIROTHON



Promoting knowledge about natural resource management

BY CELESTINE DUNCAN

Students from 47 states and 10 Canadian provinces gathered in Bozeman, Montana this summer to tackle complex issues in sustainable rangeland management, including invasive plants. As competitors in the North American Envirothon, these young people came to develop a deeper understanding of principles and practices of natural resource management and ecology by formulating complex resource management decisions.

The North American Envirothon was established as a competitive, problem-solving, natural resource event for high school students to challenge them about the environment. The competition is centered on four universal testing categories (i.e., soils/land use, aquatic ecology, forestry, and wildlife) and a current environmental issue. The environmental issue for the 2013 Envirothon was “Sustainable Rangeland Management: Achieving a Balance Between Traditional Agricultural Uses With Non-Agricultural Uses on Montana Rangelands” and includes addressing management challenges such as invasive plants.

The competition broadens the students’ knowledge about a wide range of action strategies involved in solving environmental problems. Thousands of high school students have met the challenge and have come away more informed and concerned about the natural world and their environment. Top ranking competitors receive Canon products, university scholarships, and non-monetary awards.

Sponsors of the 2013 North American Envirothon include Canon USA, Dow AgroSciences, Montana Department of Natural Resources and Conservation, Montana Conservation Districts, Montana Department of Environmental Quality, National Association of Conservation Districts, Natural Resources Conservation Service, and many others.

For more information, visit
envirothon.org or
montanaenvirothon.org



WEBSITE REFRESH

We are proud to announce the launch of our new and improved website. This redesign more effectively brings innovative information to our readers... wherever and however they may be reading. In addition to some general sprucing-up, we’ve added a few new features. The new site is:

OPTIMIZED to view on multiple devices and using any level of Internet connection.

ORGANIZED more logically with articles that can be filtered by category, tag, publication date, and unique keyword searches.

SOCIAL, making it easy to share articles with friends and colleagues.

We encourage you to explore the new site. Although much has changed, all of the resources that we have created over the years are still available.

www.techlinenews.com

>> [READ MORE ABOUT NEW WEBSITE FEATURES at http://bit.ly/18MzEEE](http://bit.ly/18MzEEE)



MORE THAN 76 HIGHLY INVASIVE PLANTS have been introduced to Santa Catalina Island as the result of importing non-native plants as livestock feed and landscaping material. The island supports more than 60 miles of pristine beaches and an array of plant, animal and insect species (left).

MILK THISTLE SEEDLINGS germinate throughout a seven-month period, October to May (top).

Reducing Milk Thistle to Zero Density

Catalina Island Conservancy develops a model for annual weed eradication

BY CELESTINE DUNCAN; DATA AND PHOTOGRAPHS PROVIDED BY TONY SUMMERS

SANTA CATALINA ISLAND, LOCATED ABOUT 22 MILES SOUTHWEST OF LOS ANGELES, CALIFORNIA, IS PART OF THE CHANNEL ISLAND ARCHIPELAGO. The island supports more than 60 miles of pristine beaches and an array of plant, animal and insect species. About 90 percent (42,135 acres) of the island is protected by the Catalina Island Conservancy,

a nonprofit organization established to conserve the island's natural resources through preservation and restoration.

The native plant community is central to the ecosystem of Catalina Island. It provides habitats that offer shelter and food to the Island's endemic animals like the Catalina Island fox (*Urocyon littoralis*) and Catalina quail (*Callipepla californica catalinensis*), and native wildlife such as bald eagles



CATALINA ISLAND CONSERVANCY

TREATING SCATTERED INFESTATIONS of invasive plants in the backcountry of Catalina Island.

“ALTHOUGH ERADICATION ISLAND-WIDE WILL BE DIFFICULT TO ACHIEVE, WE ARE CONFIDENT THAT WE CAN REMOVE THE PLANT FROM OUR BACK-COUNTRY AREA.”

TONY SUMMERS, FORMER INVASIVE PLANTS PROGRAM SUPERVISOR FOR CATALINA ISLAND CONSERVANCY

(*Haliaeetus leucocephalus*) among many other species. Years of importing non-native plants as livestock feed and to landscape homes has introduced more than 76 highly invasive plants to Catalina Island.

Milk thistle (also known as *Silybum marianum*, milkthistle and blessed milkthistle) is an invasive plant on the island that presents a unique challenge for land managers. This winter annual can germinate throughout a seven month period and occurs in remote infestations. Tony Summers, former Invasive Plants Program Supervisor for Catalina Island Conservancy explains. “Milk thistle infests about 43 acres on the island within 257 scattered infestations. We’ve observed milk thistle germinating on the Island as early as October and as late as May, resulting in plants ranging in height from 4 inches to 8 feet tall during the late growing season.”

The Conservancy’s milk thistle control effort historically included hand pulling, mowing, and glyphosate or Garlon®4 Ultra herbicide treatments from April through June.

“We found that hand pulling disturbed the soil seed bank resulting in an increase in milk thistle seedling density, and mowing caused plants to re-sprout. Also, our spring herbicide applications were ineffective because of late-germinating plants, and large mature plants that didn’t receive a lethal dose of herbicide due to leaf overlap,” explains Summers. In 2010, a field study was initiated on the island to develop a more effective treatment strategy that would reduce milk thistle to zero density on Catalina Island.

The new milk thistle treatment protocol included early fall applications of Milestone® herbicide at 6 fluid ounces per acre (fl oz/A). Infested sites were surveyed and Milestone herbicide was applied to newly emerged seedlings. A five-foot treatment buffer was treated around seedlings during application. Herbicide was not applied if seedlings were not visible at time of application. Late-season follow-up treatments were made in May and June on mature plants with a 5 percent solution of glyphosate or 1 percent



Catalina Island Conservancy

The Catalina Island Conservancy founded in 1972 is the oldest and largest private land trust in Southern California. The Conservancy is a leader in conservation programs that protect and restore endangered species and threatened habitats. The Conservancy’s Catalina Habitat Improvement and Restoration Program (CHIRP) goal is to control the spread of invasive plants as well as restore areas that have been cleared of weeds.

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THE CHANNEL ISLAND ARCHIPELAGO extends for 160 miles between San Miguel Island in the north and San Clemente Island in the south. Santa Catalina Island is one of the eight channel islands in Southern California and the only island with a significant permanent human population.

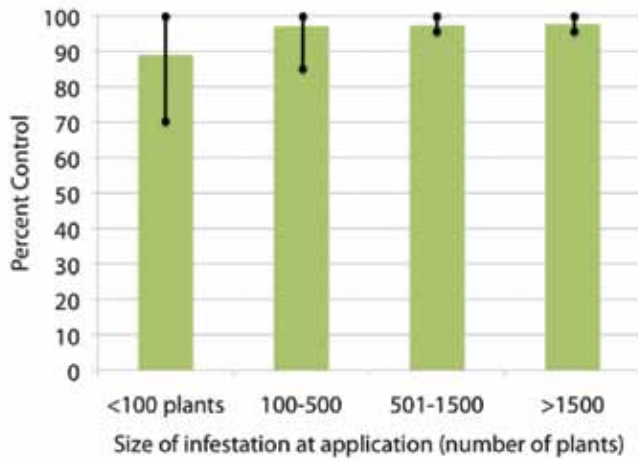


FIGURE 1. PERCENT OF CONTROL OF MILK THISTLE PLANTS within various infestation sizes following a fall application of Milestone herbicide at 6 fl oz/A to seedlings and rosettes. Green bars represent average percent control.

solution of Garlon® 4 Ultra herbicide. Late spring treatments were focused on quickly killing large plants to stop flower production. Flowers that were present on mature plants at application were clipped and buried about one foot deep in soil to prevent seed dispersal and germination.

Results of fall treatments showed that Milestone® herbicide effectively controlled milk thistle seedlings throughout the germination period. Large populations (those with greater than 1,500 plants per site) had a greater average percent reduction (97.7%) compared to smaller population possibly due to more consistent herbicide application (Figure 1). Summers explains, “About half of the milk thistle populations were completely controlled with fall applications of Milestone herbicide. On sites where we didn’t get complete control we had an average of less than 5 percent of the original milk thistle plants to treat in late spring. This saved staff time and resources in our busy spring season. The fall timing also gave us more flexibility and availability of staff resources for the control effort.”

CONCLUSIONS AND BROADER IMPLICATIONS

Results of the field work showed that fall application of Milestone® herbicide to seedlings and rosettes drastically reduced milk thistle density across the treatment area and gave some residual activity on milk thistle. “Applying Milestone early in the season, when there is minimal grass or other vegetation to obstruct the herbicide contacting the soil surface and newly germinated seedlings, was key to achieving a high level of control,” says Summers. “There were only two populations (0.8% of the original infestation) that produced seed in 2012. This puts us on a trajectory toward total eradication of milk thistle from back-country sites on Catalina Island. Although eradication island-wide will be difficult to achieve, we are confident that we can remove the plant from our back-country area. We believe that our current application strategy could be applied to other annual weeds in the Asteraceae family.”

For additional information about this project contact

Tony Summers at chirp.tony@gmail.com or

Grant Powell at GPowell@catalinaconservancy.org.



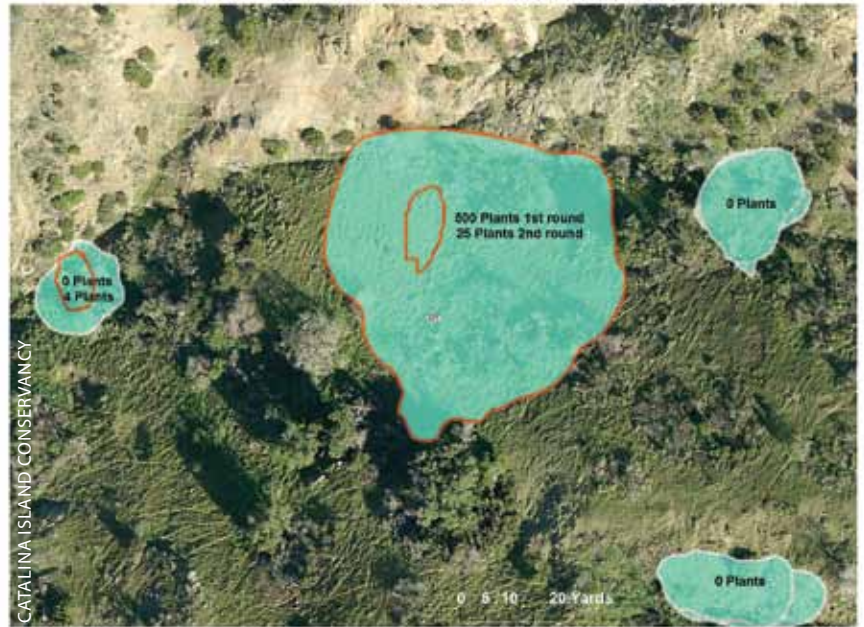
Milk Thistle Identification

Milk thistle grows up to six feet tall, with large, dark green clasping leaves that have distinctive white veins. Leaf margins are wavy and edged in yellow prickles that are roughly half an inch in length. Milk thistle differs from other thistles by the leathery thorn-tipped bracts at the base of each solitary purple flower head. The plant germinates in the fall through early spring and blooms from April to August.

Milk thistle has been used for 2,000 years as an herbal remedy for a variety of ailments, particularly liver, kidney, and gall bladder problems. Several scientific studies suggest that substances in milk thistle (especially a flavonoid called silymarin) may protect and heal damage to the liver. Although a number of animal studies demonstrate that milk thistle can be helpful in protecting the liver, results in human studies are mixed.

China Wall Milk Thistle: 2012 Treatment Results

AERIAL MAP SHOWING INFESTATION BOUNDARIES AND NUMBER OF MILK THISTLE PLANTS TREATED with Milestone® herbicide during fall application (round 1) compared to late season treatments applied in April, 2012 (round 2).



A NEW STRATEGY. Managers found that **mowing caused plants to re-sprout** and hand pulling disturbed the soil seed bank resulting in an increase in milk thistle seedling density (right). **A more effective strategy** was an early fall treatment of seedlings and rosettes with Milestone herbicide and late season (May/June) treatment of mature plants with Garlon® 4 Ultra or glyphosate herbicides (bottom).

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Herbicide products (active ingredients) mentioned in this article include Garlon 4 Ultra (triclopyr), Milestone (aminopyralid).

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Always read and follow label directions.



River to River Cooperative Weed Management Area

Sharing expertise and resources across
jurisdictional boundaries

BY CELESTINE DUNCAN; PHOTOS COURTESY OF KARLA GAGE, RIVER TO RIVER CWMA

KARLA GAGE,
River to River CWMA coordinator

NESTLED BETWEEN THE MISSISSIPPI AND OHIO RIVERS, THE RIVER TO RIVER COOPERATIVE WEED MANAGEMENT AREA (CWMA) ENCOMPASSES ABOUT 2.5 MILLION ACRES IN SOUTHERN ILLINOIS. The CWMA joins 13 federal and state agencies, organizations, and universities whose common goal is to coordinate efforts and programs on invasive plants across 11 counties in southern Illinois.

“The CWMA was formally established in 2006 and is funded completely by grants,” explains Dr. Karla Gage, CWMA coordinator. “Our on-ground efforts are project-driven, so we identify the needs of our partners and write grants for funding to address those needs. To date we’ve raised more than \$900,000 for various weed management projects.” These innovative projects, along with strong leadership, are proving successful for managing invasive plants in southern Illinois.

The River to River CWMA targets 34 invasive plants for management including herbaceous species such as garlic mustard (*Alliaria petiolata*), Chinese yam (*Dioscorea oppositifolia*), Japanese stiltgrass (*Microstegium vimineum*), and teasel (*Dipsacus* spp.); and woody species such as bush honeysuckle (*Lonicera maackii*), Japanese honeysuckle (*L. japonica*), kudzu (*Pueraria lobata*), tree-of-heaven (*Ailanthus altissima*), and Oriental

bittersweet (*Celastrus orbiculatus*). Some of the invasive plants are relatively new invaders, while others like bush honeysuckle and autumn olive (*Elaeagnus umbellata*) are widespread. Management of these species is a combination of public awareness and education; on-ground control efforts within volunteers, strike teams, agencies, and private land managers; comprehensive surveys; and research and demonstration projects.

PRIVATE LANDS ASSISTANCE PROGRAM

The private lands assistance program provides cost-share funding for invasive plant management. “We identify private landowners that need help managing priority invasive plants such as bush honeysuckle, and provide financial incentive for control,” explains Gage. “This program is non-regulatory and completely voluntary for landowners.”

Funding for the private landowner program is from the US Forest Service State and Private Forestry, and US Fish and Wildlife Service - Wildlife and Sport Fish Restoration State Grant programs. Commercial contractors do most of the control work with 25 percent of the cost paid by the landowner and 75 percent by the grant program. Invasive plants targeted in the program are those that are considered major threats to conservation and have the potential to spread rapidly.

Gage explains, “We believe that controlling these infestations on private



RIVER TO RIVER CWMA

River to River CWMA Partners

Illinois Department of Agriculture
Illinois Department of Natural Resources
Illinois Department of Transportation
Shawnee Resource Conservation and Development Area, Inc.
Southern Illinois University at Carbondale
The Nature Conservancy
University of Illinois Extension
USDA Animal Plant Health Inspection Service
USDA Natural Resource Conservation Service
USFS Shawnee National Forest
USFWS Crab Orchard National Wildlife Refuge
USFWS Cypress Creek National Wildlife Refuge
USFWS Middle Mississippi River National Wildlife Refuge

lands will help landowners conserve the resources on their lands, and also benefit the region by removing a seed source and slowing the spread.” Although seven invasive plants are currently targeted in this program, other species can be included upon a situation-by-situation basis.

The CWMA partners also recognized that having the right equipment can help the efficiency and success of any invasive plant project. To meet this need the CWMA has application equipment available for loan to private landowners living within the CWMA, or any conservation organization, Friends group, or land management agency.

STRIKE TEAM SUPPORT

Modeled after the National Park Service’s Exotic Plant Management Team, the Southern Illinois Exotic Plant Strike Team was developed in 2008 by The Nature Conservancy (TNC), in partnership with the Illinois Department of Natural Resources (IDNR), and the USDA Forest Service Northeast Area State and Private Forestry Program. Their mission is to monitor and control invasive plants within the River to River CWMA while keeping detailed management records. The team consists of two plant management specialists working under the guidance of The Nature Conservancy, IDNR biologists and the CWMA Coordinator.

Invasive plants are prioritized for management based on their threat to high-quality natural areas and rare species; size of the target infestations; probability of successful control and potential for restoration; opportunities for public involvement; and commitment to follow-up



THE SOUTHERN ILLINOIS EXOTIC PLANT STRIKE TEAM was modeled after the National Park Service strike team program, with a mission to monitor and control invasive plants within the CWMA. Pictured left, Bruce Henry, former Strike Team member.

monitoring and treatment. Applying an early detection and rapid response approach to invasive species management greatly improves the likelihood that invasions will be controlled while populations are still localized and containable.

“The Strike Team has accomplished an amazing amount of work within the CWMA in the past four years,” reports Gage. “They typically work on IDNR natural areas and parks, with a smaller amount of time spent on federal lands.”

In 2012, the Strike Team used herbicides, mechanical and manual removal to control 3,704 acres of 11 different nonnative invasive plant species. Using The Nature Conservancy’s Weed Information Management System (WIMS), comprehensive time and treatment records were recorded by the Strike Team and will be used to refine future operations and assess treatment success.

INTERN PROGRAM EXPANDS EFFORT

The CWMA participates in a summer internship program sponsored by the Illinois Department of Natural Resources, Southern

CWMA Grant Funding Partners

- USFS State and Private Forestry, Forest Health Protection Program
- USFWS-WSFR State Wildlife Grant
- IDNR Illinois Wildlife Preservation Fund grant programs
- National Fish and Wildlife Foundation - Pulling Together Initiative
- Boat U.S. Foundation
- USDA Forest Service, Northeastern Area
- National Forest Foundation
- Illinois Department of Natural Resources’ C2000



VOLUNTEERS Misty Dodd and Jason Willard remove Japanese honeysuckle vines to release young trees in an oak restoration project at a Green Earth Inc. property (left), and **Dan Stroh and Rob Stroh** carry bags of garlic mustard removed during a control project (right).

COOPERATIVE RESEARCH. Southern Illinois graduate student Lindsay Shupert guides applicator Scott Flynn, research biologist with Dow Agrosciences, by pointing out corners of her sericea lespedeza research plots.

RELATED RESOURCE



WOODY PLANT CONTROL IN NORTHERN PRAIRIES

This updated resource from TechLine features recommendations, methods, and equipment for managing woody vegetation encroaching in northern prairies. Learn about foliar, basal, and cut surface applications as well as technical facts about herbicides used to manage woody plants.

>> <http://bit.ly/woodyplantcontrol>



DAVID GIBSON

Illinois University Center for Ecology, Illinois Nature Preserves Commission, and the Illinois Clean Energy Community Foundation. This nine-week summer internship provides students with the opportunity to learn about invasive species management and research.

“Our most recent spring semester intern, Austen Slone, used data collected from volunteers to develop a strategic control plan for bush honeysuckle in the Trail of Tears State Forest. He also worked on a project to determine which species of invasive plants are being sold online, and if so, whether the plant would be capable of surviving in southern Illinois. Both of these projects are very important for developing future management plans and priorities,” explains Gage. “This program not only helps us, but also gives students practical experience in managing invasive species.”

INVASIVE PLANT RESEARCH AND DEMONSTRATION PROJECTS

One of the goals of the River to River CWMA is to educate and engage as many people as possible to help prevent introduction and spread of invasive plants in southern Illinois.

“As part of the education process, the CWMA is in a unique position to identify and address knowledge gaps in practical

invasive plant management that will benefit our partners and the public,” says Gage. Once a research need is identified, the CWMA often works with researchers at Southern Illinois University to develop a project.

Lindsay Shupert, a graduate student with Dr. David Gibson at Southern Illinois University is conducting a research project on sericea lespedeza (*Lespedeza cuneata*) in the Crab Orchard National Wildlife Refuge. The objectives of her project are: (1) Measure the level of sericea lespedeza control and forb tolerance to varying rates of Garlon® 4 Ultra herbicide, and tank mixes of Garlon 4 Ultra herbicide and Vista® XRT herbicide applied in spring and fall; and (2) determine how supplemental seeding enhances restoration success following herbicide treatment. A split-plot design was used, where half of the treated plot received an early spring seeding of desirable prairie species, and the other half did not receive seeding. Field work is on-going and data analysis will be completed in spring 2014.

Gage explains another research project proposed for 2013. “There is concern among land managers about the risk of exceeding the label application rate when controlling dense stands of woody invasive species with low-volume basal bark applications of Garlon 4 Ultra herbicide. Our new research project seeks to answer two questions: (1) At what stem densities of three woody invasive species (bush honeysuckle, autumn olive, and Oriental bittersweet) are managers at risk of going over the labeled application rate; and (2) Can this risk be minimized by reducing the rate of Garlon 4 Ultra herbicide and adding Milestone herbicide, thus maintaining a label application rate while still achieving optimal control?”

Showing the public firsthand the benefits of controlling invasive plants is also an important component of the program. At the popular Giant City State Park Visitors Center, a three-acre demonstration plot was established next to the Center, with an Illinois Wildlife Preservation Fund grant, to show successful management of invasive woody plants compared to a non-treated adjacent area.

Scott Flynn, research biologist with Dow AgroSciences also worked with the CWMA to establish a demonstration site for management of woody species. “We established plots in the summer of 2012 to demonstrate woody plant control. Low volume basal treatments included

“THE GREATEST
SUCSESSES IN INVASIVE
SPECIES CONTROL WILL
BE BUILT UPON PUBLIC
EDUCATION.”

– KARLA GAGE, RIVER TO RIVER CWMA
COORDINATOR.



STUDENTS FROM THE CARBONDALE HIGH SCHOOL ENVIRONMENTAL CLUB learn about invasive species from Karla Gage on Earth Day in the Park at Giant City State Park.

a 25 percent (%) solution of Garlon 4 Ultra in basal oil and a 20% solution of Garlon 4 Ultra plus 2% Milestone and 78% basal oil. Visual observations one year after treatment indicate excellent (95% or more) control of bush honeysuckle and autumn olive with both treatments. There was a noticeable decrease in the presence of Oriental bittersweet observed, but visual control was more difficult to determine for this species.”

SUMMARY

Partnerships developed through the River to River CWMA are providing a focused, organized effort in invasive species control at the local and regional scale. The CWMA facilitates projects across borders between townships, counties, federal, state, and private lands.

Gage explains her thoughts on the future of the CWMA. “Because of the rich biological diversity of the region, there are many concerned stakeholders

in the conservation effort. Education and outreach is a critical component of the CWMA, and even more emphasis on this is needed—greater outreach, mobilizing more volunteers and training more individuals to recognize invasive species. We believe the greatest successes in invasive species control will be built upon public education. It is critical that individuals learn to appreciate native ecosystem so they fully understand the importance of controlling invasive plants and preventing the introduction of new invasive species.”

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Additional On-going River to River CWMA Projects

Partnership with the Central Hardwoods Invasive Plant Network (CHIP-N) on invasive plant survey

Mermet Lake Curly leaf Pondweed Eradication Program

Southern Illinois Database of Exotic Plant Occurrences

Volunteer Workdays

Aquatic Invasive Plant Boat Ramp Survey

Hydrilla Task Force and Hydrilla Hunt! Program

Illinois Invasive Plant Species Council

The Nature Conservancy’s Weed Information Management System (WIMS):

AN APPLICATION TOOL FOR INVASIVE SPECIES MANAGEMENT

WIMS 3 is a Microsoft Access-based database designed to assist natural resource managers in organizing weed data. WIMS 3 keeps track of three types of data records:

- Weed occurrences (GPS point locations)
- Assessments (size and status of the weed infestation to facilitate monitoring over time)
- Management treatments applied to those weed infestations

Data can be easily exchanged between multiple users, exported in North American Weed Management Association standards, and written to shapefiles for mapping in any standard GIS program. Anyone who is interested in invasive species management can use WIMS 3. The program is available for free to all interested users. However, users need to purchase their own handheld GPS units and software (if desired). For additional information go to <http://www.imapinvasives.org/GIST/WIMS/>

THOSE INTERESTED IN FORMING A CWMA

can download the “CWMA Cookbook: A Recipe for Success” at <http://www.mipn.org/CWMACookbook2011.pdf>.

FOR ADDITIONAL INFORMATION on the River to River CWMA contact Dr. Karla Gage at rtrcwma@gmail.com or go to <http://www.rtrcwma.org/>.



Update: Utah Tamarisk Control Project Gets Results

Strong partnerships and long-term commitment is key to success

BY CELESTINE DUNCAN // PHOTOS COURTESY OF RALPH WHITESIDES

TAMARISK OR SALT CEDAR

dominates plant communities in many riparian and lowland sites in the western United States.

RELATED RESOURCE



SALT CEDAR AND RUSSIAN OLIVE MANAGEMENT

This resource from TechLine features recommendations for managing saltcedar and Russian olive with herbicides. Learn tips and techniques for cut stump, foliar, and low volume basal bark applications. Plus, learn when and how to use Garlon® 3A and/or Garlon 4 Ultra.

>> <http://bit.ly/scro2011>

BUCKHORN WASH, A LONG, STEEP-WALLED CANYON LOCATED IN CENTRAL UTAH, IS RENOWNED FOR ITS SPECTACULAR SCENERY, WATERSHED VALUE, AND EXTENSIVE NATIVE AMERICAN ROCK ART. “Invasion of tamarisk (*Tamarix ramossisima*, also known as saltcedar) in Buckhorn Wash is a priority for land managers tasked with protecting the area’s important resources,” explains Ralph Whitesides, Weed Extension Specialist at Utah State University.

In June 2008, ArrowCorps5 Scouts, volunteers, and city, state, county and federal agencies joined forces to treat over 46 linear miles of tamarisk within three project areas. The five-day project involved a total of 400 Scouts, 110 agency personnel, and 50 volunteers. 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.

Partners in the project realized that long-term management was critical to stop reinvasion of tamarisk. Since the initial effort in 2008, members of the Skyline Cooperative Weed Management Area (CWMA) have conducted an annual monitoring and retreatment program in Buckhorn Wash.

“Ten members of the CWMA spend one day each year applying a 25 percent solution of Garlon® 4 Ultra herbicide mixed with methylated

seed oil to treat tamarisk regrowth within the project area,” says Whitesides. “Their long-term commitment to the project has proven successful.”

Utah State University has periodically measured the status of the control effort since 2008. Results of their evaluations 12 months after treatment showed a reduction in tamarisk canopy of 97.5 percent. In April 2013 (five years after treatment), Whitesides returned to Buckhorn Wash to measure long-term control of tamarisk.

“Our monitoring plan was to evaluate regrowth on 500 tamarisk plants within the project area along 10 miles of the wash,” he explains. “We were prepared to measure and count, but instead found only one tamarisk plant out of 500 that had regrowth. This one plant had six stems ranging in length from eight to 50 inches, equivalent to 99.98 percent reduction in canopy five years following the initial control program. The tamarisk control project in Buckhorn Wash is incredibly impressive in both the level of control achieved and commitment by the CWMA.”

In addition to mechanical and herbicide treatments, the *Diorhabda* beetle (*Diorhabda elongata deserticola*) released on private land for biological control of tamarisk has expanded its population into the Wash. The establishment of the beetle along with continued monitoring and control efforts will help ensure complete control of tamarisk in Buckhorn Wash.

It took great vision on the part of the Skyline CWMA (which included support from Bureau of Land Management, U.S. Forest Service, and the Emery County Weed Program) to recognize and pursue a partnership with the ArrowCorps5 Scouts. The CWMA’s commitment to a long-term monitoring and retreatment program helped assure the high level of control within the project area.



See original article, “Scouts Team Up Against Tamarisk” in TechLine News, Spring 2010, page 6

>> <http://bit.ly/14HLoFp>



RALPH WHITESIDES



RALPH WHITESIDES



RALPH WHITESIDES



RALPH WHITESIDES

SCENES FROM THE FIELD. **NOTICABLE CHANGE** in the Buckhorn Wash landscape is one measure of success observed by locals who are returning to recreate in the Wash where saltcedar has been removed (top left).

SPRAYER CALIBRATION was an important part of volunteer training. Ralph Whitesides, Weed Extension Specialist at Utah State University demonstrates sprayer calibration methods to volunteers (top right).

VOLUNTEERS share a laugh as they set out to search for and treat regrowth from saltcedar plants (bottom left).

FOLLOW-UP EVALUATIONS of the site produced only one tamarisk plant out of 500 that had regrown. Most treated plants looked like this one (bottom right).

Cost of the Tamarisk Retreatment Program in Buckhorn Wash

TABLE 1. Annual and total cost of the tamarisk retreatment program in Buckhorn Wash over a five-year period.

Cost Item	Cost/Year
Labor:	
10 people/1 day (\$88.50/day)	\$ 885.00
Transportation/Equipment:	
5 trucks/446 miles @ \$.56/mile	\$ 250.00
Herbicide:	
Garlon® 4 Ultra herbicide plus Methylated Seed Oil (10 gallons spray solution/year)	\$ 460.00
TOTAL COST PER YEAR	\$1,595.00
TOTAL COST OVER 5 YEARS	\$7,975.00

COST OF RETREATMENT. Whitesides calculated the cost of the tamarisk retreatment program at \$1,595 per year or a total of \$7,975 over the five-year period. Cost assumptions were based on discussion with CWMA members and are shown in Table 1.

Tamarisk canopy within Buckhorn Wash originally encompassed about 11.9 canopy acres with plants scattered within the 13,850-acre project area. Excluding costs of the initial treatment program (\$157,000 agency funding and grants), the cost of follow-up treatment to protect the Wash from tamarisk reinvasion was \$0.58 per acre.

Herbicide product (active ingredient) mentioned in this article include Garlon 4 Ultra (triclopyr).

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Always read and follow label directions.

Bohemian knotweed plant.



CELESTINE DUNCAN

Identification and Management of Invasive Knotweeds

BY CELESTINE DUNCAN

Knotweed Names

The knotweed genus has changed several times from *Reynoutria*, to *Polygonum*, and now *Fallopia*, according to the Flora of North America (2005).

The Flora of North America and TROPICOS taxonomic database both show Himalayan knotweed as *Persicaria wallichii* Greuter & Burdet [Gaskin, J. pers. comm.]

THE INVASIVE KNOTWEED COMPLEX IS A GROUP OF TALL, RHIZOMATOUS, PERENNIAL PLANTS IN THE POLYGONACEAE

FAMILY. Plants range in height from about 5 feet to more than 20 feet. There are four highly invasive species typically included in the complex including Japanese knotweed (*Fallopia cuspidatum*); giant knotweed (*Fallopia sachalinense*); Bohemian knotweed (*Fallopia x bohemicum*), a hybrid between giant and Japanese knotweed; and Himalayan knotweed (*Persicaria wallichii*) [See *Knotweed Names*, left]. Recent genetic studies have found that Bohemian knotweed is the most widespread knotweed in the West [See *Bohemian Knotweed Wins the West*, p. 15].

Identification and Spread

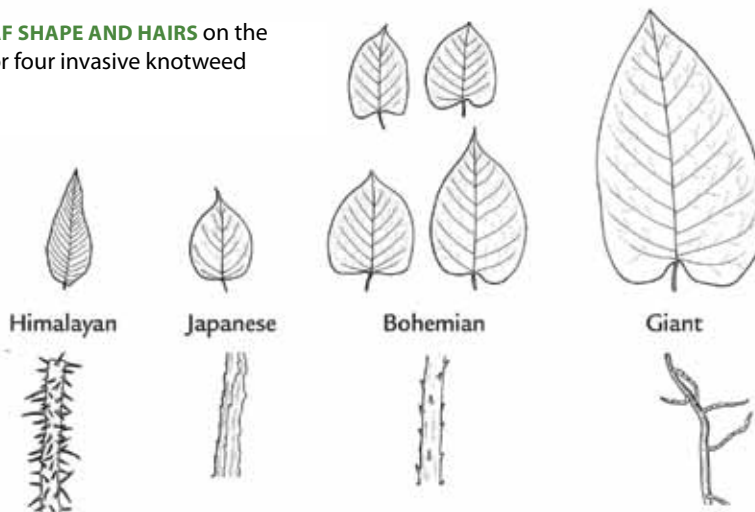
Knotweed is an herbaceous plant producing new shoots each year from rhizomes and crowns. Shoots emerge from mid-spring to late summer and may not be hollow until they mature. Following emergence, plants can grow two to four inches per day. Flowering occurs from August to September, with fruit set beginning in September. Above ground growth (stems and leaves) is not frost tolerant and dies at first frost. Dead canes (stems) often remain upright throughout winter.

The four invasive knotweed species can be distinguished from each other by physical differences summarized in Table 1, and variation in leaf shape and hairs on the underside veins of leaves shown in Figure 1.

TABLE 1. Characteristics of species in the knotweed complex (Adapted from Wilson 2007 and Parkinson and Mangold 2010)

	Giant	Bohemian	Japanese	Himalayan
Plant Size	9'9" to 19'8"	6'6" to 16'5"	4'10" to 8'2"	6'6" to 9'10"
Leaf Size	7.8 to 16" long, 2/3 as wide	2 to 12" long, 2/3 as wide	1 to 4" long, 2/3 as wide	up to 8" long, less than 1/2 as wide
Sex	Perfect and fertile, usually produces seed	Female or perfect, occasionally produces seed	Female or perfect (rare), occasionally produces seed	Perfect and fertile, usually produces seed
Flower Color and Arrangement	Greenish-white to creamy-white in a compact, drooping arrangement	Greenish-white to creamy-white in an erect or loose, drooping arrangement	Greenish-white to creamy-white in a loose, drooping arrangement	Pinkish-white to pink in a loose, spreading arrangement

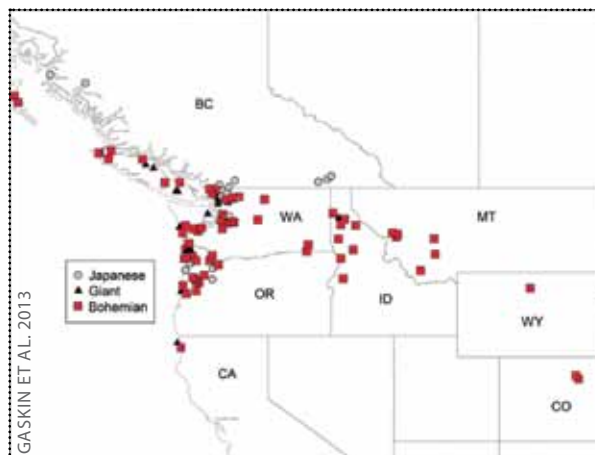
FIGURE 1. VARIATION IN LEAF SHAPE AND HAIRS on the underside veins of leaves for four invasive knotweed species. (Images by Cindy Roche)



Himalayan knotweed leaves are narrow (its width is less than half its length), distinguishing it from giant, Japanese and Bohemian knotweeds, which have leaf widths more than 2/3 their length. The leaf base of giant knotweed is deeply heart shaped compared to the base of Japanese knotweed, which forms a right angle with the leaf stem. Bohemian knotweed's leaf shape is variable and may resemble either parent (giant or Japanese knotweed). Small stout hairs on the underside leaf veins distinguish Bohemian knotweed from the multi-cellular hairs on giant knotweed veins, and the rough ridges (but absence of hairs) on Japanese knotweed veins. A magnifying glass or hand lens is needed to see diagnostic features on leaf veins.

If you find a mystery plant that you can't identify by vegetative characteristics, contact John Gaskin at Sidney, Montana, USDA-ARS (john.gaskin@ars.usda.gov), to discuss whether the plant is candidate for DNA identification.

In all four knotweed species, reproduction is primarily vegetative by rhizome fragments. Movement of fragments occurs when a patch is excavated and moved, or when rhizomes from plants growing along a riverbank break off and float downstream. Even very small fragments that have a node present can regenerate a new plant. Rhizomes have been observed to emerge through two inches of concrete and burial of



Bohemian Knotweed Wins the West

The University of Idaho, Oregon State University, and Washington State University spearheaded the collection of 865 knotweeds from 132 populations across the western United States and Canada. Samples were sent to the USDA-Agricultural Research Service station in Sidney, Montana for DNA analysis. Results of the cooperative study showed that 72% of knotweeds sampled were the hybrid Bohemian knotweed, making it the most common knotweed species in the West. [Gaskin, J. pers. comm]

MAP OF KNOTWEED COLLECTIONS from western North America. Plant Species are indicated by symbols (Gaskin).



CELESTINE DUNCAN

A CUT STEM landing on moist soil or grass can develop root and shoots forming a new plant.

more than three feet. Stem fragments can also serve as a mode of spread. A cut stem landing on moist soil or grass can develop root and shoots forming a new plant. Once a knotweed rhizome fragment, stem section, or seed (least common) lands on a suitable site, the weed can grow rapidly. Underground rhizomes can grow 50 to 65 feet laterally and produce new shoots.

Management

Preventing knotweed establishment is the highest priority for management. Once established, eradication is extremely difficult. Knotweed control efforts will typically require a combination of treatments over multiple years.

HERBICIDE

Dr. Mark Renz, University of Wisconsin conducted field trials near McFarland, Wisconsin to study the efficacy of various herbicide treatments in combination with mowing on Japanese knotweed. Treatment combinations included: 1) mowing once

followed by herbicide treatments in summer; or 2) mowing twice followed by herbicide treatments in fall. Knotweed regrowth was 2 to 3 feet tall at time of application and plots were arranged as a randomized complete block with three replications.

Results of the studies indicate that mowing twice followed three months later by a fall herbicide application provided significantly greater control than mowing once followed by a summer herbicide application applied only six weeks after mowing (Table 2). Milestone® herbicide at both rates applied, and Capstone® herbicide provided excellent control when applied in fall three months after mowing. Arsenal* is a non-selective herbicide which controls both grass and broadleaf plants, so revegetation following application is critical. Maintaining or restoring desirable vegetation on infested sites will reduce the potential for knotweed re-invasion.

Field trials on Bohemian knotweed conducted by Dr. Kim Patten, Washington State University showed that Milestone herbicide at 14 fluid ounces per acre (fl oz/A) provided

MCFARLAND, WISCONSIN

TABLE 2. Percent Japanese knotweed control 10 or 12 months after treatment (MAT) with herbicide and mowing treatments applied in summer or fall at McFarland, Wisconsin.

Treatment	Herbicide Rate fluid ounces/Acre	Application Timing	
		% Control 12 MAT Mow 5/28/2012+Herbicide 7/13/2012	% Control 10 MAT Mow 5/28 & 6/25/2012+ Herbicide 9/12/2012
Milestone® + mowing	9.2	24	85
Milestone® + mowing	13	38	97
Capstone® + mowing	44	39	92
Arsenal + mowing	84	98	91

BEFORE AND AFTER. Japanese knotweed plants were mowed in summer and treated with Milestone herbicide at 13 fl oz/A in the fall (left) when plants were 3 to 4 feet tall. These treatments provided good to excellent control 10 months later (right).



MARK RENZ



MARK RENZ

good to excellent control especially with application volumes of 100 gallons per acre (gpa) or greater (Figure 2) when the plants were 3 to 4 feet tall (earlier in the season than the typical timing with other herbicides). Multiple applications will be necessary to provide long-term control.

IN SUMMARY, optimum suppression of invasive knotweeds with Milestone® herbicide is obtained when applications are made to plants that are at least 3 to 4 feet tall. Results of field trials conducted in the western United States indicate that high volume applications (100 gpa or greater) of Milestone herbicide at 7 fl oz/A or a spot treatment rate up to 14 fl oz/A¹ applied in summer will provide good control of invasive knotweeds.

In the upper Midwest, mowing in summer followed by fall application of Milestone herbicide (prior to frost) provided the best control. Infestations of invasive knotweed that are mowed should be allowed to regrow to at least 3 feet in height prior to herbicide treatment. Monitoring and follow-up herbicide treatments on regrowth will be necessary to control resprouts and achieve long-term control.

MECHANICAL, MANUAL AND CULTURAL

Stem cutting, mowing, and digging are effective on small, newly established infestations. These methods must be repeated at least three times during the growing season and continued for more than three years for successful control. Tillage is not effective and will increase spread of root or stem fragments that can start new plants.

Covering plants with heavy black plastic or other barrier can be used on

small infestations. The covering must be left in place for more than one year. Rhizomes may remain dormant for up to 20 years, so the lack of regrowth in years following removal of the covering does not mean the plant is dead, and regular monitoring is required. Livestock will graze young shoots of the plant and intensive grazing may reduce density and competitive ability of the plant.

Long term monitoring and follow-up treatment is necessary for many years to eradicate invasive knotweeds.

Infestations that are successfully controlled should be revegetated with appropriate species if desirable vegetation is not returning naturally.

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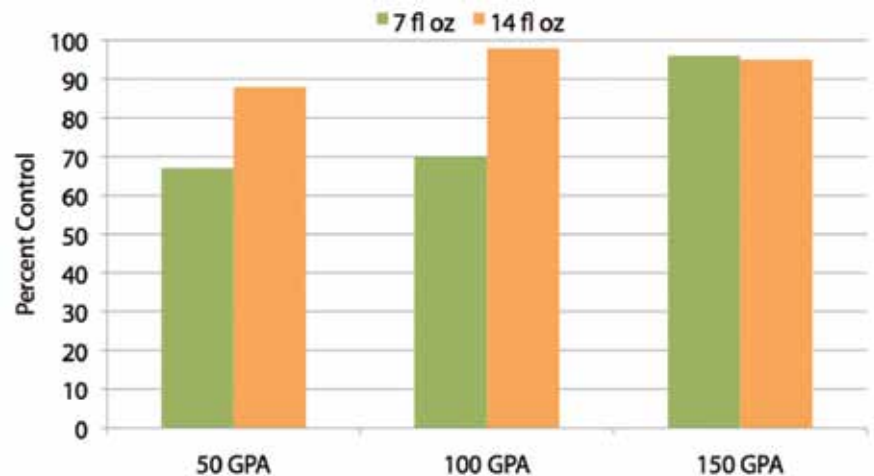
Herbicide products (active ingredients) mentioned in this article include Milestone (aminopyralid), Arsenal* (imazapyr), and Capstone (aminopyralid+triclopyr amine).
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FIGURE 2. BOHEMIAN KNOTWEED CONTROL WITH MILESTONE® HERBICIDE at 7 and 14 fl oz/A at three application volumes. Herbicides were applied to knotweed in late May (3 to 4 foot plant height), and data shown is about 6 months following treatment.



¹Milestone may be applied as a spot treatment rate of 14 fl oz/A per growing season; however not more than 50 percent of an acre can be treated at this rate.

Additional information on identification, biology, and management of invasive knotweeds is available at:

<http://msuextension.org/publications/AgandNaturalResources/EB0196.pdf>

http://www.for.gov.bc.ca/hra/Publications/invasive_plants/Knotweed_key_BC_2007.pdf

Research Studies Support Aquatic Labeling of Aminopyralid

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NOTE: INFORMATION IN THIS ARTICLE WAS PRESENTED AT THE WESTERN SOCIETY OF WEED SCIENCE ANNUAL MEETING IN SAN DIEGO, CA IN 2013. AN ABSTRACT IS AVAILABLE AT [HTTP://WWW.WSWEDSCIENCE.ORG/SECURE/EDITOR/PROCEEDINGS_ARCHIVES.ASP](http://www.wswedscience.org/secure/editor/proceedings_archives.asp)

DENNIS PEDERSON

Aminopyralid is the active ingredient in several herbicides used for invasive plant control.

It is currently registered in products such as Milestone[®] herbicide, or mixed with other active ingredients such as triclopyr or 2,4-D (for example, Capstone[®] herbicide, PasturAll[®] herbicide, GrazonNext[®] HL herbicide, or ForeFront[®] HL herbicide).

The current labels for these products allow treatment of invasive plants growing on many sites including those near water, such as non-irrigation ditch banks, seasonally dry wetlands (flood plains, deltas, marshes, swamps, or bogs), and transitional areas between upland and lowland sites. Although aminopyralid-containing herbicides can be used to the water's edge, the herbicide label does not allow for applications directly to water.

An aquatic registration would expand the utility of aminopyralid-containing herbicides by allowing control of

invasive or other weedy plants along shorelines, and on banks of ponds or moving water sites. The new label would not include control of submersed aquatic plants; however it will expand uses to sites currently covered under the National Pollutant Discharge Elimination System permit requirements.

Field research trials were initiated in ponds and flowing water systems to gather data to support the addition of aquatic uses to aminopyralid product labels. Research was designed to establish food tolerances for fish, shellfish and crustaceans, and define herbicide dissipation in water and sediment over time.

POND RESEARCH STUDIES

Studies were conducted in Texas and Indiana on ponds that ranged in size from 0.4 to 0.7 surface acres, and averaged about five feet deep (Figure 1). Milestone herbicide at 7 fluid ounces per acre (fl oz/A) was applied on the pond banks, with over-spray into adjacent water. Applications were made on June

24, 2010 in Texas, and July 7, 2010 in Indiana. Water and sediment samples were collected prior to application and periodically over 120 days following application (Table 1). Dissipation of aminopyralid was calculated from residues in water and sediment samples.

Caged organisms including catfish, bluegill sunfish, and fresh water clams were collected prior to and following application. Analysis provided data on the amount of aminopyralid in the tissue of aquatic organisms, and whether residues were at levels that would harm animals consuming the organisms.

RESULTS OF THE POND STUDY indicated that there was rapid dissipation of aminopyralid with more than 99 percent of the applied herbicide dissipating within 120 days following treatment. No residue was measured accumulating in water, sediment or aquatic organisms.

FLOWING WATER RESEARCH STUDIES

Dissipation studies in a flowing water system were established near Blodgett,

TABLE 1. Number and type of samples collected and analyzed in two pond studies (Texas and Indiana) and two flowing water body studies (Oregon and Florida).

Type of Sample	Number of Samples Collected	
	POND STUDIES	FLOWING WATER STUDIES
Water	800	500
Sediment	150	100
Animal (fish, crayfish, crustaceans)	75	80

Oregon and in Lake County, Florida. Milestone® herbicide at 7 fl oz/A was applied along the stream bank and over adjacent water on April 20, 2011 in Oregon and June 22, 2011 in Florida. The treated area was 225 feet long and 15 feet wide, encompassing 12 feet of soil/vegetation on the stream bank, and 3 feet beyond the edge of the stream bank (over vegetation in water and/or directly over water) (Figure 2 and 3). Absorbent pads were used to observe the herbicide application pattern (Figure 4). The total number of water, soil, and sediment samples that were collected and analyzed is shown in Table 1.

RESULTS OF THE FLOWING WATER DISSIPATION STUDIES (120-day study period) indicate that dilution was the major route of dissipation in the Oregon research site. Dissipation to non-quantifiable levels within the treated plot was reached in less than two hours following application. At the Florida research site, degradation was the major route of dissipation. Transport of aminopyralid from the treated area was significantly slower in Florida compared to the Oregon location; however, dissipation to non-quantifiable levels was similar (a few hours following application). Sporadic detections of the herbicide were found 1,175 feet downstream at 37 minutes following application in Oregon, and 335 feet downstream from the application area at 2 hours and 13 minutes following application in Florida.

CONCLUSIONS

Data collected in the pond and flowing water field research trials were used in registration submissions to the Environmental Protection Agency in November 2012 to support aquatic uses for Milestone herbicide, GrazonNext® HL herbicide, ForeFront® HL herbicide, Capstone® herbicide, and PasturAll® herbicide. Registration will support use of these products for invasive or other weedy plant control on shorelines, and stream or river banks. Following approval, labels are NOT expected to have restrictions on recreational or livestock use of water after applications. Use will NOT be permitted on the inside banks of irrigation ditches or for submersed aquatic plant control. Precautions and restrictions on use of water treated with Milestone for irrigation will likely be included on the new label. Registration is anticipated for the 2014 use season. Although the cost of these studies is substantial (\$300,000 for the pond studies and \$200,000 for flowing water studies), it shows Dow AgroSciences commitment to supporting responsible use of aminopyralid-containing products for invasive plant management.

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FIGURE 1: POND STUDY SITE at the US Army Corps of Engineers Aquatic Plant Control Research Center.



FIGURE 2: DIAGRAM of herbicide application and sampling in flowing water dissipation sites.



FIGURE 3: HERBICIDE APPLICATION at the Oregon flowing water research site. Total width of the application pattern was 15 feet, with 12 feet over soil/vegetation and 3 feet past the edge of stream bank (over vegetation in water and/or directly over water).

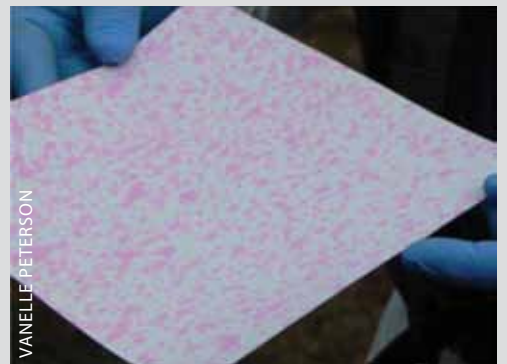


FIGURE 4: APPLICATION PATTERN using Hypro XT010 boomless nozzle for the flowing water studies.



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Selecting ATV or UTV Herbicide Spray Platforms for Wildland and Natural Area Weed Management

We asked 10 public and private invasive plant management professionals which ATV and UTV herbicide application platforms they recommend and why. Learn about the equipment they endorse based on experience. >><http://bit.ly/atvutvplatform>



CELESTINE DUNCAN

Boots on the Ground: Volunteers Unite to Protect Greater Yellowstone Area

More than 70 invasive plant managers representing a dozen agencies from three states gathered in early August to protect the Greater Yellowstone Area from noxious weeds. >><http://bit.ly/gycc2013>



CELESTINE DUNCAN

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